

परिशिष्ट – XII

SYLLABUS FOR MEDICAL LABORATORY TECHNICIAN/ ABG TECHNICIAN

(A) Fundamentals of Physiology & Basics of Biochemistry

Fundamental of Physiology

General outline along with the functional anatomy of various body systems

1. Cell: Structure & function
2. Tissue: Epithelium, Connective, Sclerous, Muscular & Nervous
3. Blood: Blood cells, Hemoglobin, Blood groups, Coagulation Factors, Anemia & Immunoglobulins
4. Cardiovascular system: Heart rate, cardiac cycle, cardiac output, blood pressure, hypertension, radial pulse, Measurement of pulse, blood pressure, Auscultation for Heart Sounds.
5. Respiratory System: Ventilation, Functions, Lungs Volumes and capacities
6. Gastrointestinal System: Process of digestion in various parts
7. Endocrinology: Endocrine Glands, Hormones - Their secretion and functions
8. Excretion system: Structure of nephron, Urine formation
9. Central Nervous System: Parts, Sliding Filament Theory, Neuromuscular Junction, Wallerian Degeneration, Motor Nervous system, Sensory nervous system, Sympathetic Nervous system, Parasympathetic nervous system
10. Reproductive System: Male and Female reproductive systems
11. Skin: Structure & Function
12. Muscular System : Classification of muscles & their functions
13. Special Senses : Eye & ear (in brief)

Basics of Biochemistry

1. Introduction to Apparatus, Chemical Balance: Different types, Principles and Practice.
2. Concepts of Molecular weight, Atomic weight, Normality, Molarity, Standards,
3. Atomic structure, Valence, Acids, Bases, Salts, & Indicators.
4. Chemistry of carbohydrates & their related metabolism: Introduction, definition, classification, biomedical importance & properties.
5. Brief outline of metabolism: Glycogenesis & glycogenolysis, Glycolysis, Citric acid cycle & its significance, HMP shunt & Gluconeogenesis, regulation of blood glucose level, Hyperglycemia & hypoglycemia, Diabetes mellitus - definition, types, features, gestational diabetes mellitus , glucose tolerance test, glycosurias, Hypoglycemia & its causes
6. Amino acids: Definition, classification, essential & non essential amino acids.
7. Chemistry of Proteins & their related metabolism: Introduction, definition, classification, biomedical importance.
8. Metabolism: Transamination, Decarboxylation, Ammonia formation & transport, Urea cycle, metabolic disorders in urea cycle, catabolism of amino acids especially Phenylalanine, Tyrosine & Tryptophan, Creatine, Creatinine, Proteinuria.
9. Chemistry of Lipids & their related metabolism: Introduction, definition, classification, biomedical importance, essential fatty acids.

10. Brief outline of metabolism: Beta oxidation of fatty acids, Fatty acid synthesis, Ketosis, Cholesterol & its clinical significance. Lipoproteins- composition & functions, Fatty liver & Atherosclerosis.
11. Chemistry of Nucleic acids: DNA Structure and function, RNA Types: Structure and function.
12. Vitamins: Fat & water soluble vitamins, sources, requirement, deficiency disorders & biochemical functions.
13. Enzymes: Introduction, definition, classification, coenzymes, isoenzymes, properties, factors affecting enzyme action, enzyme inhibition, diagnostic value of serum enzymes

(B) Hematology & Clinical Pathology

Hematological Disorders

1. Classification of Anemia (Morphological & etiological), Definition, causes, classification & lab findings of Iron Deficiency Anemia, Megaloblastic Anemia, Hemolytic Anemia
2. Bone Marrow : Cell composition of normal adult Bone marrow
3. Leukemia: Classification, Blood Picture, Differentiation of Blast Cells.

Basic Hematological Techniques

1. Blood collection
2. Anticoagulants used in Hematology
3. Normal values in Hematology
4. Basic Hematological Techniques: RBC count, Hemoglobin estimation, Packed cell volume.
5. Calculation of absolute indices: WBC counts-Total and differential, Absolute eosinophil count, Platelet count, Erythrocyte sedimentation rate, Reticulocyte count
6. Preparation of blood films
7. Stains used in Hematology
8. Morphology of red cells
9. Morphology of Leukocytes and platelets
10. Bone marrow: Techniques of aspiration, preparation and staining of films, Bone marrow biopsy
11. Laboratory methods used in the investigation of anemia.

Clinical Pathology

1. Urine examination: Physical, Chemical & Microscopic
2. Examination of body fluids, cell counts
3. Semen analysis
4. CSF (Cerebrospinal Fluid)
5. Stool Examination.

(C) General Microbiology

1. Introduction & History of Microbiology

Development of microbiology as a discipline, Contributions of Anton von Leeuwenhoek, Louis Pasteur, Robert Koch, Joseph Lister, Alexander Fleming, Edward Jenner.

2. Microscopy

Study of compound microscope-magnification, numerical aperture, resolution and components of microscope, different types of microscopy-Bright field microscope, Dark field microscope, Phase contrast microscope, Electron Microscope-Transmission & Scanning Electron Microscope, Precautions and care of microscope

Bacteria

1. General characters and classification.
2. Morphology: Shape, Capsule, Flagella, Inclusion, Granule, Spore.

Growth and Maintenance of Microbes

1. Bacterial division, Batch Culture, Continuous culture, bacterial growth- total count, Viable count, bacterial nutrition, oxygen requirement, CO₂ requirement, temperature, pH, light.

Sterilization and Disinfection

1. Physical agents- Sunlight, Temperature less than 100°C, Temperature at 100°C, steam at atmospheric pressure and steam under pressure, irradiation, filtration.
2. Chemical Agents- Alcohol, aldehyde, Dyes, Halogens, Phenols, Ethylene oxide.

Culture Media

1. Definition, uses, basic requirements, classification, Agar, Peptone, Transport
2. Media, Sugar Media, Anaerobic Media, Containers of Media, Forms of Media

Staining Methods

1. Simple, Grams staining, Ziehl-Nelsen staining or AFB staining, Negative Impregnation

Collection and Transportation of Specimen

1. General Principles, Containers, Rejection, Samples- Urine, Feces, Sputum, Pus, body fluids, Swab, Blood.

Care and Handling of Laboratory Animals

1. Fluid, Diet, Cleanliness, Cages, ventilation, Temperature, Humidity, handling of animals, Prevention of disease.

Disposal of Laboratory/Hospital Waste

1. Non-infectious waste, infected sharp waste disposal, infected non-sharp waste disposal.

Nosocomial Infections/ Hospital Acquired Infections (HAI)

1. Causative methods, transmission methods, investigation, prevention and control of Hospital Infection

(D) Clinical Biochemistry

Photometry

1. Definition,
2. Laws of photometry, absorbance, transmittance, absorption maxima,
3. Instruments,
4. Parts of photometer, types of photometry—colorimetry, spectrophotometry,
5. Flame photometry,
6. Fluorometry, choice of appropriate filter,
7. Measurements of solution,
8. Calculation of formula, applications.

Water & Mineral Metabolism

1. Distribution of fluids in the body,
2. ECF & ICF,
3. Water metabolism, dehydration,
4. Mineral metabolism, macronutrients (principal mineral elements) & trace elements.

Acid base balance concepts & disorders

1. Concepts of Acid Base reaction and hydrogen ion concentration. pH meter & pH buffer.
2. pH, Buffers, Acidosis, Alkalosis

Organ Function Tests

1. Liver Function Tests, Renal Function Tests,
2. Thyroid function tests and Pancreatic Function tests

Cardiac Profile

1. Hypertension, Angina, Myocardial Infarction,
2. Pattern of Cardiac Enzymes in heart diseases.

Diabetic Profile

1. Regulation of Blood Glucose,
2. Glucose tolerance test,
3. Glycosylated Hemoglobin,
4. Microalbuminuria etc.

Endocrinology

1. Classification of hormones;
2. Regulation and general mechanism of action of hormones;
3. Pituitary gland & hypothalamus;
4. Hormones of the Anterior Pituitary, neurohypophysis,
5. Thyroid gland,
6. Adrenocortical hormones, Adrenal medulla,
7. Gonads & Pancreas.

(E) Histopathology & Cytology

1. Introduction to Histopathology, Exfoliative cytology.
2. Basic steps for Tissue Processing: Fixing, Embedding, Microtomy, Staining, Mounting, methods of decalcification.
3. Laboratory requirements for Histopathology & Cytology: Chemicals & Reagents
4. Equipments - Microscope, Microtome: Types, Uses, Parts, different types of microtome knives, care & maintenance. Automated tissue processor - components, working & precautions during use, Tissue floating bath.
5. Staining Methods
 - a) Hematoxylin & Eosin stain,
 - b) Reticulin stain
 - c) PAP staining
6. Museum Techniques
 - a) The mounting of pathological specimens: Introduction, Preparation of specimen, Fixation of specimen
 - b) Precaution taken for the Fixation of Specimens.
 - c) Storage of Specimens.
 - d) Mounting of Museum Specimens.
 - e) Routine Mounting of Specimens.
 - f) Filling and Scaling.

(F) Immunology, Serology & Parasitology

Immunology & Serology

1. Immunity - Definition and classification, General Principles of Innate & Acquired Immunity.
2. Immune Response - Humoral immunity & cell mediated immunity.
3. Antigen - Definition, classes, properties.
4. Antibodies/Immunoglobulins - Definition, Properties, Sub types of Immunoglobulins, Introduction of hybridoma technology, monoclonal antibodies, polyclonal antibody
5. Antigen/Antibody Reaction/ Serological Refractions
6. Features of antigen/antibody Reaction- Precipitation, Agglutination, ELISA, RIA, Complement fixation test, Neutralization, Opsonization, Immune adherence, Immuno fluorescence, Immuno electron microscopic test
7. Structure and functions of Immune System
 - a) Parts of Immune system
 - b) T/B cells, Natural Killer cells, other cells & their functions
8. Hyper sensitivity Reactions
 - a) General Principles of different types of hypersensitive reactions i.e., type 1, 2, 3, 4.
 - b) Auto immune disorders
9. ELISA
10. Vaccination- Immunoprophylaxis schedule in neonates, children and in pregnancy

Parasitology

1. Definition - parasitism, Host, Vectors etc.
2. Classification of Parasites.
3. Lab diagnosis of parasitic infections.

Protozoa: Life cycle, Morphology, Disease & Lab Diagnosis

1. Intestinal Amoebae: *E. histolytica*, *E. coli*
2. Flagellates of intestine/genitalia: *Giardia lamblia*, *Trichomonas vaginalis*
3. Malarial Parasite: *Plasmodium vivax* ; Differences between *P. vivax*, *P. malaria*, *P. falciparum* & *P. ovale*.

Nematodes: Intestinal Nematodes:

1. *Ascaris*: Life cycle, Morphology, disease & lab diagnosis
2. *Enterobius vermicularis* (Thread worm) and *Ancylostomaduodenale* (Hook worm) (in brief)
3. Tissue Nematodes: *W. bancrofti* - Life cycle, Morphology, Disease & Lab Diagnosis

Phylum Platyhelminths

1. Cestodes - *T. solium*, *T. saginata* & *E. granulosus*.
2. Trematodes - *S. haematobium* & *F. hepatica*

(G) Coagulation studies & Blood Bank procedures

Coagulation studies

1. Hemostasis: Definition, Basic concept and principle, Basic steps involved in Hemostasis.
2. Coagulation:
 - a) Basic Physiology, coagulation factors.
 - b) Mechanism of blood coagulation.
 - c) Extrinsic Pathway.
 - d) Intrinsic Pathway.
 - e) Regulators of blood coagulation.
3. Testing of blood coagulation:
 - a) Bleeding Time, Duke's method.
 - b) Clotting Time- Capillary tube method & Lee white's method.
 - c) PT, APTT
 - d) Clot retraction time
 - e) Determination of fibrinogen.
4. Quality Assurance for routine Hemostasis Laboratory:
 - a) Introduction.
 - b) Sample collection technique (Phlebotomy)
 - c) Sample preparation, Anticoagulant used, Importance of use of Sodium Citrate.
5. Role in Diseases, Bleeding disorders
 - a) Platelet disorder - Thrombocytopenia - causes including aplastic anemia
 - b) Hemophilia

Blood Bank Procedures

1. Principles and practice of:
 - a) Blood Grouping
 - b) Blood Transfusion
 - c) Blood Donation
 - d) Blood Collection
 - e) Storage & Transport
 - f) Maintenance of Blood Bank Records
 - g) Compatibility Testing
 - h) Blood Components
 - i) Blood Transfusion Reactions

(H) Systematic Bacteriology, Mycology & Virology

Systematic Bacteriology

1. Morphology, cultural characteristics,
2. Biochemical reaction,
3. Pathogenesis/ disease caused & lab diagnosis of:
 - a) Staphylococcus,
 - b) Streptococcus,
 - c) Pneumococcus,
 - d) Neisseria gonorrhoeae,
 - e) Neisseria
 - f) meningitidis,
 - g) Corynebacteriumdiphtheriae,
 - h) Mycobaterium,
 - I) Clostridium,
 - j) E.coli,
 - k) Klebsiella,
 - l) Salmonella,
 - m) Proteus,
 - n) Pseudomonas,
 - o) Vibrio
 - p) Spirochaetes.
4. Molecular techniques in diagnostic microbiology -PCR, DNA hybridization Mycology
 - a) Morphology and Structure of fungi
 - b) Classification of fungi
 - c) Nutrition and cultivation of fungus
 - d) Cutaneous, Subcutaneous and Systemic Mycosis
 - e) Lab diagnosis of fungal Infections
 - f) Opportunistic fungal infections

Virology

1. General characters of viruses
2. Classification of viruses
3. Structure of Viruses: Capsid symmetry, enveloped and non-enveloped viruses
4. Lab diagnosis of viral infections
5. Cultivation of viruses
6. Bacteriophages.
7. Retro viruses - HIV, Hepatitis virus, Pox virus
8. Picorna virus - Polio
9. Orthomyxo virus - Influenza
10. Arbo virus - Chikungunya, Dengue
11. Herpes and Adeno virus

SYLLABUS FOR FINE ARTS

APPLIED ART

1. ADVERTISING ART AND IDEAS

Introduction, Advertising in everyday life. History of advertising in general, Social and economic aspects of advertising, Different advertising medias.

2. DRAWING : (STUDIO)

Head Study – planes/masses in shade and light. Structural drawing from the cast, Human figure in action. Birds, Animals study. Rendering in different medium.

3. DESIGN 2 D :

Study of Visual Elements, Point, Line, Planes and Shapes. Study of Design Principles, 2-D designs, Organization in space (positive and negative). Basic and free shapes- Line, Colour, Tone, Texture, Form and Space.

4. COLOUR :

Perception of colour, Light and Pigment theory, Understanding of Primary and Secondary colours. Colour Wheel and various Colour Schemes derived from it. Complementary Scheme

.Analogous Colour. Split and Double Split Complementary Colour Scheme. Gray Scale, Keys and Contrast.

5. PRODUCT DRAWING :

Manmade Object :- Drawing (Line and Tonal), Use of various techniques. Observation and Understanding the quality of Objects. Rendering the product.

6. LETTERING – TYPOGRAPHY AND CALLIGRAPHY

History of Writing. Development of alphabets. Different calligraphic schools. Script styles. Roman lettering .Classification of types .Study of one family of serif and san-serif type face and rendering the same .Hot metal types .Types in digital form .Leading and word spacing.

7. GRAPHIC DESIGN :

Basics of graphic design .Definition, need, elements, colour, design of logo & symbol with proper understanding of print and production process. Designing simple stationary items e.g. Letterheads, Visiting Cards, Envelops.

8. PERSPECTIVE

Structural Design – Projection Plan, Elevation, Section, Perspective – Parallel – Angular.

9. DESIGN 3-D

Study of basic 3-D shapes and forms such as cubes, spheres and cylinders, constructed or molded in different medias like paper, card, soft clay, plaster, wire etc. Positive and Negative spaces.

10. PRESS LAYOUT

Principles of press layout. Elements of press advertisement and its aspects Single column layout.

11. POSTER / HOARDING

History of poster design. Principles. Elements of poster / hoarding.

12. **COMPUTER GRAPHICS :**
Introduction to Computers graphics, Basic fundamentals of computer, Common terminologies, types of commands, types of booting, What is Unix ? Features of Unix, computer virus.
13. **STUDY FROM LIFE**
Structure of Human figure in full and parts. Drawing from life. Rendering in pencil, ink and colours. Understanding of different rendering techniques. Outdoor study of nature/man-made objects. Rendering in pencil and colour.
14. **CORPORATE IDENTITY**
Application of Symbol – Logos for stationery and other media of 2-D and 3-D designs.
15. **PACKAGING DESIGN**
Principles of packaging, Knowledge of various materials-Paper, Board. Methods of Packaging, Label and Carton Designing, Costing and estimating.
16. **ILLUSTRATION**
The importance of Illustration for Communication from pro-historic period to modern period. Definition of illustration. The different areas of Communication where illustration is applicable. How illustration plays its role in communication media.
17. **COPY WRITING**
Types of headlines Declarative, Interrogative, Testimonial, Humorous etc. Types of Copy, Use of Product Service – Information – Its report – special target audience for making copy effective
18. **PRESS / MAGAZINE**
Planning of Campaign for Press/ Magazine based on data collected, Treasure – Hardsell – Softsell – Institutional – Editorial – Testimonial – Prestige etc
19. **DIRECT MAIL / P. O. S.**
Importance of P.O.S. To sell the Product, Delivers message at the location. Different forms of
P.O.S. Show card – Crowner – Banner – Mobile – Bunting – Floor Display – dispenser – Direct Mail as a Media. Its function – Conventional Printing Processes – Colour Limitations – Types of Paper.
20. **STORY BOARD**
Audio-visual Communication – Shot Films – T.V. Commercials – Information of Film making Developing Concept – Script Writing – Preparing Visuals – Presentation Live / Animated,
21. **COMPUTER GRAPHICS**
Introduction to graphic software's, Photoshop, CorelDraw, PageMaker, Illustrator, Quark X'press etc. Its use and working knowledge. Different tools of various application software's Preparing text for layouts, Preparing logo & symbols with the help of Computer.

PAINTING

1. HISTORY OF ART

A) Indian Art :

- (i) Indus civilization, Mauryan Art, Shunga Art, Andhra Art, Kushan Art, Gupta Art.
- (ii) Medieval temple architecture – Chalukyan period, Rashtrakuta period, Pallava period, Chandella period, Eastern Ganga period.
- (iii) Study of Indian Miniatures Painting, Jain, Rajasthani, Pahari and Mughal Schools. Western Art – Mannerism, Baroque Art, Rococo, New classicism, Realism, Impressionism.
- (iv) Modern Indian Art : company School, Bengal Revivalism, Painting of early decades –
Ravi Varma, Amrita Shergil, Callacutta Group, Mumbai School – Progressive Artists Group, Madras School, Delhi School, Baroda School, Tantra & its influence on Modern Indian Art, Tantras in Print Making.

B) Western Art :

- (i) Prehistoric Art, Egyptian Art, Mesopotamian Art, Minoan & Mycenaean Art, Greek Art, Roman Art.
- (ii) Early Christian Art, Byzantine Art, Romanesque Art, Gothic Art, Renaissance.
- (iii) MODERN WESTERN ART: Post Impressionism, Neo-Impressionism, Fauvism, Cubism, Dadaism, Surrealism, Expressionism, Abstract Expressionism, Pop, Op and Kinetic Art, Minimal Art.

C) Far Eastern Art : Art of China and Japan.

2. DRAWING (MANMADE & NATURE) :

Study from manmade objects and nature with emphasis on construction. Perspective and rendering in linear and massive drawing. Experience with material quality for feel. Values in grey, texture and colour in rendering. Use of media – pencil, charcoal, pen & ink, crayon etc.

3. HEAD STUDY

Rendering of Head from cast for construction and proportion of human head. Anatomy of human face with lines, masses & effect of light and shades.

4. DRAWING FROM LIFE

Mainly based on general form and gesture. Observed and studied in pencil, charcoal and pastels medias in various light conditions.

5. PAINTING (2-D DESIGN)

Study of Visual Elements, Point, Line, Planes and Shapes. Study of Design Principles, 2-D designs, Organization in space (positive and negative). Basic and free shapes- Line, Colour, Tone, Texture, Form and Space.

Practical application of Colour Theory in Practice Assignments.

6. PRINT MAKING

Fundamentals of various methods of taking prints. Rubbing, Potato Print. Mono-print in single or two colours with various types of materials and their combinations, viz. paper, card board, cloth etc.

7. MEMORY DRAWING

To develop the sense of observation and the capacity to retain and recall images and their co- ordination.

8. AESTHETIC

Section – A. introduction to Art & Aesthetics

- 1) What is Art: Art as a social phenomenon's Art as object of perception.
- 2) Aesthetics Activity : The diversity of its forms; The Aesthetics & Artistic design.
- 3) Ideas of life and art according to Indian philosophy.
- 4) Early references to Art and Beauty.
- 5) Indian Aesthetics and it's relations to philosophy and relation.
- 6) The theory of RASA and it's applications to various Arts.
- 7) Plato's views on Art and Aesthetics..
- 8) Aristotle's theory of imitation and the concepts of catharsis.
- 9) Beauty and ugly : Views of Plotinus, St. Augustine and David Hume.
- 10) Sublime : Views of Longinus Burke and A.C. Bradley.
- 11) Bosanqite : Three lectures on Aesthetics.

9. MURAL

Methods of plastering & making grounds, Transfer of Drawing & Painting on wet and dry background. Different mediums like plaster, Terra-cotta, Ceramics, Stain Glass, Metal etc.

* Study of the subjects depend upon the expert and infrastructure available in the Institute.

SYLLABUS OF DENTAL MECHANIC

1. APPLIED PHYSICS:

- (i) Specific gravity, density, properties of matter, including cohesion, capillarity, surface tension viscosity, elasticity, diffusion and osmosis
- (ii) 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 Charles laws. Unit of heat, thermal capacity and specific heat, change of state; latent melting point.
- (iii) Properties of vapors, conduction, convection and radiation

Principles of electro-technology applied to dental work room small motors, constructional features and characteristics, electric furnaces, thermostats, pyrometers, spot welders, electroplating, electroforming, and anodizing, wiring regulations relating to low voltage supplies.

2. APPLIED MECHANIC :

- (i) Forces, Parallelogram and triangle of forces.
- (ii) Moments,
- (iii) Couples,
- (iv) Centre of gravity principles of lever and cantilever work,
- (v) Energy, power, friction, inclined plane, screw stress, strain, shearing strain, torsion, bending movements, strength and stiffness of materials.

3. APPLIED CHEMISTRY :

- (i) Distinction between physical and chemical change; elements, mixtures, and compounds composition of the atmosphere;
- (ii) 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.
- (iii) 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.

- (iv) Alcohol, ethers, aldehydes and ketones, fatty acids and their more important derivatives, amines.
- (v) Simple treatment of carbohydrates, fats and proteins, Benzene and its homologues.
- (vi) General characteristics of aromatic substances.
- (vii) Synthetic resins and plastics used in dentistry

4. APPLIED ORAL ANATOMY

- (i) Elementary anatomy and structure of denture/bearing area.
- (ii) Human dentition and occlusion.
- (iii) Functions of teeth and morphology of crowns of teeth.
- (iv) Muscles of mastication and facial expression.
- (v) Mastication deglutition and phonation.
- (vi) Movements of temporo-mandibular joint.

5. DENTAL MECHANIC (PRIMARY)

- (i) Infection control measures for impressions and models
- (ii) Impression preservation and Boxing-in
- (iii) Cast: preparation, trimming, including Orthodontic casts
- (iv) Cast duplication –various methods
- (v) Construction of special trays-spacers
- (vi) Bite blocks - plates and wax rims
- (vii) Articulators: Classification, daily uses, and care of articulators
- (viii) Adjustments, mounting of casts
- (ix) Articulation, occlusal plane, protrusive balance, working bite, balancing bite, curve of spee, compensating curve, lateral curve
- (x) Principles of selection of teeth
- (xi) Setting of teeth, wax-up finishing and polishing
- (xii) Flasking, Dewaxing, Paking, Curing, Deflasking, Finishing and Polishing
- (xiii) Additions, repairs, Relining and rebasing of dentures
- (xiv) Immediate denture construction
- (xv) Making of acrylic teeth
- (xvi) Kennedy's classification of partial dentures
- (xvii) Principles of partial denture, design, clasp surveyor, surveying, path of insertion and removal. Establishment of clasp seat. Clasp's parts, classification function and reciprocation

- (xviii) Principles of wire bending, Preparation of wrought clasps occlusal rests and lingualbar
- (xix) Furnaces,
- (xx) Principles of casting
- (xxi) Casting machines: Centrifugal and pressure casting machines
- (xxii) Casting techniques of partial denture (skeletal) Clasps, bars, occlusal rest
- (xxiii) Setting of teeth and completion of dentures on metal skeletons
- (xxiv) Mechanical principles of Orthodontic appliances, anchorage, force, tissue changes and retention
- (xxv) Stainless steel wire preparation of clasps, springs and Arch wires for Orthodontic appliances
- (xxvi) Use of various types of expansion screws
- (xxvii) Designing – Implant supported prosthesis of facilities available for dental implants
- (xxviii) Ceramic, laminates and Veneers
- (xxix) Fabricating – Maxillofacial prosthesis such as eye, nose ear, cheek, obturator and splint
- (xxx) Indirect Resin Restoration preparation techniques
- (xxxi) Porcelain firing techniques
- (xxxii) Preparation of Removable Orthodontic appliances, activators, Retention appliances and Oral screen
- (xxxiii) Construction of fixed Orthodontic appliances, bands, rules and arches
- (xxxiv) Soldering and spot welding-soldering of clasps, tags, strengtheners and lingualbars
- (xxxv) Inlays and Crowns – classification and construction facing & backings
- (xxxvi) Casting Procedures
- (xxxvii) Principles of bridge work-types of abutments – abutments and pontics
- (xxxviii) Fabrication of bridges using porcelain and acrylic pontics

6. DENTAL MATERIALS AND DENTAL METALLURGY

DENTAL MATERIALS:

Composition, properties, uses, advantages and disadvantages of the following materials.

- (i) Plaster of Paris, Dental stone, die stone
- (ii) Investment materials
- (iii) All impression materials
- (iv) Tray materials
- (v) Denture base materials both for cold curing and heat, Tooth Materials waxes
- (vi) Base plates
- (vii) Zinc oxide
- (viii) Dental Luting cements
- (ix) Dental ceramics and indirect resin restoration materials

DENTAL METALLURGY:

- (i) Metallurgical Terms
- (ii) Study of Metal used in Dentistry particularly Gold silver, Copper, Zinc, Tin, Lead and Aluminum
- (iii) Study of Alloys used in Dentistry particularly, Casting gold wrought gold silver alloys, stainless steel, Chrome cobalt Alloys
- (iv) Heat treatment annealing and tempering
- (v) Solders, Fluxes, Anti fluxes
- (vi) Tarnish and corrosion
- (vii) Electric deposition
- (viii) Dental implant materials

पद – महिला अधीक्षक / आशुलिपिक–सह– लेखापाल / आशुलिपिक

- (क) हिन्दी भाषा का ज्ञान— इसके अन्तर्गत हिन्दी अनुच्छेद एवं हिन्दी व्याकरण से संबंधित प्रश्न पूछे जायेंगे।
- (ख) अंग्रेजी भाषा का ज्ञान— इसके अन्तर्गत अंग्रेजी अनुच्छेद एवं अंग्रेजी व्याकरण से संबंधित प्रश्न पूछे जायेंगे।

(ग) (सामान्य ज्ञान)

(क) सामान्य अध्ययन:—

इसमें प्रश्नों का उद्देश्य अभ्यर्थी की सामान्य जानकारी तथा समाज में उनके अनुप्रयोग के सम्बन्ध में उसकी योग्यता की जाँच करना होगा। वर्तमान घटनाओं और दिन-प्रतिदिन की घटनाओं के सूक्ष्म अवलोकन तथा उनके प्रति वैज्ञानिक दृष्टिकोण जैसे मामलों की जानकारी जिसे कि किसी भी शिक्षित व्यक्ति से अपेक्षा की जाती है। इसमें झारखण्ड, भारत और पड़ोसी देशों के संबंध में विशेष रूप से यथा संभव प्रश्न पूछे जा सकते हैं। सम-सामयिक विषय, वैज्ञानिक प्रगति, राष्ट्रीय/अंतर्राष्ट्रीय पुरस्कार, भारतीय भाषाएँ, पुस्तक, लिपि, राजधानी, मुद्रा, खेल-खिलाड़ी, महत्वपूर्ण घटनाएँ। भारत का इतिहास, संस्कृति, भूगोल, पर्यावरण, आर्थिक परिदृश्य, स्वतंत्रता आंदोलन, भारतीय कृषि तथा प्राकृतिक संसाधनों की प्रमुख विशेषताएँ एवं भारत का संविधान एवं राज्य व्यवस्था, देश की राजनीतिक प्रणाली, पंचायती राज, सामुदायिक विकास, पंचवर्षिय योजना।

झारखण्ड राज्य की भौगोलिक स्थिति एवं राजनीतिक स्थिति की सामान्य जानकारी।

(ख) सामान्य विज्ञान:—

सामान्य विज्ञान के प्रश्न में दिन-प्रतिदिन के अवलोकन एवं अनुभव पर आधारित विज्ञान की सामान्य समझ एवं परिबोध से संबंधित प्रश्न रहेंगे। जैसा कि एक सुशिक्षित व्यक्ति से जिसने किसी विज्ञान विषय का विशेष अध्ययन नहीं किया हो, अपेक्षित है।

(ग) सामान्य गणित:—

इस विषय में सामान्यतः अंक गणित, प्राथमिक बीजगणित ज्यामिति, सामान्य त्रिकोणमिति, क्षेत्रमिति से संबंधित प्रश्न रहेंगे। सामान्यतः इसमें मैट्रिक/10वीं कक्षा स्तर के प्रश्न रहेंगे।

(घ) मानसिक क्षमता जाँच:—

इसमें शाब्दिक एवं गैर शाब्दिक दोनो प्रकार के प्रश्न रहेंगे। इस घटक में निम्न से संबंधित यथासंभव प्रश्न पूछे जा सकते हैं—सादृश्य, समानता एवं भिन्नता, स्थान कल्पना, समस्या समाधान, विश्लेषण, दृश्य स्मृति, विभेद, अवलोकन, संबंध अवधारणा, अंक गणितीय तर्कशक्ति, अंक गणितीय संख्या श्रृंखला एवं कूट लेखन तथा कूट व्याख्या इत्यादि।

(ड) कम्प्यूटर का मूलभूत ज्ञान:-

इसमें कम्प्यूटर के विभिन्न उपकरणों, एम.एस. विन्डो ऑपरेटिंग सिस्टम, एम.एस. ऑफिस एवं इंटरनेट संचालन की विधि की जानकारी से संबंधित प्रश्न पूछे जा सकते हैं।

(च) झारखण्ड राज्य से संबंधित ज्ञान:-

झारखण्ड राज्य के भूगोल, इतिहास, सभ्यता, संस्कृति, भाषा-साहित्य, स्थान, खान खनिज, उद्योग, राष्ट्रीय आंदोलन में झारखण्ड का योगदान, विकास योजनाएँ, खेल-खिलाड़ी, व्यक्तित्व, नागरिक उपलब्धियाँ, राष्ट्रीय एवं अन्तर्राष्ट्रीय महत्त्व के विषय इत्यादि।

SYLLABUS FOR O.T. ASSISTANT/VENTILATOR TECHNICIAN

ANATOMY & PHYSIOLOGY

1. Elementary Physics & Chemistry
2. Characteristics of Living Matter
3. Structure of Living Matter
4. The Tissues
5. Systems and Various Parts of Human Body
6. Development & Types of Bones
7. Bones of Head & Trunk
8. Bones of the Limbs
9. Joints or Articulations
10. Structure and action of Muscles
11. The chief Muscles of the Body
12. The Brain
13. The Heart and Blood Vessels
14. The Circulatory System
15. The Lymphatic System
16. The Respiratory System
17. The Digestive System
18. The Liver, Biliary System and Pancreas
19. Nutrition & Metabolism
20. Endocrine Glands and Exocrine Glands
21. The Urinary System
22. The Nervous System
23. The ear
24. The Eye
25. The Skin
26. The Reproductive System

SURGICAL INSTRUMENTS AND PROCEDURES

1. Preoperative Consideration Psychological

Support of the Surgical Patient

2. Protection of the Patient in Surgery

- Admission Process
- Transfer Procedure Position
- Environmental Controls
- Electro Surgery
- Operative Records
- Counting Procedure
- Sterilization
- Emergencies & Disasters

3. Surgical Instruments

- Instruments for General Surgery
- Operation of Face & Neck
- Operation of Nose, Throat and accessory Nasal Sinuses
- Ophthalmic Surgery
- Sinuses, Ear and Throat
- Operations on the Chest
- Operations on the Genito-Urinary Tract
- Gynaecological & Obstetric Operations
- Orthopedic Operations
- Neuro-Surgical Operations
- Operations on the Vascular System
- Radium Insertion
- Traumatic Surgery

4. Surgical procedures

a) Neck Surgery

- Thyroidectomy
- Parathyroidectomy
- Thyroglossal Cystectomy

b) Breast Procedures

- Breast Biopsy
- Mastectomy

c) Abdominal Extra intestinal Surgery

- Abdominal Laprotomy
- Abdominal Hernlography
- Cholecystectomy

- Drainage of Pancreatic Cyst(Pseudo Cyst)
- Pancreaticoduodenectomy(Whipples procedure)
- Pancreatectomy
- Drainage of Abscess(es)in the region of Liver
- Hepatic Resection
- Splenectomy

d) Gastrointestinal Surgery

- Eosophagoscopy
- Gastroscopy
- Colonoscopy
- Sigmoidoscopy
- Vagotomy & Pyloroplasty
- Gastrostomy
- Gastrectomy
- Small Bowel Resection
- Cutaneous Ileostomy
- Appendectomy
- Colostomy
- Closure of Colostomy
- Right Hemicolectomy
- Transverse Colectomy
- Anterior Resection of the Sigmoid Colon and Rectum
- Haemorrhoidectomy
- Pilonidal Cystectomy and Sinusectomy
- Theirsch Procedure
- Ripstein Procedure(Prosacral Rectopexy)

e) Gynaecological and Obstetric Surgery

- Dilatation of the Cervix and Curettage of the Uterus(D&C)
- Conization of the Uterine Cervix
- Therapeutic Abortion by Suction Curettage
- Marsupialization of Bartholin's Duct Cyst
- Abdominal Ligation (Different Procedures)
- Culdoscopy
- Vaginal Hysterectomy
- Anterior and /or Posterior Colporrhaphy
- Laparoscopy
- Total Abdominal Hysterectomy
- Salpingo-Oophorectomy
- Tuboplasty of the Fallopian Tubes

- Pelvic Exenteration
- Caesarian Section

f) Genito-Urinary Surgery

- Hypospadias Repair
- Epispadias Repair
- Penile Implant
- Marshall-Marchetti-Krantz Procedure
- Hydrocoelelectomy
- Vasectomy
- Vasovasostomy
- Cutaneous Vasostomy
- Spermatocelectomy
- Orchiectomy
- Cystoscopy
- Cystoscopy
- Transurethral Resection of the Prostate
- TURP and /or Lesions of the Bladder or Bladder Neck(TURB)
- Open Prostatectomy
- Nephrectomy
- Upper Tract Urolithotomy
- Ureterolithotomy, Phelolithotomy, Nephrolithotomy
- Cutaneous Vreterstomy
- Ileal Condukt
- Adrenalectomy
- Extracorporeal Shock Wave Lithotripsy (ESWL)
- Ultrasonic Lithotripsy
- Electrohydraulic Lithotripsy

g) Thoracic Procedures

- Bronchoscopy
- Mediastioscopy
- Segment Resection of the Lung
- Wedge Resection of the Lung
- Pulmonary Lobectomy
- Pneumonectomy
- Decortication of the Lung
- Insertion of Transvenous Endocardial Pacemaker
- Correction of Pectus
- Excavatum

- Thymectomy

h) Cardiovascular Surgery

- Carotid Endarterectomy
- Abdominal Aortic Procedures
- Abdominal Aortic Aneurysmectomy, Abdominal Aortic Endarterectomy with Aortic Graft
- Femoro-popliteal bypass
- Greater Saphenous Vein Ligation and Stripping
- Portosystemic Shunt
- Arteriovenous Shunt
- Arteriovenous Fistula
- Cardiac Procedures
- Bypass Surgery (Different Procedures)

i) Orthopedic Surgery

- Open Reduction of Carpal Bone Fracture
- Excision of a Ganglion
- Carpal Tunnel Release
- Open Reduction of the Humerus
- Open Reduction of the radius and / or Ulna
- Open Reduction of an Olecranon Process Fracture
- Repair of Recurrent Anterior Dislocation of the Shoulder
- Open Reduction of Fracture of the Humerus Head (Including Humeral Head Prosthesis)
- Internal Fixation of the Hip
- Femoral Head Prosthetic Replacement
- Total Hip Replacement
- Open Reduction of the Femoral Shaft
- Triple Arthrodesis of the Ankle
- Total Ankle Joint Replacement
- Open Reduction of Ankle
- Arthrotomy of the Knee
- Excision of Popliteal (Baker's) Cyst
- Total Knee Replacement
- Open Reduction of the Tibial Shaft
- Bunionectomy
- Correction of Hammer Toe Deformity with Intra-phalangeal Fusion
- Vertebra Head Resection
- Procedure for Correction of Scoliosis
- Amputation of Lower Extremity

j) Neurological Surgery

- Craniotomy
- Cranioplasty
- Transphenoidal Hypophysectomy
- Ventricular Shunts
- Laminectomy
- Excision of Cervical Intervertebral Disc with Fusion
- Anterior Approach

k) Plastic Surgery

- Cleft Lip Repair
- Cleft Palate Repair
- Reduction of Nasal Fracture
- Reduction of Mandibular Fracture
- Reduction of Zygomatic Fracture
- Open Reduction of an Orbital Floor Fracture
- Rhinoplasty
- Mentoplasty Augmentation
- Blepharoplasty
- Rhytidectomy
- Dermabrasion
- Otoplasty
- Repair of Syndactyly
- Digital Flexor tendon repair
- Peripheral nerve repair
- Palmar fasciectomy
- Reduction Mamoplasty
- Abdominoplasty/ Abdominal Liposuction
- Liposuction

l) Otorhinolaryngologic (ENT) Surgery

- Myringotomy
- Mastoidectomy
- Tympanoplasty
- Stapedectomy
- Submucous resection of nasal septum/ Septoplasty
- Intranasal Antrostomy/Intranasal fenestration of nasoantral wall
- Nasoantral Wall
- Caldwell- Luo procedure
- (Radical Drainage of the Antrum of the Maxillary Sinuses)
- Nasal Polypectomy
- Drainage of the Frontal Sinus
- Tonsillectomy and adenoidectomy(T and A)

- Laryngectomy
- Radical Neck Dissection
- Excision of lesions of the oral Cavity
- (Partial Glossectomy with Marginal Resection of the Mandible)

m) Ophthalmic Surgery:

- General Information
- Excision of a Chalazion
- Canthotomy
- Corection Of Ectroplon
- Blepharoptosis Repair
- Lacrimal Duct Probing
- Dacryocystothinostomy
- Correction of Strabismus
- Esysceration of Globe
- Enucleation of the Globe
- Orbital Exenteration
- Corneal Transplant/Ekeratoplasty
- Cataract Extraction
- Iridectomy
- Trabeculectomy
- Excision of a Pterygium
- Repair of Retinal Detachment/Scleral Bucking
- Vitrectomy
- Refractive Keratoplasty

n) Pediatric Procedures:

- Pediatric General Information
- Pediatric Sinusectomy
- Repair of Congenital Diaphragmatic Hernia
- Omphalocele repair
- Pediatric Umbilical Herniography
- Repair Of Congenital Artesia of the Esophagus
- Insertion of a central Venous Catheter (Pediatric)
- Pyloromy for Congenital Hypertrophic Pyloric Stenosis

- Pediatric Gastrostomy
- Relief Of Intestinal Obstruction (Pediatric)
- Reduction of Pediatric intususception
- Pediatric Colostomy
- Pediatric Colorectal Resection For Aganglionic megacolon /Hirschsprung's Disease
- Repair of Imperforate Anus.

ANAESTHESIA

(Including Different Methods and Procedures for Anaesthesia, Preparation of Patient for Anaesthesia, Intensive Care etc.)

1. ANAESTHESIA

- **General information**
- **General Anaesthesia**
- **Conduction**

2. GENERAL ANAESTHESIA

3. CONDUCTION ANAESTHESIA

- **Spinal**
- **Epidural**
- **Caudal**
- **Local**
- **Topical**

4. METHODS FOR PREPARATION OF THE PATIENTS FOR ANAESTHESIA:

- **Methods for Procedures (During & After Operation)**

SURGICAL PROCEDURES AND MONITORING, OPERATION THEATRE ETHICS/ DISCIPLINE, SAFETY FOR OPERATING ROOM PERSONNEL, PREPARATION OF INSTRUMENTAL TRAYS, NATIONAL HEALTH

PROGRAMMES & POLICY AND Health care delivery system in the country etc.

1. Surgical Procedures & Monitoring

2. Safety for operation room personnel

- **In service education**
- **Body mechanic**
- **Fatigue factors**
- **Radiation Safety**
- **Infection Control**
- **Chemical hazards**

3. Preparation of Instrumental Trays

- **Major procedures tray**
- **Basic/ Minor procedures tray**
- **Limited procedures tray**
- **Thyroid tray**
- **Long instruments tray**
- **Biliary Tract procedures tray**
- **Choledochoscopy tray**
- **Basic rigid Sigmoidoscopy tray**
- **Gastrointestinal procedures tray**
- **Rectal procedures tray**

4. Gynaecological And Obstetric Trays

- **Dilatation of the cervix and curettage of the Uterus (D&C Tray)**
- **Cervical cone tray**
- **Laparoscopy**
- **Abdominal Hysterectomy**
- **Caesarian section tray**
- **Vaginal Hysterectomy tray**

5. Genito-Urinary Tray

- **Vasectomy tray**
- **Open Prostatectomy**
- **Kidney tray**

6. Thoracic Trays

- **Mediastinoscopy tray**
- **Thoractomy tray**
- **Pacemaker tray**

7. Cardiovascular trays

- **Vascular procedures tray**
- **Vascular shunt tray**
- **Cardiac procedures tray**

8. Orthopedic tray

- **Basic orthopedic procedures tray**
- **Minor orthopedic procedures tray**
- **Bone holding instruments tray**
- **Hip Retractor tray**
- **Knee Arthrotomy tray**
- **Knee or Ankle Arthroscopy tray**

9. Neurologic Procedures Tray

- **Craniotomy tray**
- **Laminectomy tray**
- **Kerrison Rongeurs and Pituitary corceps**

tray10.Otorhinolaryngologic (ENT) Tray

- **Basic ear procedures tray**
- **Nasal procedures tray**
- **Myringotomy tray**
- **Tonsillectomy and Adenoidectomy tray**
- **Trachestomy tray**
- **Antral puncture tray**

11.Ophthalmic Trays

- **Basic Eye procedures tray**
- **Eyelid and Conjunctival procedures stray**
- **Basic eye muscle procedures tray**
- **Dacryocystorhinostomy tray**
- **Corneal procedures tray**
- **Cataract Extraction and Lens procedures tray**
- **Glaucoma procedures tray**
- **Basic eye procedures /Laparoscope tray**
- **Retinal procedures tray**

tray12.Pediatric Tray

- **Pediatric major procedures tray**
- **Pediatric minor procedures tray**

- **Pediatric gastrointestinal procedures tray**
(With special emphasis on National Health Programmes & Policies including Health Care delivery System of India.)

SYLLABUS CATH LAB TECHNICIAN

A. HUMAN ANATOMY & PHYSIOLOGY

- Study of the structure of a cell.
Normal anatomical structure, Histology & Functions (Physiology) of the following systems.
- The circulatory system (Heart & Blood Vessels)
The Respiratory system
The Digestive system
Liver & Pancreas
Lymphatic system
Urinary system
Reproductive system – Male & Female
Endocrine system
Central nervous system (Brain & Spinal cord)

B. Cath Lab Technician

- (1) Cardio-vascular pharmacology.
- (2) Electrocardiography- Electrophysiology, Einthevenrnis law Introduction to ECG
Reading normal and Abnormal ECG.
- (3) Cardio pulmonary resuscitation
- (4) Electricity- Power Supply system, Ohm's Law CRT. TUBE multi meter.
- (5) Electro med, equipment standards and safety ECG Maintenance of minimum repairs
- (6) Applied aspects of Ultra sound/ Doppler principles and practice.
- (7) Defibrillator- indication, operation and indications and Precautions.
- (8) Arrhythmia's conduction/abnormalities, pacemaker
- (9) Stress ECG principles, methods of recording and observation.
- (10) Holter Recording- principles, methods of recording and observations.
- (11) Introduction to cardiac catheterization.

C. CARDIAC CATHETERIZATION

Introduction

1. Normal Physiology
2. Vascular Resistance
3. Vascular Heart disease.
 - (1) Stenotic Lesions
 - (2) Regurgitate Lesions.
4. Congenital Heart Disease
 - (1) Acyanotic obstructive & Left to Right Shunt 4Hrs.
 - (2) Cyanotic CHD 3Hrs.
5. Cardiac Output – 2 hrs.
6. L.V. Function assessment – 1hrs.
7. Coronary Graft Angio – 4 hrs.
8. Coronary Graft Angio – 2 hrs.
9. Oxygen consumption calculation – 2hrs.
10. Exercise and Cath – 2hrs.
11. PTCA (Percutan Transmural coronary Angiography) – 6 hrs.
12. Valvuloplasty
 - (i) Mitral Valvuloplasty.
 - (ii) Aortic Valvuloplasty.
 - (iii) Pulmonary Valvuloplasty.
13. IABP (Intra Aortic Balloon pump) – 2 hrs.
14. CPR – 2 hrs.
15. Pressure recording – 3hrs.
16. Care of the patient following cardiac catheterization – 2 hrs.
17. Post – Angioplasty care post valvuloplasty cares – 2 hrs.
18. Pre-cath evaluation with check lists – 1hrs.
19. Pre PTCA evaluation with check lists – 1 hrs.
20. Pre – Valvulo plasty evaluation check lists – 1 hrs.
21. Emergency cardiac cath and coronary angiogram – 2 hrs.
22. Permanent Pace Maker implantation after care –
23. Radiology
 - a. Single plain
 - b. Bi- plain.
 - c. DSA.
 - d. angulations.
24. Film developing/processing –

D. ELECTRICITY AND ELECTROSTATICS & COMPUTER SCIENCES

1. ELECTRICITY AND ELECTROSTATICS:

- (a) Simple electron theory of conduction's.
- (b) Resistance.
- (c) The Joule, The watt.
- (d) Properties of electric charge.
- (e) Capacitor.
- (f) Electronic potential/potential difference (PD).
- (g) Types of AC/DC.
- (h) Basic of Ac/Circuits.

2. Magnetism/Electro-magnetism/Electromagnetic induction:

- (a) Magnetic poles/Fields/ flux and in flux density.
- (b) Magnetic field due to a straight and circular coil wire.
- (c) The AC transformer.

2. COMPUTER SCIENCES:

I. FUNDAMENTALS:

1. Evolution of computers, contributions of eminent scientists of the field of computers, field.
2. Concepts of computer hardware, input/output devices, central processing unit, main memory, secondary memory etc.
3. Definition of instructions, programmes software.
4. Software spectrum system software, business orient applications, R & D type research S/W,real time software etc.
5. Languages – Machine languages, assembly languages, natural languages.
6. Significance of Grammar in computer languages.

II. LOGIC DIAGRAMS:

- (i) Flow charts – symbols and their significance.
- (ii) Variables –simple variables array variables.

III. BASIC LANGUAGES:

1. Input/output commends, assignment, if then, if then R Statements, for Next statement, GOTO, on GOTO STOP interactions, swapping, ascending and descending order also arrays DIM command.

Data Types : Integer, Real double precision files: Data fields, records, data files, program file sequential files, random files etc.

2. (I) Basic aspects with special emphasis on applied aspects as related to medicine,

electricity, sound, pressure, properties of solids and liquids and magnetism.

(IV) Biomechanics.

(V) Electronics – Basic principles with special reference to applied aspects as related to medicine.

3. Basic aspects of computers and computer language. The lecture courses should cover all aspects of computers so as to enable the candidate to do simple programming

IV. SPECIFIC TO THIS SPECIALITY:

(i) Instrumentation and their circuits as related to the speciality. The candidate should be given training to enable him to identify the defect if any instrument goes out of order and to rectify the simple defects.

(ii) The candidate should be trained in all the techniques in the concerned speciality. He should be able to do the procedure independently and know the normal and abnormal pattern of the tests.

(iii) The candidate should be taught basic aspects of anatomy, physiology of the concerned specialty account of disease states related to various test procedures to be taught.

Syllabus for Dental Hygienists

A. Introduction to Biology

From cell to organism - survey of various organisms that are composed of cells. The existence of order and balance: homeostasis. The cell - Structure and function: Introduction to cell biology. The cell as a basic unit of life. Structure of the cell, cell membrane, hereditary material. Cell division. Mother cells: division and differentiation. Unicellular and multi cellular organisms. Homeostasis.

B. Principles of Microbiology

types of bacteria, fungi and viruses. Familiarity with the connection between the various components of the bacteria and its environment and growth. Familiarity with the mechanisms for causing damage to the human body. Prokaryotes: bacteria, viruses, fungi, structure and function. Physiology and metabolism. Interactions between bacteria, viruses and fungi and the human body. Biochemistry and genetics of the bacterial cell. Biotechnology - bacteria at the service of man, from the food industry to genetic engineering. Introduction to virology. Incorporation into the genes of the host cell. Viral diseases: influenza, polio, rubella, measles, herpes, hepatitis, H.I.V. Introduction to mycology. Sepsis, bacteremia. Gum disease and caries - microbial aspects. Immunizations to protect against viruses and bacteria.

C. Introduction to Chemistry

familiarity with the structure of the periodic table. Familiarity with chemical bonds and reactions between molecules. Ability to balance chemical equations and to find the concentrations of solutions. Organic

chemistry: familiarity with the various functional organic chemistry groups. Structure of the atom (radioactivity). Electron configurations - Bohr's model. Ionization energy, electron affinity. Metals and nonmetals. Molecules.

Chemical bonds: ionic, covalent, coordinate. Stoichiometry, concepts of the mole, molecular weight, balancing a reaction. Units of concentration. Equilibrium. Types of chemical reactions. Metals, carbon: graphite, diamond. Acids and bases. Buffers and indicators. Salts. Redox. Saliva and its components. Fluoride. Components of the tooth.

D. Principles of Biochemistry

The mechanism of action of metabolic systems, roles of amino acids, role and normal metabolic function of carbohydrates, proteins and fats - with an emphasis on changes in pathologic states and hereditary disorders. Definitions, organelles in the cell, membranes, metabolism, carbohydrates, fermentation, proteins. The structure of saliva, immunological components, taste, the sense of smell, halitosis. Cell metabolism: catabolism and anabolism, storage of energy. Carbohydrates: types of carbohydrates, the structure of starch, glycogen and cells. Metabolism of carbohydrates in aerobic and anaerobic cells. Krebs cycle and the electron transport chain, phosphorylation - diseases connected to sugar metabolism. Amino acids: types of amino acids and their metabolism in the body. Amino acids and neurotransmitters. Diseases connected to metabolism of amino acids. Protein: the peptide bond; primary, secondary, tertiary and quaternary structure; S-S bonds. Methods for identification and separation of proteins. Enzymes: regulation of enzymatic activity in the body. Diseases originating from defective enzyme function. Hormones: types of hormones and the use of a second messenger. Diseases originating from inadequate hormonal function. Proteins as carriers: hemoglobin, positive cooperativity, hemoglobin as a buffer in the blood. Sickle-cell anemia. Fats: saturated and unsaturated fatty acids, triglycerides, cholesterol, prostaglandins.

E. Principles of Pharmacology

Introduction to pharmacology and pharmacokinetics. Pharmacokinetics. Routes of administration and presentation of drugs. Familiarity with the autonomic nervous system, cholinergic agonists and antagonist. Adrenergic agonists and antagonist. Drugs for diabetes. Antihistamines. Drugs for allergies and asthma. Local anesthetics. Opiate analgesics. NSAID analgesics. Tranquillizers. Antidepressants. Cardiac drugs. Drugs for hypertension and angina pectoris. Treatment of heart failure. Treatment of arrhythmias. Antibacterial drugs. Anticoagulants. Vitamins. Names of drugs. Analgesic drugs. Antibiotic drugs. Anesthetics. Reading labels. Sedation - Emphasis on inhalation sedation. Gas. Steroids.

F. Introduction to Genetics

Nucleic acids, purines and pyrimidines. The structure of DNA, the bonds between nucleotides in chains. Mechanisms for DNA replication - semiconservative replication. Mutations: types of mutations and genetic diseases. The genetic code, the process of transcription: the various RNA molecules, mRNA, t-RNA, r-RNA. Ribosomes and final protein processing. Mendelian principles, examples of human characteristics, e.g. blood types - A, O, B, AB, RH. Principles of genetic engineering and their use.

G. Introduction to General Histology

Tissue components: types of cells, extracellular substances, in the bodily systems. Structure of the cell. Division and differentiation. Epithelium: various types of epithelium, location and structure. Connective tissue: the structure and function of the components of connective tissue. Muscle: histological structure and the various muscle fibers. Blood cells: the various types of blood cells - structure and function. Cartilage: structure, development and function. Bone: the structure of bone tissue and its various forms. Development of changes in the structure of bone tissue, "calcium balance", pressure and stress. The nervous system - development and structure. Skin: structure and function. The immune system.

H. Introduction to General and Functional Anatomy and General and Systematic Pathology

1. Introduction to general and functional anatomy: Classification, surface, developmental, macroscopic, microscopic, gross anatomy, radiological. General terms in anatomy. Anatomical planes: transverse, oblique, sagittal, coronal. Concepts of relative position: superior, inferior, anterior, posterior, medial, lateral, proximal, distal, external, internal, contralateral, ipsilateral.
2. Skeleton, bones, joints. Roles of the skeleton: support, protection, reservoir, hematopoiesis, movement. Bones of the skeleton (general survey) - bones of the limbs, pelvis, spinal column, thorax. Cartilage, types of bones, microscopic structure. Microscopic structure of bone and cartilage. Joint: types and structure.
3. Muscular system. Types of muscle (striated (skeletal muscle), smooth, heart muscle). Function of muscle (movement, generation of heat, standing, posture). Microscopic and macroscopic structure of the muscle unit. Physiology of muscle action, neural stimulation, bone-muscle relations. Definition of body movement: abduction, adduction, extension, flexion, rotation, pronation, supination.
4. The nervous system. Function of the nervous system. The nerve cell, structure of the neuron, synapse. Reflex arc. Structure of the nervous system: central / peripheral nervous system. Motor and sensory pathways: definitions and functions. Sensation of pain, temperature, touch and pressure. Structure of the brain. Autonomic nervous system: sympathetic and parasympathetic. Definition and function.
5. Cardiovascular system: heart and blood vessels. Functions of the system. The circulatory system: systemic and pulmonary. Arteries, veins, capillaries - structure, function, main blood vessels. Location and function

of the heart. Structure of the heart: layers, ventricles, atria, valves, main blood vessels. Mode of function of the heart, conduction system. Blood supply to the heart. Blood pressure and its significance. Pulse and its significance. The circulatory system and the lymphatic system. Functions of the circulatory system. Types of blood cells and their functions. Composition of blood and blood types: A, B, AB, O. Basic concepts of the mechanism of coagulation. Roles of the lymphatic system.

6. Structure of the lymphatic system - spleen, lymphatic vessels, lymph nodes.
7. The respiratory system. Definition and function. Components of the system: nose, sinuses, pharyngeal and laryngeal cavity, trachea, bronchi, alveoli. Thorax, diaphragm. Structure of the lung. Blood vessels in the lung. Mechanism of respiration - basic concepts in gas exchange.
8. The digestive system. Definition, function. Esophagus: location, structure, functions. Stomach: location, structure, functions. Small intestine: location, structure, functions. Large intestine: location, structure, functions. Liver and bile ducts: location, function, major blood vessels. Pancreas: location and function.

I. Principles in Physiology

Physiology of the following systems: nervous, circulatory, urological, endocrine, with an emphasis on aspects relevant to dentistry, such as: conduction of pain and coagulation of blood. Movement across membranes: simple diffusion, diffusion across the cell membrane, principles of osmosis, osmotic pressure, osmotic characteristics of cells. Movement of water into and out of the cell. Expedited transport, active transport. Structure and function of the cell membrane: ionic channels, diffusion forces. Excitable biopotentials: action potential (ionic mechanism). Potentials in the nerve and the muscle. Intercellular communication: structure and function of the synapse. Activity of the nervous system: central, peripheral, autonomic nervous system. Pain, EEG. The cardiovascular system: mechanical characteristics, electrical characteristics. Respiratory system: mechanics of breathing, structure and function. Transport of gasses in the blood. The renal system. The digestive system. The endocrine system. Muscular system. Internal diseases.

J. Introduction to Epidemiology

Epidemiology of disease: caries, gingiva. Indices utilized in epidemiology. Roles and uses. Research methods. Epidemiology of dental caries in Israel and internationally. Epidemiology of periodontal disease
Indices: DMF, CPITN, OHIP.

K. Immunology

The immune system, the circulatory system, the lymphatic system. Inflammation - what it is, ways of dealing with it. Active immunity and passive immunity. Organ transplantation mishaps and diseases of the immune system: autoimmune. Immune failure (L.E., congenital or acquired). Innate immune system -

white blood cells lymphatic system, B,T. Acquired immune system - antibodies, specific memory. Soluble molecules and various proteins in the immune system. Disorders of the immune system: allergy, asthma, autoimmune, immunodeficiency. Viral diseases such as HBV, HCV, AIDS. Bacterial diseases tetanus etc.

Basic Sciences in Dentistry

L. Oral and Dental Histology

Supportive tissue, teeth, glands, saliva, lymph.

M. Oral and Dental Embryology

From zygote to blastocyst, from the embryological stage to the newborn. Development of the tooth bud.

N. Dental Morphology

The detailed structure of each and every tooth, relations of contact between teeth in the jaws, dental outlines of the jaw. Exercising the identification of teeth. Methods of numbering deciduous and permanent teeth. Order of eruption and ages for deciduous / permanent dentition. Anatomic structure of a single tooth. Directions and sides for teeth (L, P, M, B, D). Characteristics of groups of teeth - incisors, canines, premolars, molars. Morphological differences between deciduous and permanent dentition. Relation between structure and function. Understanding the relation between the morphology of the tooth and the dental hygienist's work. Identification of teeth. Anomalous effects during development of dentition. Including practical exercise.

O. Principles of Occlusion

Occlusion and how it affects gum disease. Calcification of occlusion. General definition of the relation between the jaws. State of relation in occlusion and movement. Envelope of movements. The jaws and the temporomandibular joint.

P. Infection Control (Disinfection and Sterilization)

Infective agents - viruses, bacteria and fungi, emphasis on oral and respiratory tract diseases. AIDS, NBV, HCV, TB, SARS, etc. Prevention and protection. Means of preventing infection. CDC OSHA guidelines. Masks, gloves, safety glasses, clothes. Disinfection, sterilization. Ministry of Health guidelines for the prevention of infections. Protocol following exposure to infection, medicolegal aspects.

Clinical Fields in Dentistry

Q. Orthodontics

Introduction to orthodontics - including the objectives of orthodontic treatment. Process of the growth of the face and jaws. Order of tooth eruption - morphology. Jaw relations. Classification of malocclusion, skeletal defects. Instrumentation - fixed and moveable. Examples of treatments of common types of orthodontic problems and principles of treatment; diagnostic aids. Treatment of adults. Hypodontia and hyperdontia. Orthognathic surgery. Combined orthodontic - dental implant treatment. The role of the dental hygienist during and after the course of orthodontic treatment. Lingual orthodontics.

R. Endodontics

Structure of the dental pulp, histopathology, diagnosis, types of endodontic treatment, etiology, stages of treatment and filling of root canals, endodontic instrumentation, including rotary. Instruments for measuring the length of canals; tooth whitening after root canal therapy. Diagnosis - clinical and radiologic. Principles of non-surgical root canal therapy, problems and complications during root canal therapy - not at the level of the tooth. Endo-perio processes Pain of endodontic origin.

S. Caries

Definition and description of the disease. Saliva, substrate, plaque. Genetics. Age, multifactorial etiology. Host nutrition. Diagnosis. Bacteria. Fluoride. Types of caries - primary lesion, process of progression of caries in the enamel and dentin, ECC rampant etc. Expansion of all topics, fluoride, cervical caries. Obligatory course, no exemptions

T. Oral Rehabilitation

Classification of missing teeth. Treatment plan, principles of execution. Impression methods. Fixed partial denture - single. Fixed partial denture - multiple teeth. Temporary rehabilitation. Cementation. Partial denture and complete denture, denture over posts. Denture over implants. Implants, connections. Dental technician concepts.

U. Dental Materials

Amalgam, resins and their products, materials for temporary fillings, bases, liners, cements, impression materials.

V. Surgery

1. Extraction of teeth and extraction of wisdom teeth.
2. Apicectomy.

3. Odontogenic and non-odontogenic infections.
4. Malignant tumors in the mouth.
5. Cysts and benign tumors.
6. Pathology.
7. Salivary glands and benign and malignant tumors.
8. Osseous tumors.
9. Manifestations in the oral cavity of systemic diseases and metastases from various tumors in the body.
10. Temporomandibular joint pain.
11. Dental and facial skeletal trauma.
12. Treatment of various craniofacial distortions (e.g. cleft, orthognathic surgery, etc.).
13. Control of bleeding - complications following oral surgery procedures.
14. Sutures, materials for suturing and their removal. Bibliography:
 - Oral and Maxillofacial Pathology, Neville, Damm, Alle, Bougot; Saunders.
 - Oral Surgery in the Dental Practice, E. Kruger, P. Worthington; Quintessence.
 - Maxillofacial Surgery, Ward Booth, Schendel; Chutchill Livingstone.

W. Oral Pathology and Oral Medicine

Defects of growth and development. Vesicular-ulcerative lesions. Pathology of the salivary glands, dryness of the mouth, autoimmune disease connected to the salivary glands (e.g. Sjögren). Cysts of developmental / odontogenic origin. Kaposi sarcoma. Tongue, burning mouth, expression of systemic disease. Piercing. Inflammation - theory. Wound healing. Tumors - theory. Disorders of blood flow. Pathology of the hard dental tissues. Pathology of the pulp. Dentigerous and facial cysts. Color changes of the oral mucosa. Pre-cancerous lesions. Oral lesions that are connected to dermatology. Malignant tumors of the oral cavity. Benign tumors of the oral cavity. Pathology of the salivary glands. Odontogenic tumors. Oral pathology in children. AIDS. The oral medicine profession and examination of the oral tissues. The salivary glands - in health and disease. Congenital lesions - processes and diseases in the oral cavity. Color changes in oral tissues - white lesions. White lesions - candida. States of compromised continuity of the epithelium - ulcers, habits. Recurrent aphthous syndrome. Viral and bacterial infections. Allergic and autoimmune conditions.

Color changes in the oral cavity - dark lesions, disease and tumor processes. Case presentations. Treatment of gingiva in patients with impaired oral mucosa. Facial and dental pain.

Syllabus For Dresser Course

1. Scope of Anatomy and Physiology. Definition of various terms and in anatomy.
2. Structure of cell, Function of its components with special reference to mitochondria and microcosms.
3. Elementary tissues of the body i.e. Epithelial tissues, muscular tissues, connective tissues and nervous tissue.
4. Structure and function of skeleton, classification of joints and their function, joint disorders.
5. The blood compositions, blood pressure and its recording, blood groups and coagulation of blood, brief information regarding disorders of blood.
6. Functions of lymph glands .
7. Structure and functions of various parts of the heart, and brief information about cardiovascular disorders
8. Various parts of respiratory system and their functions, physiology of respiration.
9. Various parts of urinary system and their functions, structure and function of kidney, physiology of urine formation, pathophysiology of renal diseases and edema.
10. Structure of skeletal muscle, physiology of muscle contraction, positions, attachments and functions of various skeletal muscles.
11. Various parts of central nervous system, brain and its parts and functions. Anatomic nervous system.
12. Elementary structure of structure and function of the following sense organs, smell, eye, skin, physiology of pain.
13. Digestive System, various parts of digestive system and their functions, structure and function of liver, physiology of digestion and absorption.
14. Principles of nutrition and vitamins.
15. Endocrine glands and hormones, location of the gland and their functions-pituitary, thyroid, adrenals and pancreas.
16. Concept of health and disease, basic principles of rural and health sanitation

Dressing, Medical Instruments, Chemical Solution and Sterilization Dressing: in general keep dressings as simple as possible

1. Principle of Dressing, Technique of Sterilization & Room Management, Dressing Technique & Uses of Surgical Instrument
2. SURGICAL INSTRUMENTS AND SURGICAL PROCEDURES Sterilization and Disinfection-different methods, protection of patients in surgery, preparation of patients for surgery etc.
3. ANESTHESIA-Different methods and procedures for anesthesia, Preparation of patient for anesthesia, Intensive care etc.
4. SURGICAL Procedures and preparation of operation theatre, Ethics Discipline, Safety for operating room and personnel. Preparation of instruments etc. National Health Programmes and Policy and health care delivery system in the country etc.

SYLLABUS FOR PERFUSIONIST

Applied Anatomy and Physiology

1. ANATOMY OF CARDIOVASCULAR SYSTEM

- o Gross anatomy and structural features of heart
- o GREAT VESSELS: Structure of blood vessels and its organization.

2. ANATOMY OF RESPIRATORY SYSTEM

- o Organization of the respiratory system
- o Gross structure and features of trachea and bronchial tree
- o Gross structure and histology of lungs

Pulmonary circulation – pulmonary arteries, pulmonary veins and bronchial arteries.

3. ANATOMY OF NERVOUS SYSTEM

- o Brain – location, gross features, parts, functional areas, cerebral blood circulation.
- o Spinal cord – gross features, extent, blood supply and coverings.

4. ANATOMY OF RENAL SYSTEM

- o Organization of renal system
- o Kidneys: location, gross features, structure, blood supply and nerve supply
- o Ureters and urinary bladder – location, gross features and structure.

APPLIED PHYSIOLOGY

1 Physiology of cardiovascular system

- o INTRODUCTION – Functions of CVS and blood circulation. Tissue perfusion and microcirculation
- o CARDIAC CYCLE – Various phases
 - Cardiac output – definition, measurements, regulation and control
 - Stroke volume, Arterial pressure and its regulation Peripheral resistance, Venous return, Heart rate
- o LOCAL
 - Vasodilation, Auto regulation (myogenic theory) Vasodilator

metabolites, kinins and vasoconstriction

o SYSTEMIC

- Circulatory vasoconstrictors
- Neural and hormonal regulatory mechanism
- Cardio inhibitory center
- Baro and chemo receptors
- Movement of fluids and dissolved solutes in the body
- Basics of electro cardio gram – Definition, electrical condition, atrial activation, atrial complex, ventricular activation, ventricular complex and normal values

2 PHYSIOLOGY OF RESPIRATORY SYSTEM

- Upper airway – nose, pharynx, larynx
- Lower airway – trachea bronchial tree
- The mucus blanket – mucus and cilia
- Lung parenchyma – alveoli, gaseous exchange, alveolar macrophages and surfactant.
- Physics of ventilation – principles of elasticity compliance and airway resistance.
- Mechanism and regulation of respiration
- Principles of gaseous exchange
- Concept of physiological shunt and its effect Brief concept of artificial ventilation

3 HAEMATOLOGY

- Components of blood – their normal values and functions
- Blood groups and briefly procedures involved in blood transfusion
- Briefly coagulation factors and coagulation cascade (Hemostasis)

4 PHYSIOLOGY OF RENAL SYSTEM

- Organization and functions of renal system
- Renal circulation and glomerular filtration rate
- Mechanism of urine formation and excretion
- Renal function tests

APPLIED BIOCHEMISTRY and PHARMACOLOGY

Applied Biochemistry

- Proteins I: Composition and Structure
- Proteins II: Structure-Function Relationships in Protein Families
- Enzymes: Classification, Kinetics, and Control
- The Cytochromes P450 and Nitric Oxide Synthases
- Biological Membranes: Structure, Receptors, and Solute Transport
- Fundamentals of Signal Transduction
- Bioenergetics, Mitochondria, and Oxidative Metabolism
- Carbohydrate Metabolism I: Major Metabolic Pathways and Their Control
- Carbohydrate Metabolism II: Special Pathways and Glycoconjugates
- Lipid Metabolism I: Synthesis, Storage, and Utilization of Fatty Acids and Triacylglycerols
- Lipid Metabolism II: Pathways of Metabolism of Special Lipids
- Amino Acid and Heme Metabolism
- Purine and Pyrimidine Nucleotide Metabolism
- Metabolic Interrelationships
- Biochemistry of Hormones

APPLIED BIOPHYSICS

- The Biochemical Structure and Function of the cell membrane
- Transport across cell membrane
- Active Transport Sodium and potassium channels
- Osmotic Pressure of Cells
- *Oncotic pressure and fluid mechanics*
- Solvent Accessible Surface Area
- Ion Channels and Ion Pumps
- Cytochrome Oxidase Enzymes
- A Simplified Model Calculation
- Principal of Fluid mechanics
- Gas liquid interphase
- Unit conversion to SI system.

APPLIED PHARMACOLOGY

1. Cardiovascular drugs

- Antihypertensives
- Beta Adrenergic antagonists
- Alpha Adrenergic antagonists
- Peripheral Vasodilators
- Calcium channel blockers
- Antiarrhythmic drugs
- Cardiac glycosides
- Sympathetic and non sympathetic inotropic agents.

- Coronary vasodilators.
 - Antianginal and anti failure agents
 - Lipid lowering & anti atherosclerotic drugs.
 - Drugs used in Homeostasis – anticoagulants Thrombolytics and antithrombolytics, Fibrinolysis inhibitor
 - Cardioplegic drugs- History, Principles and types of Cardioplegia.
 - Priming solutions – History, principles & types.
 - Drugs used in the treatment of shock.
2. Pharmacological protection of organs during CPB
 3. Inhalational gases and emergency drugs.
 4. Corticosteroids – Classification, mechanism of action, adverse effects and complications. Preparation, dose and routes of administration.
 5. Diuretics
 6. Detailed review of drugs and fluids commonly added to the pump by the perfusionist and/or anaesthetist
- Mannitol
 - Sodium bicarbonate
 - Cardioplegic solutions
 - Potassium, magnesium, and calcium ions
 - * Heparin
 - * Blood and blood products
 - * Crystalloid and colloid solutions
 - * Vasoactive drugs
 - Anaesthetic vapour agents

APPLIED PHYSICS FOR PERFUSIONISTS

An introduction to the properties of liquids and gases and the medical application of pressures in fluids and the cardiovascular system, mass and heat transfer as they apply to equipment used in extracorporeal perfusion.

1. Introduction to thermal sciences, review of calculus
2. Pressure, hydrostatics, and intro concepts in thermodynamics

3. Conservation of mass
4. The first law of thermodynamics and mechanical energy balance
5. Applications of conservation of energy
6. Integral conservation of linear momentum
7. Concepts in cardiovascular fluid mechanics
Flow through tubes
8. Intro to differential analysis and the continuity equation
9. The Navier-Stokes equations
10. Transport applications in cardiopulmonary bypass: oxygenation and ultrafiltration
11. Mass transfer and the differential component mass balance
12. Gas laws, solubility of gases
13. Volume, pressure, flow
14. Mass, density, viscosity
15. Heat units, temperature scales, heat transfer
16. Diffusion/osmosis
17. Molarity, concentrations
 - Sterilization and Disinfection
 - Cardiac operation Theatre Etiquette

Applied Pathology and Hematology

1 CARDIOVASCULAR SYSTEM

- Atherosclerosis
- Ischemic heart disease
- Valvular heart disease
- Cardiac hypertrophy and hypertensive heart disease
- Cor pulmonale and pulmonary hypertension
- Myocarditis
- Cardiomyopathies
- Pericardial disease
- Endocrines and the heart
- Heart tumors
- Arrhythmias and conduction disorders

- Diseases of the aorta: Aneurysms and dissections

2 HAEMATOLOGY

- Anaemia – definition, morphological types and diagnosis of anaemia brief concept about haemolytic anaemia and polycythemia.

- Leukocyte disorders – briefly leukaemia, leukocytosis, agranulocytosis etc.,

- Bleeding disorders – definition, classification, causes and effects of important types of bleeding disorders. Briefly various laboratory tests used to diagnose bleeding disorders. Blood Transfusion Techniques

Blood grouping

- Minor and Major cross matching
- Venous Sample Collection
- Storing Techniques of Blood Products
- Blood collection from Donor
- Separation of the Blood products

3. RESPIRATORY SYSTEM

- Chronic obstructive airway diseases – definition and types
- Briefly concept about obstructive versus restrictive pulmonary diseases
- Pulmonary congestion and edema
- Pleural effusion – causes, effects and diagnosis

5. RENAL SYSTEM

- Clinical manifestation of renal diseases
- Briefly causes, mechanism, effects of acute renal failure and chronic renal failure. Briefly glomerulonephritis and pyelonephritis Brief concept about obstructive uropathy

Clinical Diagnostics

1. Basics of diagnostic techniques-

- A. Laboratory investigations in relation to perfusion technology
- B. Chest of X-ray,
- C. ECG,
- D. ABG
- E. Angiography,
- F. 2 D Echo
- G. TEE

2. Monitoring and instrumentation-

- A. Instrumentation technology of ECG machine, pressure transducers, syringe and
- B. peristaltic pumps, monitors, ventilators, pulse oximeters, temperature probes
- C. and thermo regulatory monitoring, defibrillators.
- D. Hemodynamic monitoring, Haemostatic monitoring.
- E. Maintenance of oxygen, carbon dioxide and acid base status and their monitoring
- F. Coagulation Monitoring
- G. Coronary artery and graft flow measurement
- H. Resuscitation and support
- I. Catheterisation
- J. Angiography
- K. Angioplasty
- L. EPS Studies
- M. Valvuloplasty
- N. Intra-aortic balloon

Principles of Perfusion Technology

1. Physiology of extra-corporeal circulation

1. Assessment of patients before bypass; going on & coming off bypass.
2. Hemodilution and priming solutions
3. Principles of extracorporeal gas exchange
4. Analyzing & correction of ABG, VBG and other blood investigations

2. Perfusion Equipment - Hardware:

1. Heart-lung machines/centrifugal pumps
2. Pressure and low level alarm devices
3. Heart-lung heater/coolers
4. Mechanical/electronic flow meters, blenders
5. Perfusion data's recording, store keeping
6. In-line oxygen saturation devices
7. In-line blood gas devices
8. Oxygen analyzers
9. Cell savers
10. Intra-aortic balloon pump

3. Pathophysiology of cpb

1. Blood cells trauma & Anticoagulation in bypass: its monitoring and complications Blood conservation & Auto transfusion

- Risks of blood transfusion

- Blood conservation techniques

2. Myocardial Protection & Cardioplegia

- History
- Various methods of myocardial protection
- Reperfusion injury, oxygen free radicals ,myocardial edema
- myocardial protection for specific clinical problems
- problems during Cardioplegia delivery
- Hot shot

3 Effects of CPB

- Immune and inflammatory response
- Fluid balance and interstitial fluid accumulation
- Nervous system
- Renal function
- The lungs
- The liver

4 Hypothermia

- Physiology
- Deep Hypothermic Circulatory Arrest
- Alterations with temperature change
- Acid-base
- Organ function

PERFUSION FOR SPECIAL PROCEDURES

1. Aortic Surgery

2. Management of Unusual Problems & Special Consideration in Perfusion

I. Sickle cell

A. Pathophysiology

B. Considerations for CPB

C. Other blood disorders

II. Methemoglobinemia

A. Pathophysiology

- B. Considerations for CPB
- III. Thalassemia
- IV. Spherocytosis & elliptocytosis
- V. Hemosiderosis & hemochromatosis
- VI. Erythroblastosis fetalis
- VII. Hereditary coagulation disorders
 - A. Von Willebrand's disease
 - a) Type I
 - b) Type II
 - c) Type III
 - B. Hemophilia A
 - C. Hemophilia B
- VIII. Acquired coagulation disorders
 - A. Disseminated intravascular coagulation (DIC)
 - B. Primary fibrinolysis
 - C. Vitamin K dependent deficiency
- IX. Platelet disorders
 - 1. Thrombocytopenia
 - 2. Cold Agglutinin
- X. Perfusion techniques for Pregnant Patients.**
- XI. Malignant Hyperthermia.XII Re-**
- Operations**

ADVANCED PERFUSION TECHNIQUES

- 1. ECMO
- 2. Counter pulsation and VENTRICULAR ASSIST DEVICES(VAD)
- 3. Minimally Invasive Cardiac Surgery(MICS)
- 4. Perfusion for Non cardiac Procedures
 - Liver transplant
 - Isolated Limb Perfusion
- 6. Recent advances in Perfusion Techniques

PEDIATRIC PERFUSION

1. Preparation for CPB: Equipment Preparation

of the Patient for CPB

2. Blood Flow, ECC component and circuit selection Cannulation

3. Priming Conduct of Bypass

CO₂ management & Choice of Acid Base management Fluid

Management and Drug management during CPB Myocardial Protection

4. ECMO for Neonates, Infants and Children – Components Circulatory assist devices for Infants and children

Blood Conservation Techniques

1. Preparation for CPB:

Equipment Preparation of the Patient for CPB

2. Blood Flow, ECC component and circuit selection Cannulation

3. Priming Conduct of Bypass

CO₂ management & Choice of Acid Base management Fluid

Management and Drug management during CPB Myocardial Protection

ECMO for Neonates, Infants and Children – Recent Advances in Cardiac Perfusion Technology
IABP and ECMO Medico legal Considerations and Record Keeping

SYLLABUS FOR RADIO THERAPY TECHNOLOGIST

A. Human *Anatomy - & Physiology*

1. General Anatomical Terms and Regions of the body

2. . Description of a typical animal cell: Cell mitosis; genes; sex cell; ova and spermatozoa. Fertilization of the ovum. Broad lines of embryonic development. Cell function and differentiation of tissues.

4. Structure of General Tissues: Epithelium; simple and, complex epithelial glands; skin. Connective tissue; fibrous tissue; cartilage; bone; Haversian systems; blood; numbers and types of cells in blood; clotting of blood. Muscle tissue; involuntary, voluntary and cardiac muscle. Nerve tissue.

5. Bones, joints and locomotors system: General description of bones, their main processes and attachments, including the skull with emphasis on the skull as a whole. Development of bones, Primary and secondary bone centres; diaphyses and epiphyses. Position and function of main joints. Some common diseases and injuries of bones and joints; Healing of fractures.

6. Thorax and Abdomen: Structure of thoracic cage, abdominal cavity; diaphragm and mediastinum.

7. Heart and Blood Vessels: Structure and function of the heart, pericardium, peripheral vascular system; names of main arteries and veins, circulation. Common terms used in connection with diseases of this system.

8. Respiratory system: Nasal passages and accessory nasal sinuses, pharynx and larynx, trachea, bronchi and lungs; pleura, nature and function of respiration. Common terms used in connection with diseases of this system.

9. Lymphnode Groups: Lymph and tissue fluid, main lymphatic gland groups and drainage areas, lymphoid tissue and tonsil.

10. Reticulo-Endothelial system: Spleen and liver, bone marrow, extent and nature, physiology of the red and white blood corpuscles.

11. Alimentary system: Mouth, tongue and teeth, salivary glands, pharynx and esophagus, stomach, small and large bowel, liver and biliary tract, pancreas, motility of the alimentary tract; digestion, absorption and metabolism, nutrition and dietetics, common terms used in connection with diseases of this system.

III. Urinary tract: Kidneys, ureters, bladder and urethra; urine formation and excretion, common terms used in connection with diseases of the system.

JJJ. Reproductive system: male genital tract; testes; epididymis, seminal vesicle and prostate; female genital tract; uterine tubes, ovaries, uterus, vagina and vulva, the mammary glands; menstruation, pregnancy and lactation; common terms used in connection with diseases of this system.

KKK. Endocrine glands: anatomy and function of pituitary, thyroid, para thyroids, adrenal, thymus, pancreas and gonads as endocrine organs; common terms used in connection with diseases of this system.

LLL. Nervous system: brain: main subdivisions and lobes; ventricular system, spinal cord, concept of motor, sensory and reflex pathways; meninges and cerebrospinal fluid; its circulation; autonomic nervous system; common terms used in connection with diseases of this system.

MMM. Special sensory organs; structure and function of the eye; structure and function of the ear; structure and function of the skin.

NNN. Surface markings and topographical relations; radiography anatomy.

B. Radiation Physics & Basics of clinical radiography/imaging.

Structure of Matter: Constituents of atoms, atomic and mass, energy units, electron shells, atomic energy levels, Nuclear forces, Nuclear energy levels. Atomic structure-Nucleus, - Electromagnetic spectrum, Energy quantization, Relationship between wavelengths, Frequency, Energy.

* **Physics Units and measurements-** Force, Work, Power, energy- temperature and heat-SI units of above parameters. Atomic Number, Mass No., electron orbit and energy levels- Periodic table-Isotopes-Isobars-Ionization and excitation.

Electromagnetic radiation.

* **Electricity and magnetism:** Electric charges, Coulomb's law-Unit of charge-Electric potential, unit of potential-Electric induction, capacitance and capacitors, series and parallel connection-electric current, unit, resistance, ohm's law, electric power, Joule's law Magnetism: Magnetic induction-magnetic properties-Hysteresis-magnetic effect of current- Electrical instruments, Galvanometer, voltmeter, ammeter and multimeter.

1. X-Rays:

Electromagnetic waves -quantum theory of radiation - visible light -fluorescence. X-Rays – Production of X-rays: The X-ray tube, Physics of X-ray production, continuous spectrum, characteristic spectrum,–Basics of X-ray Circuits -measurement of high voltage –control of KV circuit –MA circuit - Distribution of X-rays in space, specifications of beam quality, Measurement of beam quality, filters –the quality and intensity of x-rays–the Current affecting quality and intensity

2. Radioactivity:

Natural and artificial radioactivity-alpha decay-beta decay and spectra – gamma emission-positron decay electron capture and internal conversion-Exponential decay-Half life-Unit of activity-specific activity. Nuclear Fission-Nuclear reactor.

Radiation sources- Natural and artificial-production of radio isotopes-reactor produced isotopes-Fission products-Gamma ray source for Medical uses.

3. Interaction of X-and Gamma rays:

Attenuation of X-ray or Gamma rays-absorption and scattering-Half value layer-Coherent

scattering-Photo electric absorption-Compton scattering-Pair production and photoelectric disintegration. X-Ray transmission of through Medium, Linear and mass attenuation coefficients. HVT, TVT and interaction of charged particle and neutrons with matter. — Interaction of X-and Gamma rays in body-fat-soft-tissue-bone-contrast medium-LET- Total attenuation coefficient Relative important of different types of interactions.

Imaging in oncology

4. Radiographic Image:

Primary radiological image formation, use of contrast media. Density- contrast – brightness – X-ray film construction and film characteristics – exposure to x-rays – developer – effect of temperature and development time –constituents of developer-film processing methods- Optical density measurements. Image quality - Unsharpness, Resolution – Fog and noise.

5. Fluoroscopy:

Direct fluoroscopy – fluoroscopic image – Fluorescent screen in Radiology-factors affecting the Fluoroscopic image. Image intensifiers – principle construction and function regarding intensified image. The television process – The Television camera tube – the Cathode ray tube
– Television image.

6. Tomography:

Theory of tomography – multi section radiography- tomographic equipment Computed tomography – Scanning principle – Reconstruction of image – storing the image – viewing the image – evaluation of the image . Equipment for computed tomography – Table, scanning gantry X-Ray generator – image quality.

7. M.R.I

Magnetic Resonance imaging – Basic principle – Imaging methods – Slice section - Image contrast – Factors affecting Image quality - Difference CT and MRI images – Instrumentation.-Imaging sequences Bio-effects of MRI.

8. Basics of SPECT and PET CT

C. Radiotherapy Physics & Principles of Radiotherapy

1. Nuclear Transformation: Natural and artificial radioactivity, Decay constant, Activity, Physical and Biological Effective half-lives, Mean life, Decay processes, Radioactive series, Radioactive equilibrium

2. Interaction of radiation with matter: Attenuation, scattering, absorption, Transmission, Attenuation coefficient, Half Value (HVL), Energy transfer, Absorption and their coefficients, Photoelectric effect, Compton effect, Pair- production, relative importance for different attenuation processes at various energies.

Electron interactions with matter: Energy loss mechanism - Collision losses, radioactive losses, Ionisation, Excitation, Heat production, Delta rays, Polarization effects. Scattering, stopping power, absorbed dose, secondary electrons.

Interactions of charged particles: Ionization vs. Energy, stopping power, Linear Energy Transfer (LET), Bragg curve, Definition of particle range.

3. Basic Radiation Therapy Physics:

Historical developments in Radiotherapy, Physical components of telecobalt Unit/ Linear Accelerator Unit/ Remote after loading Brachytherapy Unit, / Gamma Knife Unit / Simulator and their descriptions,. Various types of sources used in Radiotherapy and their properties, Physics of Photons, electrons, protons and neutrons in radiotherapy, Physical parameters of dosimetry such as percentage depth dose, Tissue-Air Ratio, Tissue maximum Ratio, Physics of Bolus and phantom materials, Compensators, Wedges, Shielding Blocks, Patient immobilization devices, Port film, processing and development, Special techniques in Radiotherapy such as SRS, SRT, IMRT, IGRT and Tomotherapy. Beam Therapy:

Various sources used in Radiotherapy and their properties- Physics of Photons, Electrons, Protons and Neutrons in Radiotherapy. Physical Parameters of dosimetry- Phantoms – percentage depth dose – Factors affecting percentage depth dose – Tissue air ratio- Back scatter factor, Tissue maximum Ratio – Factors affecting TAR & BSF, TMR. SSD technique and SAD technique – Rotation technique- Conversion of percentage depth dose from one SSD to another – Time and Dose calculations in SSD, SAD and Rotation techniques-Worked examples.

4. Treatment planning Concepts:

Physics of Bolus & Phantom material-Isodose Curves- Comparison of isodose curves- measurement of isodose curve – factors affecting the isodose distribution –Wedge filters – Design of wedge filters – application of wedge filters in radiotherapy, and compensating

filters –Shielding Blocks, Patient immobilization devices, Port film, Processing and development-Dose calculations with isodose curves and wedge fields.

5. Basics of Pharmacokinetics & pharmacodynamics of the Cytotoxic and other drugs used for the management of cancer

D. Tumor Pathology and Radiotherapy applications

1. Introduction: Basic functioning of various organ systems, central of vital functions, pathophysiological alternation in diseased states, interpretation of symptoms &

sign in relation to pathophysiology- Pathological changes in various organs associated with tumors -Scope of radiotherapy, growth, the cell, Reproduction of cell, Tumours, benign and malignant, cause of cancer, spread of cancer in the body, Lymphatics, Metastasis, other uses of Radiotherapy, Biopsy purpose and method.

2. Pathology related to Onco-Radiotherapy practice: therapeutic intervention, possible distinction between different types of tumors, grading immunological effects & genetic alterations - various microorganisms - their pathogenic potential, important organism commonly seen - levels of therapeutic interventions possible in preventing and /or eradicating organism. Volume doubling times, potential volume doubling times, repopulation, and accelerated repopulation

3. Introduction to malignant tumor: Basic pathology-Carcinoma, Sarcoma & Lymphoma-Pattern of Spread, Biopsy/Investigations related to malignant tumor-staging work up and TNM.

Introduction of different malignant tumor treated in radiotherapy department including TNM Skin-lip-oral cavity & Para nasal sinus-nasopharynx-oropharynx-hypopharynx- larynx-thyroid-posterior oesophagus-mediastinum- lungs-pancreas-liver-breast-cervix-body of the uterus-vagina-ovary-kidney,ureter,bladder,rectum-prostate,penis,testis-pituitary gland tissue-bone marrow-CNS ,eye, orbit-soft tissue & bone-paediatric tumor, retinoblastoma, Wilms tumor, rhabdomyosarcoma.

3. Tumor localization

Radiological diagnostic procedures – X-ray, ultrasound, CT scan, MRI, Mammogram- Radio nuclide investigation Tumor localization & check film and application of simulation in radiotherapy.

Benign diseases- Radiotherapy in non-malignant diseases Application of radiotherapy in malignant condition

4. Biological effects of Radiation:

Effects of various radiation on normal tissues and malignant tumor: Early and late reaction on Skin, Mucous membrane, GI tract, Genito urinary system, respiratory system, CNS - Effects of radiation on living cell, action on cancer tissue - Radio-sensitivity of different tissues, skin reaction and their treatment, Reaction on muscle membrane, Late effects on workers, effects on blood, effects on reproductive organs, effects on other organs, Radiation sickness. Effect of low LET and high LET radiation on cell. Cell survival curves. Effect of sensitizing and protective agents. Dose modifying factors and their determination. Variation of response with growth and the progression of cell through the phases of cell cycle. Hyperthermic and photodynamic injury.

Biological hazards of irradiation - effects on the embryo and the fetus, life shortening, leukaemogenesis and carcinogenesis, genetic and somatic hazards for exposed individuals and population. Biological basis of radiological protection.-Importance of correct dosage, Blood supply, time factor, fractionation, Quality-Radical and palliative treatment.

5. Factors influencing radiation response.

Physical factors: dose, dose quality, dose rate temperature - Chemical factor: Oxygen, radio

sensitizers, radio protectors- Biological factors: Type of organism, cell type and stage, cell density and configuration, age, sex.- Host factors: Partial and whole body exposure.

6. Methods of Treatment of Malignant Disease:

Principle affecting the treatment of malignant disease; Chemotherapy, Hormone therapy, Radiotherapy and surgery in management of malignant disease, relative value of each method for individual tumors or tumor sites.

7. Choice of treatment:

Anatomical site, relation to other tissue, extent of tumor and histology, place of previous treatment, place of radical and palliative therapy.

8. Choice of Radiotherapy:

Tumor sensitivity, anatomical site, relation to other structure availability of equipment.

E. Radiotherapy Equipments, Applications & Maintenance

1. Radiotherapy Equipments;

Historical developments in Radiotherapy- Kilo voltage Unit-

Grenz Ray Therapy-contact therapy- superficial therapy- Deep therapy Megavoltage therapy-

Vande Graff generator –Physical components of Linear accelerator- Betatron- microtron – Cyclotron- Heavy particle beams.

Radio Isotope units –Physical Components of Cobalt 60 unit- source housing beam collimation and penumbra –Caesium 137 units – Advantages and Disadvantages – Gamma Knife unit –Simulator and its descriptions.

2. Linear accelerators: History, development, detailed description of modern, dual mode linear accelerator, Physical components of Linear accelerator- Betatron- microtron –

Cyclotron Linac head and its constituents, safety mechanisms, computer controlled Linacs, record and verify systems - accuracy of mechanical or digital readout for gantry, couch, and collimator rotation. Beam symmetry - jaw symmetry - uniformity checks - field flatness - wedges - wedge angle checking - mechanical safety - collision devices check

Equipment - Radiation field analyzer - film densitometry - Relative merits and demerits of Co-and Linac units.

3. Simulators: Need for them, detailed description of typical unit, CT Simulator - Mechanical movements - isocentre - gantry - collimator couch check - beam congruence of field delineators and collimators. Mechanical safety devices - installation of collision devices - auto centering of image intensifier camera

4. Teletherapy Beams

Characteristics of photon beams: Quality of beams, Difference between MV and Me, Primary and scattered radiations.

Percentage depth dose, Tissue-Air Ratio, Scatter Air Ratio, Tissue-Phantom Ratio, TissueMaximum Ratio, Scatter Maximum Ration, Back Scatter Factor, Peak Scatter Factor, Off-Axis Ratio, Variation of these parameters with depth, field size source-skin distance beam quality or energy, beam flattening filter, target material .Central axis depth dose

profiles for various energies.- Equivalent square concept, surface dose (entrance and exit),

skin sparing effect, Output factors.- Practical applications: Co-60 calculations (SSD and SAD

technique), Acceleration- calculations (SSD and SAD technique)-Beam profiles, Ionisation

curves, Charts Flatness, Symmetry, Penumbra (Geometric-Transmission and Physical), Field size definition.

5. Beam directing devices: Different types of collimators- penumbra trimmers-Front and back pointer-pin and arc. Tissue compensation-Field blocks-field shaping-multileaf collimator-IMRT concept-separation of adjacent fields. - Electron contamination – penumbra and penumbra trimmers – front and back pointer- pin and arc- their application in radiotherapy.

6. Brachytherapy:

Radioactive sources – exposures rate constant – calibration of –Brachytherapy sources-Brachytherapy methods-mould –Implant –intracavitary-radiography examination of implant – radiographic examination of intracavitary application and implant dosimetry – Radiographic verification of implant-Orthogonal verification of intracavitary application- dose calculation in intracavitary application- dose calculation methods. After loading systems-BARC Cs-137 kit-LDR remote after loading system and HDR remote after loading system-Physical components of LDR, HDR Brachy unit. Various type of sources used in brachy therapy and their properties.

7. Treatment planning concepts: Isodose chart-Measurement of isodose curves- parameters of isodose curves. Wedge filters-Wedge field techniques-Combination of radiation fields-Isocentric techniques-tumor dose specification. Simulator-treatment verification-Correction for contour irregularities-Corrections for tissue inhomogeneities. Treatment planning system-external beam planning-brachytherapy planning

8. Test cases - periodic checks of decay correction of output - repetition of quality assurance tests after software upgrade - speed of processor. Measurement of entry and exit doses - doses to critical organs.

9. The care and use of Equipment and responsibilities:

Common problems like inter locks PCB (Printed Circuit Boards) Observation of all apparatus (including timing and measuring devices) The reporting of faults

– care and use of accessory equipment – Beam directional devices – Applicators and diaphragms – lead rubber- skin. Marking – Ink – bolus bags – Immobilisation devices. Management of Radiotherapy machines – records supervision of patients work in other departments – administration – some legal points.

F. Radiotherapy Techniques

1. Importance of Immobilization in radiotherapy, Immobilization methods - Method of beam alignment - Treatment execution-Treatment verification -changes in patient position, target volume and critical volume during course of treatment.

2. Body in homogeneities: Effects of patient contour, Bone, Lung cavities, Prosthesis on dose distribution. Dose within bone /lung cavities, Interface effects,Electronic disequilibrium

3. Beam modifying and shaping devices: Wedge filters and their use, wedge angle , Wedge Factors , Wedge systems -Wedge Isodose curves Bolus, Build-up material, Compensators , Merits and Demerits.- Shielding of dose limiting tissue: Non-divergent and Divergent beam blocks, Independent jaws- Multileaf collimators, Merits and Demerits.

4. Electron Beam Therapy

Production of electron beams: using accelerators-Characteristics of electrons. Surface dose, percentage depth dose, beam profiles, Isodose curves and charts, Flatness and symmetry. Beam collimation, variation of percentage depth dose and output with field size, and SSD, photon contamination. Energy spectrum-Energy and field size choice, air gaps, and obliquity, Tissue in homogeneity lung, bone, air filled cavities. Field junctions - External and internal shielding. Arc therapy, use of bolus in electron beam. -Total skin Electron Irradiation, Intraoperative Radiation Therapy.

5. External beam therapy practical experience

Technique of fixed beam treatments- single field, parallel fields, multiple fields, regional fields. The use of wedge filters, compensators and shaping blocks, diaphragms and applicators. Immobilization of the patient- Rotation and arc therapy-beta ray and electron beam therapy. Care of machine-Set up single, multiple fields-Use of wedges, shields and tissue compensators-Use of beam directional devices, methods of patient immobilization- Knowledge of technique involving electron beam therapy-moving beam therapy-conformal therapy-stereo tactic radio surgery and radiotherapy-Handling emergencies in Teletherapy **6.CT planning-MRI**

planning-Interpretation of treatment prescription-Record keeping relevant to planning – patient position, support, immobilization, Land marks Mould room techniques and immobilization.

Treatment positioning in radiotherapy to various cancers; CNS-benign-pituitary-craniopharyngioma etc. Malignant tumor-primary and secondary; orbit-eye –middle ear- parotid-buccal mucosa-tongue-hard palate-maxillary antrum- naso pharynx-oropharynx- hypo pharynx- larynx- oesophagus- media sternum- lung- bladder-prostate-penis- testis-cervix-body of the uterus—vagina-vulva-lymphoma

7.Mould room technique:

Construction of casts-Construction of applicator and moulds-Construction of shields

8.Chemotherapy-Chemo-radiation- concepts of combined modality treatment and the significance of radiation and chemotherapy in comprehensive management of cancer.

Sequelae associated with multimodality therapy and their management.

SYLLABUS FOR TECHNICAL ASSISTANT

1. Basic concept of

- (i) Cells and its organelles
- (ii) Basic anatomy and Position of body parts
- (iii) Cardiovascular System
- (iv) Digestive System
- (v) Excretory System
- (vi) Reproductive system
- (vii) Musculo skeletal System

2. Biochemistry

(a) Chemical Structure Function and metabolism of

- (i) Carbohydrate
- (ii) Proteins
- (iii) lipids

(b) Enzymes

- (i) Definition and general characteristics
- (ii) Nomenclature and classification
- (iii) Factors affecting enzyme activity
- (iv) Enzymes Patterns in disease

(c) Vitamins and Minerals

Sources, Daily requirement, metabolism functions and deficiency diseases of

- (i) Fat soluble vitamins (A, D, E. K)
- (ii) Water soluble vitamin (B complex)

(d) Acid base balance, water and electrolyte balance

(e) Biochemical tests

- (i) Blood sugar
- (ii) Blood urea

- (iii) Serum bilirubin
- (iv) Serum cholesterol

3. Pathology

- (i) Inflammation
- (ii) wound healing
- (iii) Neoplasia
- (iv) Pathological tests for
 - Urine
 - Stool
 - Sputum

- (v) Gangrene
- (vi) Thrombosis
- (vii) Ulcer
- (vii) Abscess

4. Microbiology

- (i) Sterilisation and disinfection
- (ii) Basic concept of bacteria, virus and fungus
- (iii) Pathology, treatment and epidemiology of diseases caused by bacteria virus and fungus
- (iv) Collection and Labeling of Specimens

5. Pharmacology.

- (i) General Principles of pharmacology
 - (a) Doses
 - (b) forms
 - (c) Prescription writing
 - (ii) Nature of drug and its administration
 - (iii) Common drug used: Indication contraindication and adverse effect of
 - (a) Analgesics
 - (b) Antibiotics
 - (c) Antifungal
 - (d) Antiviral
 - (e) Antitubercular
 - (d) Drugs used in acute emergency
6. Recording of temperature, Pulse, respiration and blood pressure
7. Injection Routes and Process (IM/IV)
8. IV cannulisation
9. Fluid & blood transfusion
10. Wound clearing and Bandaging
11. First aid and emergency care
12. Administration of enema
- 13 Basic knowledge and management of
- (i) Hemorrhage
 - (ii) Burn
 - (iii) Electric Shock
 - (iv) unconsciousness
 - (v) Drowning
 - (vi) Snake Bite / Scorpion Bite / Bee Bite/ Dog Bite
 - (v) Abdominal Pain/colic
 - (vi) Constipation
 - (vii) Mouth ulcer/Toothache
 - (viii) Sunstroke

- (ix) Epilepsy
- (x) Fever/Common cold
- (xi) Headache
- (xii) Cough/Asthma
- (xiii) Conjunctivitis
- (xiv) Night blindness

SYLLABUS FOR X-RAY MECHANIC

1. Fundamental of electricity. Electron theory- free electron. Fundamental terms, definitions, units & effects of electric current.
2. Solders, flux and soldering technique. Resistors types of resistors & properties of resistors.
3. Explanation, Definition and properties of conductors, insulators and semi-conductors. Voltage grading of different types of Insulators, Temp. Rise permissible Types of wires & cables standard wire gauge Specification of wires & Cables- insulation & voltage grades -Low , medium & high voltage Precautions in using various types of cables.
4. **Ohm's Law** - Simple electrical circuits and problems. **Resistors** -Law of Resistance. Series and parallel circuits. **Kirchoff's** Laws and applications. Wheatstone bridge principle and its applications .
5. Common Electrical Accessories, their specifications-Explanation of switches lamp holders, plugs and sockets .Developments of domestic ckt, Alarm & switches, lamp, fan with individual switches, two way switch.
6. **Chemical** effect of electric current-Principle of electrolysis. Faraday's Law of electrolysis. Basic principles of Electro-plating and Electro chemical equivalents. Explanation of Anodes and cathodes. Lead acid cell-description, methods of charging-Precautions to be taken & testing equipment, Ni-cadmium & Lithium cell, Cathodic protection. Electroplating, Anodising.
7. Rechargeable dry cell, description advantages and disadvantages. Care and maintenance of cells Grouping of cells of specified voltage & current, Sealed Maintenance free Batteries, Solar cell.
8. Lead Acid cell, general defects & remedies. Nickel Alkali Cell-description charging. Power & capacity of cells. Efficiency of cells.
9. Marking use of chisels and hacksaw on flats, sheet metal filing practice, filing true to line.
10. Sawing and planing practice. Practice in using firmer chisel and preparing simple half lap joint.
11. Drilling practice in hand drilling & power drilling machines. Grinding of drill bits.
12. Practice in using taps & dies, threading hexagonal & square nut etc. cutting external threads on stud and on pipes, riveting practice.

13. Practice in using snips, marking & cutting of straight & curved pieces in sheet metals. Bending the edges of sheets metals. Riveting practice in sheet metal. Practice in making different joints in sheet metal in soldering the joints.
14. **Magnetism** - classification of magnets, methods of magnetising, magnetic materials. Properties, care & maintenance, methods of magnetising magnetic materials. Para & Diamagnetism and Ferro magnetic materials. Principle of electro-magnetism, Maxwell's corkscrew rule, Fleming's left & right hand rules, Magnetic field of current carrying conductors, loop & solenoid. **MMF**, Flux density, reluctance. **B.H.** curve, Hysteresis, Eddy current. Principle of electro- magnetic Induction, Faraday's Law, Lenz's Law. Electrostatics - Capacitor-Different types, functions & uses.
15. **Resistance**- Different Types of resistors used in electrical ckts. Specification of resistance and tolerance. Effect of variation of temperature on resistance. Different methods of measuring the values of resistance.
16. Working principles and circuits of common domestic equipments & appliances.
17. **D.C. Machines** - General concept of Electrical Machines. **Principle of D.C. generator.** Use of Armature, Field Coil, Yoke, and Commutator, slip ring Brushes, Laminated core. Explanation of **D.C. Generators**- types -parts. **E.M.F.** equation-self excitation and separately excited Generators- Practical uses. Brief description of series, shunt and compound generators.
18. Expl. Of Armature reaction, interpoles and their uses, connection of interpoles, commutation.
19. **DC Motors - Terms** used in D.C. motor-Torque, speed, Back-e.m.f. etc. their relations practical application. Related problems
20. Types, characteristics and practical application of D.C. motors. Special precaution to be taken in DC Series motors. Starters used in D.C. motors
21. Types of speed control of DC motors in industry Word-Leonard control, Thyristor/electronic controls.
22. **Electric wirings**, importance, I.E.E.rules. Types of wirings both domestic & industrial - Specifications for wiring - Grading of cables and current ratings. Principle of laying out in domestic wiring-testing by meggar **Wiring system** - Using casing capping, P.V.C., concealed system. Maintenance & Repairing data sheet preparation. Specifications, standards for conduits & accessories
23. **Earthing** - Principle of different methods of earthing. Importance of Earthing.-Earth Leakage Relay.
24. **Alternating Current** - Comparison D.C & A.C. , Advantages of A.C. Alternating current & related terms frequency Instantaneous value, R.M.S. value Average value, Peak factor , form factor. Generation of sine wave, phase and phase difference. Inductive & Capacitive reactance X_L & X_C ,

Impedance (Z), power factor,(P.f) ; Vector diagram. Active and Reactive power, Simple problems on A.C. circuits, single phase & three-phase system etc. Problems on A.C. ckts. Both series & parallel power consumption P.F. etc. Concept three-phase Star & Delta connection Line voltage & phase voltage, current & power in a 3 phckt, with balanced and unbalanced load.

25. **TRANSFORMERS** Working principle of Transformer, classification C.T., P.T. Instrument and Auto Transformer/Variac Construction, Single phase and Poly phase. E.M.F. equation, parallel operation of transformer, their connections. Regulation and efficiency, Cooling of transformer, protective devices. Specifications, simple problems on e.m.f. Equation, turn ratio, regulations and efficiency. Special transformers. **Transformer** - construction coreswinding shielding, auxiliary partsbreather,conservator buckholtzrelay, other protective devicescooling of transformer Transformer oil testing and Tapchanging off load and on load. Transformer bushings andtermination.
26. **ALTERNATOR** – Explanation of alternator, prime mover, types, regulations, phase sequence, specification of alternators and brushless alternator. Automatic Voltage Regulator.

27. **Electrical measuring Instruments -**

- Types

Deflecting torque, Controllingtorque & Damping torque ,

- Moving coil permanent magnet

- Moving iron

- Range extension

- Multimeter

- Wattmeter

- P.F. meter

- Intergrading type, Digital Energymeter – megger.

- Energy meter

- Frequency meter

- Tri vector meter

- Max Demand meter

- Phase Sequence indicator

- Multimeter –Analog and Digital

- C.R.O,

28. Explanation of light White light-illumination factors,intensity of light –importance of light, human eye factor units. Types illumination & lamps -Neon sign Halogen, Mercury vapour, sodium vapour, Fluorescent tube CFL, Solar lamp applications, Concept of Energy -Characters watt ages, fixing places. Types of lighting. Decoration lighting Drum Switches, Direct & indirect lighting-efficiency in lumens per watt, colour available. Thumb rule calculations of lumens.Estimating placement of lights and fans and ratings.
29. **TRANSFORMER – winding** , Principle of different winding techniques
30. **D.C. m/c Winding**-- pole pitch,coil pitch, back pitch, front pitch , Lap & Wave winding, Progressive and retrogressive winding.
31. **SYNCHRONOUS MOTOR** - Working principle, effect of change of excitation and load. Application in industry in power factor improvement.
32. **Induction motor** – Working principle, Squirrel Cage Induction motor , Slip-ring induction motor- Construction and characteristics, starting and speed control. D.O.L Starter, Star /Delta starter, Autotransformer starter. **Single phase induction motor**- Working principle, different method of starting and running (capacitor start/capacitor run, shaded pole technique). FHP motors.
33. **A.C. m/c Winding**-- Armature winding terms, coil side, end coil and grouping of coils. Connection to adjacent poles, connected armature winding, alternate pole connection, armature winding.
34. **Universal motor**-advantages Principle, characteristics, applications in domestic appliances and industry, Fault Location and Rectification.
35. **Converter**-inverter, M.G.Set-description-Characteristics, specifications-running and maintenance.
36. Techniques, procedures of Layout of conduit wiring as per I.S-732- 1963. Use of flame proof and explosion proof, Installation of P.V.C. conduct switches.
37. **Fuse / cut out / kit Kat** – function, characteristics, and materials. H.R.C Fuses – application. Contactors – Miniature circuitbreakers. **Relays** – Thermal, Electromagnetic,solid state relays, Control Relays and Protective Relays.
38. **Industrial wiring**. Code of practice & relevant span. Wiring of electric motors, control panel, etc. Types, specifications, advantages of different types of circuit brackets construction and maintenance. I.E.E. rules for overhead service lines, study of U.G.Cables and laying techniques. Working principle and construction of domestic and agricultural appliances-their maintenance.

39. Corona, Lightning arrestor/lighting conductor, Horn gap.
40. Introduction to **Basic electronics**- Semiconductor energy level atomic structure. 'P' & 'N' type of materials – P-N-junction. Diode-classification of Diodes – Reversed Bias and Forward Bias , Heat sink. Specification of Diode – PIV rating.
41. Explanation and importance of D.C. Rectifier ckt. Half wave, Full wave and Bridge ckt. L.E.D. and Solar cells. Filter ckts-passive filter. Working principle and uses of an oscilloscope.
42. Explanation of principle of working of a transistor- Types of transistors Characters of a transistors Biasing of transistors. Mode of use of transistor. Specification and rating of transistors.
43. Explanation of transistor Amplifiers, Amplifiers. – class A,B & C Power amplifier.
44. Explanation of oscillator-working principle Explanation of stages and types. Multivibrator– applications.
45. OP-AMP – Working principles and applications. Timer I.C.555
46. Explanation. and working principle and practical applications of U.J.T., F.E.T., S.C.R. Diac, Triac, power MOSFET, G.T.O & I.G.B.T.
47. D.C/A.C Power control using power transistor, thyristor. Voltage stabilizer, U.P.S. DC/AC motor drives using transistor/ thyristor.
48. Power Supply Stabilizer, Ferro resistant circuit. DC/AC motor drives using Thyristor/Transistor control.
49. **Digital Electronics** -Binary numbers, logic gates and combinational ckts, Flip Flops, Counter, Register & Timer.

Syllabus for x-ray Technician/Radiographer

(1) Human Anatomy - & Physiology

Scope of Anatomy and Physiology - Definitions and Terms in Anatomy and Physiology- Structure and function of human cell - Elementary tissues of human body- Brief account on Composition of Blood - functions of blood elements - Blood Group and coagulation of blood.

- (i) Cardio Vascular System (Structure and functions of various parts of the heart, arterial and venous system, brief account on common cardiovascular disorders).
- (ii) Respiratory System (various parts of respiratory system and their functions, Physiology of Respiration).
- (iii) Digestive System (names and various parts of digestive system-Liver, Spleen, Gall Bladder, Pancreas, Buccal Cavity, Pharynx, Oesophagus, Stomach, intestine etc.-physiology of digestion and absorption)

- (iv) Urinary System (various parts of urinary system and its function-structure and function of kidneys-physiology of urine formation - pathophysiology of renal disease and edema.)
- (v) Reproductive System (physiology and anatomy of Male & Female reproductive system-Prostate & Uterus& Ovaries etc.)
- (vi) Musculoskeletal System (Classification of bones & joints, structure of skeleton –structure of skeletal muscle –physiology of muscle contraction)
- (vii) Nervous System (various parts of nervous system- Brain and its parts –functions of nervous system - SpinalCord & Nerves).
- (viii) Ear, Nose, Throat and Eye (Elementary knowledge of structure and functions of organs of taste, smell,hearing, vision.)
- (ix) Endocrine System (Endocrine glands ,their hormones and functions-Thyroid, Parathyroid, Suprarenal, Pituitary, pituitary and Thymus)
- (x) Haemopoietic and Lymphatic System (Name of the blood vessels & lymph gland locations).
- (xi) Surface Anatomy & Surface Markings of Human Body.

2. Radiology Physics, Radiation Physics & Physics of Diagnostic Radiology -

Basic concepts of power, work, force, energy, electricity, magnetism and their units and measurements- einstein's formula – electromagnetic induction – Atomic structure – radioactivity- ionization and excitation - electromagnetic waves – X-rays production and properties – X-ray tube - quality of x-rays – factors affecting quality and intensity of x-rays. X-ray circuits - interaction of X and gamma rays - X-radiation measurements etc. Principles of Radiation detection and measurements – TLD, Pocket Dosimeter, Radiation Survey meter and radiation zone monitor. Study with charts, models & power point presentations Atomic structure, X-ray tubes, X-ray circuits involving students to present and discuss.

3. X-Ray Machines & Accessories and their Maintenance

X-ray machines – Anode & Cathode - Thermionic diode – X-ray valves and tubes – principle and practical aspects – semiconductors – triode valves – cathode ray oscilloscopes – X-ray circuits – self rectifying circuits – half wave pulsating voltage circuits – full valve pulsating voltage circuits - measurement of high voltage – control of KV circuit – mA circuit. X-ray beam quality

4. X-ray Film / Image processing Techniques

X-ray Films- X-ray cassettes - Intensifying screens X-ray films types – basic filmstructure & quality – choosing films for different studies - basics on hard copies of radiographic images – dry & wet processing – Fixer –Developer –film processing methods - manual and automatic processing – conventional & modern image processing rooms – image processing equipments – types & maintenance – day light systems advantages & disadvantages – processing faults – glossy prints, paper prints etc – production of best quality images. Intensifying screen- Fluorescence -structure of

Intensifying screens – Cassette types – screen un-sharpness etc.

5. Clinical Radiography-Positioning

Radiological Equipments – X-ray machine - transformers, x-ray units, fluoroscopy, grids and filters - Positional Radiography - Radiographic views of different parts of the body – Chest, Abdomen, Upper Limb, Cervical & Thoracic Spine, Lumbar Spine, Sacrum & Coccyx, Bony thorax - Sternum & Ribs, Skull and cranial bones, facial bones, paranasal sinuses, Mastoids & Temporal bones etc. Upper & Lower GIT, Gall Bladder & Biliary duct, GUT etc.

6. Equipments, basic Techniques of modern Imaging Modalities - (50 hrs)

C.R (principle, equipment & imaging)

Digital Radiography (principle, equipment & imaging)

Mammography (basic principle, equipment & image acquisition)

CT (Basic physics – Tomography principle - basics of plain studies, contrast studies, special procedures)

MRI (basic principle – imaging methods - slice section- plain & contrast studies – image contrast – factors affecting image quality)

USG (Basic acoustics - ultrasound terminologies – Interaction of US with matter –Ultrasound display modes etc) Demonstration of basic procedures in all modern modalities.

7. Contrast & Special Radiography procedures.

Barium swallow - barium meal - barium enema (single and double contrast), Enteroclysis
PTBD, Sinograms, Fistulograms, IVU, AUG, MCU, HSG, Sialogram, T-tube Cholangiogra
–Fluroscopy, Image intensifiers - Tomography basics, etc

8. Quality Control in Radiology & Radiation Safety

Quality control procedure in Radiology as per NABH.

Biological effects of Radiation – Radiation dose –Effects of time, distance and shielding – personnel and area monitoring – Planning of X-ray rooms, dark rooms – Evaluation of workload versus radiation factors – Radiation safety instruments - ICRP / AERB recommendations.

SYLLABUS OF ECG TECHNICIAN

A. HUMAN ANATOMY & PHYSIOLOGY

1. Study of General Anatomy and Physiology of Human Body

2. Anatomy of Circulatory System-

- Size of the Heart
- Position
- Coverings
- Chambers
- 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

B. PHYSIOLOGY OF CARDIOVASCULAR SYSTEM

- (i) Function of Cardiovascular system.
 - Cardiac cycle,
 - Functional tissue of heart & their function,
- (ii) Cardiac output, Blood pressure, Heart Rate
- (ii) E.C.G: Basic principle of Electrocardiogram

ECG (ELECTROCARDIOGRAM)

- History of ECG.
- Cardiac Electrical Activity
- Anatomical orientation of heart
- Cardiac cycle,
- Cardiac impulse formation & Conduction,
- Recording of long axis cardiac 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.
- Interpretation of normal ECG,
- Electro- cardio- graphic features,
- Rate & regularity,
- P wave, PR interval, QRS complex,
- ST segment, T wave, U wave, QTc interval,
- Cardiac rhythm.
- Interval measurement,
- Horizontal measurement,
- Vertical measurement,
- ECG wave's interval & segments.
- Heart Rate
- Introduction,
- Measuring of heart rates using caliper.
- Electrical Axis
- Determining electrical axis,
- Normal axis,
- Right Axis Deviation & Left Axis Deviation ,
- Methods of electrical axis estimation.
- Assessment of arrhythmias,
- Supraventricular v/s ventricular rhythms,
- Rhythmic Disorders.

C. CARDIAC DISEASES & TERMINOLOGY

- CAD (Coronary Artery Diseases),
- Effects of MI injury & infarction on ECG, Manifestation of Q wave infarction,
- Manifestation of non-Q wave infarction,

- Anterior infarction
- Antero-Lateral infarction,
- Inferior infarction

- Enlargement of chambers & Hypertrophy, Conduction defect,
- AV block First degree,
- AV block second degree,
- AV block third degree,
- AV block bundle,
- Branch Block,
- RBBB, LBBB
- Chamber Enlargement:
 - (i) Right Atrial Enlargement
 - (ii) Left Atrial Enlargement
- Hypertrophy
 - (i) Right ventricular hypertrophy
 - (ii) Left ventricular hypertrophy
- Biventricular hypertrophy.

D. Clinical Cardiology.

- (i) Basic Principles of instruments,
 - (ii) Recording the electro cardiogram,
 - (iii) Correct & incorrect lead placement.
 - (iv) Chest leads, Limb leads,
 - (v) Display of 12 standard lead ECG,
 - (vi) Recognition & interrelation of ECG Equipment,
 - (vii) Usage (Pediatrics/Adults.)
-
- Indication, Contraindication, Repair & maintenance (operations, calibrations servicing) ECG Monitoring in ICCU patient,
 - Recording of holter/stress ECG,
 - Ambulatory BP.
 - Temporary- pace-maker/ permanent pace maker,
 - Coronary Angiography,
 - Coronary Angio Plasty,
 - Balloon Plasty,
 - Cardiac Resynchronisation Therapy,
 - Cardiac Resynchronisation Therapy with Dfibrillator

SYLLABUS OF OCCUPATIONAL THERAPIST (BOT)

A. General Anatomy:

- (1) Cell: Parts, Name of Cytoplasmic organelles and inclusion with their Functions.
- (2) Epithelium: Types with examples and light microscopic structure.
- (3) Connective Tissue: Classification with emphasis to tendon and ligament.
- (4) Cartilage: Types with example.
- (5) Bone: Types with example, types of Ossification (Stage of Ossification not required).
- (6) Joints: Classification with example, emphasis to synovial joints.
- (7) Muscles: Types (details of EM picture not required).
- (8) Nervous tissue: Structure of a Neuron, Synapse Reflex arc, Degeneration and Regeneration of the Nerve, typical spinal nerve.
- (9) Embryology
 - (a) Ovum, Spermatozoa, fertilization and formation of germ layers and their

derivations.

- (b) Development of skin, fascia, blood vessels, lymphatic.
- (c) Development of bones, axial and appendicular skeleton and muscles.
- (d) Neural tube, development of spinal cord, Brain stem and brain (cerebrum, cerebellum)

B. General Physiology

1. Introduction and scope of Physiology
2. Cell and tissue-Its structure, principal constituents, properties and functions including cell division.
3. Body Fluid.
 - (a) Blood: Composition and general functions of plasma. Blood cells – structure and function - Red Blood cells, white Blood Cells – including numbers and approximate length of life – position, structure and function of cells of Reticulo endothelial system.
 - (b) Blood clotting including bleeding time and clotting time, factors accelerating or slowing the process. Blood groups and their significance, Rh-factor, Hemoglobin and E.S.R.
 - (c) Formation of Blood, tissue fluid and lymph.
4. Cardio-Vascular System.
 - (a) Structure and properties of Heart Muscles and nerve supply of Heart.
 - (b) Structure and functions of arteries, capillaries and veins.
 - (c) Cardiac cycle and Heart sound.
 - (d) Cardiac output measurements, factors affecting Heart Rate and its regulation.
 - (e) Cardio-vascular reflexes.
 - (f) Blood pressure, its regulation, physiological variation, peripheral resistance, Factors Controlling Blood Pressure, Hemorrhage.
 - (g) ECG study and stress test.
5. Respiratory System.
 - (a) Mechanism of Respiration, Changes in diameter of thorax, Intra-pleural and Intra-pulmonary pressure.
 - (b) Quantities of lung volume, tidal and residual volume, vital capacity.
 - (c) Gaseous inter-changes in lung and tissues.
 - (d) Control of respiration-Nervous and chemical significance of changes in rate and depth, transportation of oxygen and carbon dioxide.

- (e) Respiratory states-anoxia, asphyxia, Cyanosis, Acclimatization.
- 6. Digestive System
 - (a) General arrangement of alimentary canal, liver, pancreas -position, structure and functions.
 - (b) Nutrition and Diet-carbohydrate, protein, fat, salts, water, vitamins and minerals digestion, absorption and Metabolism.
- 7. Reproductive System.
 - (a) Sex determination and development of puberty, male sex hormones, spermatogenesis, Female sex hormones, menstrual cycle. Ovulation, pregnancy, Function of placenta, lactation.
- 8. Excretory System.
 - (a) Gross and minute structures of kidney, renal circulation, Mechanism of formation of urine, Glomerular filtration rate and tubular function, renal function and renal tests. Physiology of micturition.
- 9. Endocrine System.
 - (a) Structure and function of pituitary (anterior & posterior). Thyroid, Parathyroid, adrenal cortex, adrenal medulla, Thymus and pancreas.
 - (b) Blood sugar regulation.
- 10. Skin-Structure and functions.

BIO-CHEMISTRY

- (1) Bio-Physics: Concepts of Ph and buffers, Acid-base equilibrium, osmotic pressure and its physiological applications.
- (2) Cell: Morphology, Structure and functions of cell, cell membrane, Nucleus, Chromatin, Mitochondria, endoplasmic reticulum, ribosome.
- (3) Carbohydrates, Lipids & proteins & Metabolism: Definition, functions, sources, classification & metabolism
- (4) Vitamins: Classification, Fat soluble vitamins A,D,E,K Water soluble vitamins-B Complex and Vitamin 'C', Daily requirement physiological functions and disease of vitamin deficiency.
- (5) Bio-Energetic: Concept of free energy change, Energetic reaction and endergonic reactions, Concepts regarding energy rich compounds, Respiratory chain and Biological oxidation.
- (6) Water Metabolism: Fluid compartments, Daily intake and output, Dehydration, Sodium and potassium Metabolism.
- (7) Mineral Metabolism: Iron, Calcium, Phosphorous, Trace elements.
- (8) Nutrition: Nutritional aspects of carbohydrate, fat and proteins, Balanced diet, Metabolism in exercise and injury, Diet for chronically ill and terminally ill patients.
- (9) Connective Tissue: Mucopolysaccharides, Connective tissue proteins, Glyco-proteins, Chemistry and Metabolism of bone and teeth.
- (10) Nerve Tissue: Composition, Metabolism, Chemical mediators of nerve activities.
- (11) Muscle Tissue: Structure, Metabolism of muscles, Muscle contraction.
- (12) Hormones: General Characteristic and Mechanism of Hormone actions.

FUNDAMENTAL OF OCCUPATIONAL THERAPY-I

- (1) Definition and scope of Occupational Therapy.
 - (a) History & development of Occupational Therapy.
 - (b) Philosophy of Occupational Therapy & Rehabilitation, Rehab team, referral mechanism, need of rehabilitation. Principles of physical medicine.

- (c) Application of Occupational Therapy-Occupational Therapy process.
 - (d) Introduction to Models of Occupational Therapy
- (2) Theory of Occupation:
- (a) Forms of occupation, occupation as evolutionary trait, Biological dimensions.
 - (b) Social dimensions, Psychological dimensions of occupation, Application of theory to Occupational Therapy.
- (3) Occupational Therapy practice frame work
- (a) Domain
 - (b) Occupations
 - (c) Client factors
 - (d) Performance skills
 - (e) Context and environment
 - (f) Process
- (4) Principles of Therapeutic Exercise :
- (a) Generalized & specific principles.
 - (b) Types of Movements, Muscle contraction used in exercise.
 - (c) Exercise classification & application to activity.
 - (d) Objective to develop i) Power ii) Endurance iii) Coordination iv) ROM
 - (e) Progressive resistive exercise (PRE), Regressive resistive exercise (RRE), brief repetitive isometric exercise (BRIME)
 - (f) Breathing Exercise
- (5) Therapeutic Modalities:
- (a) Purposeful activity & characteristics
- (6) Activity Analysis:
- (a) Principles of activity analysis
 - (b) Biomechanical & sensory motor
 - (c) Adapting & grading activity
 - (d) Selection of activity
- (7) Principles and methods of Assessment:
- (a) Joint range of motion
 - (b) Muscle strength
- (8) Definition, classification, variation in testing methods of following:

Muscle Tone:

- (a) Definition of tone.
- (b) Normal Muscle tone
- (c) Abnormal Muscle tone
- (d) Muscle tone assessment-
- (e) Modified Ashworth Scale

Coordination:

- (a) Definition
- (b) Characteristics of coordinated movements
- (c) Inco-ordination, Cerebellar signs, Extra pyramidal signs\
- (d) Assessment of co-ordination

Sensation:

- (a) Definition.
- (b) Classification of sensations.
- (c) Techniques and methods of Sensory evaluation. Specific sensory testing.

Perception:

- (a) Definition.
- (b) Components and description of each component. Assessment methods

Cognition:

- (a) Definition.
- (b) Evaluation of cognitive Skills: Attention,
- (c) Orientation, Memory (Immediate, Short term and
- (d) Long term Memory), problem solving and
- (e) Executive functions.

Endurance:

- (a) Definition.
- (b) Importance of Endurance in performance.
- (c) Factors affecting endurance.
- (d) Relation to activity tolerance.

- (8) Human Development:
 - (a) Theories of development
 - (b) Overview of motor, cognitive, psychosocial, language & Play development
 - (c) Principal of maturation
- (9) Activities of daily living –
 - (a) Definition
 - (b) Classification
 - (c) Evaluation of ADL
 - (d) Various scales used in ADL (FIM, Barthel, Katz, Home management checklist)
 - (e) Principles & specific techniques in ADL training for:
 - I. Weakness
 - II. Low endurance
 - III. Limited ROM
 - IV. In co-ordination
 - V. Loss of use of one side of body
 - VI. Limited vision
 - VII. Decreased sensation
 - (f) Achieving access to home, community & work place.
 - I. Environment modification
 - II. Driver Rehab
 - (g) Adaptation:
 - i. Adaptation process
 - ii. Principal of adaptation
 - iii. Introduction to adapted devices
 - iv. Designing of adaptive devices: Explain design and fabrication of common adaptive devices with knowledge of material and equipment used for the same. Briefly explain application of the same in occupational therapy.
 - (h) Cultural & socio-economical deviations in ADL

- (10) Occupational Therapy as diagnostic & prognostic procedure –
 - (a) Definition of evaluation
 - (b) Types of evaluation
 - (c) Steps involved in evaluation

- (11) Preparing for return to work -
 - (a) Prevocational capacity evaluation
 - i. Work capacity evaluation
 - ii. Physical capacity evaluation
 - iii. Functional capacity evaluation
 - iv. Discharge plan

- (12) Crafts: Knowledge of tools, equipment, materials, their therapeutic values & uses.

- (13) Hand function & evaluation methods:
 - (a) Functional anatomy of hand
 - (b) Prehension and grasp patterns.
 - (c) Grip & pinch strength.

- (14) Introduction to hand splints: Definition, Classification, principles, material used in designing & fabrication.

- (15) Recreational Activities: Outline the use of the following recreational activities as a therapeutic medium. Plan the following activities for various patient groups.
 - (a) Sports
 - (b) Games
 - (c) Picnic
 - (d) Drama
 - (e) Leisure & hobbies
 - (f) Music
 - (g) Play

E. PATHOLOGY & MICRO BIOLOGY

Pathology

- (1) Aims and objectives of study of pathology.
- (2) Brief outline of cell injury, degeneration, necrosis and gangrene.
- (3) Inflammation: Definition, vascular and cellular phenomenon, difference between Transudate and exudates, Granuloma.
- (4) Circulatory disturbances: Hemorrhage, Embolism, Thrombosis, Infarction, shock, Volkmann's ischemic contracture.
- (5) Blood disorder: Anemia, Bleeding disorder.
- (6) CVS: Heart and Blood vessels, Coronary heart disease.
- (7) Respiratory System: Ch. Bronchitis, Asthma, Bronchiectasis, Emphysema, COPD etc.
- (8) Bones and Muscles: Arthritis & Spondyloarthropathy.
- (9) PNS and Muscles: Neuropathies, Poliomyelitis & Myopathies.
- (10) CNS: Infection, Demyelinating disease, Degenerative disease.
- (11) Neoplasia.
- (12) Growth and its disorders like hypertrophy, hyperplasia & atrophy.
- (13) Autoimmune diseases.
- (14) Healing and repair.
- (15) Diabetes mellitus and gout.

Section B: Microbiology

- (1) Introduction and History of Microbiology
- (2) General lectures on Microorganisms (brief).
- (3) Sterilization and asepsis.
- (4) Infection- Source of infection and Entry and it's Spread
- (5) Immunity- Natural and Acquired
- (6) Allergy and hypersensitivity.
- (7) Outline of common pathogenic bacteria and diseases produced by them.
 - (a) Respiratory tract infections.
 - (b) Meningitis.
 - (c) Enteric infections.
 - (d) Anaerobic infections.
 - (e) Urinary tract infections.
 - (f) Leprosy, tuberculosis and miscellaneous infections.
 - (g) Wound infections.
 - (h) Sexually transmitted diseases.
 - (i) Hospital acquired infections.
- (8) Virology- virus infections with special mention of Hepatitis.
- (9) Poliomyelitis & rabies.

(F) PHARMACOLOGY

- (1) General Pharmacology:-Introduction and definitions, Nature and sources of drugs: Dosage forms of drugs. Routes of drug administration, Pharmacokinetics (Absorption, Bioavailability, Distribution, Metabolism Excretion, First order Zero order Kinetics); Pharmacodynamics (sites and mechanisms of drug action in brief, Adverse drug reactions, Margin of safety of drugs and factors influencing dosage and drug response)
- (2) Drugs Affecting ANS: - General Introduction, Drug affecting parasympathetic nervous system, Drug affecting sympathetic nervous systems.
- (3) Drugs Affecting Peripheral (Somatic) nervous System:- Skeletal Muscle Relaxants: Local Anesthetics.
- (4) Renal and CVS:- Diuretics; Renin-angiotensin system and its inhibitors, Drug treatment of Hypertension, Angina pectoris, Myocardial infarction Heart failure, and hypercholesterolemia.
- (5) Anti-inflammatory drugs and related autacoids:- Histamine, Bradykinin, 5-HT and their antagonists; Prostaglandin's and leukotrienes; Nonsteroidal-Anti-inflammatory drug, Antirheumatic drugs and drugs used in gout.
- (6) Drugs Affecting CNS:- General anesthetics, Anxiolytics and hypnotics; Alcohol, Opioid analgesis Drug dependence and abuse Antiepileptic drugs, Drug therapy for Neurodegenerative disorders.
- (7) Endocrines:- Parathyroid hormone, Vitamin D, calcitonin and drugs affecting Calcium balance, Thyroid and antithyroid drugs; Adrenocortical and anabolic steroids, Insulins and Oral Hypoglycaemic agents.
- (8) Drugs Affecting Respiratory System:- Drug therapy of bronchial asthma and chronic obstructive pulmonary disease.
- (9) Chemotherapy:- Introduction; sulfonamides, Fluoroquinolones, Penicillins, Cephalosporins, Newer B-lactam antibiotic, aminoglycosides, Macrolides and Newer antibiotics, Tetracyclines, Chloramphenicol, Chemotherapy of Tuberculosis and leprosy, antiseptics and disinfectants.
- (10) Miscellaneous Topics:- Management of stroke, Toxicology and heavy metal poisoning, special aspects of paediatric and geriatric pharmacology; Drug interactions with drugs commonly used by physiotherapists; Hematinics, vitamins and antioxidants.

(G) ERGOTHERAPEUTICS

- (1) Industrial Rehabilitation;
 - (a) Evaluation and assessment of work process & factor that might bias assessment result
 - (b) Occupational injuries of back, upper limb and evaluation and prevention of injuries.
 - (c) Return to work
 - (d) Job simulation
 - (e) Work conditioning and work hardening
 - (f) Job site analysis
 - (g) On site therapy
 - (h) Pre-vocational and vocation assessment
 - (i) Employment and types of employment
 - (j) Human engineering
 - (k) Decision making
 - (l) Laws: OSHA
 - (m) Work samples: TOWER, WEST, BTE, VALPAR
- (2) Overview of Ergonomics:
 - (a) Definition
 - (b) Principals of ergonomics
 - (c) Role of occupational therapy in ergonomics.
- (3) Ergonomics of computer.
- (4) Ergonomics of home for wheelchair bound patients.
- (5) Assistive technology: ADL, Seating and positioning devices, Transfer devices, Visual Aids, communication aids, Mobility aids, pointing and writing aids.
- (6) Clinical reasoning
- (7) Documentation
- (8) Consultation
- (9) Counseling

(H) SOCIOLOGY & PSYCHOLOGY

Section-A-Sociology

- (1) Introduction**
 - (a) Definition of Sociology. Sociology as a science, uses of the study of Sociology, application of knowledge of sociology in Occupational Therapy.
- (2) Sociology and health**
 - (a) Social factors affecting health status, social consciousness and perception of illness, social consciousness and meaning of illness, decision making in taking treatment. Institutions of health, their role in the improvement of health and the people.
- (3) Socialization**
 - (a) Meaning of socialization, influence of social factors on personality, socialization in hospital and socialization in rehabilitation of patients & the introductory anthropology.
- (4) Social groups**
 - (a) Concepts of social groups & influence of formal and informal groups on health and sickness, the role of primary groups and secondary groups in the hospital and rehabilitation setting & knowledge of global social issues prevailing health.
- (5) Family**
 - (a) Influence of family on human personality, discussion of changes in the functions

of a family, influence of family on the individual's rehabilitation.

(6) Social problems of the disabled

- (a) Consequences of the following social problems in relation to sickness and disability, remedies to prevent these problems:
 - i. Population explosion
 - ii. Poverty and unemployment
 - iii. Beggary
 - iv. Juvenile delinquency
 - v. Prostitution
 - vi. Alcoholism
 - vii. Problems of women in employment

Section-B-PSYCHOLOGY General

Psychology

- (1) Definition of Psychology
 - (a) Science of mind, consciousness and behavior
 - (b) Scope and branches of Psychology
- (2) Methods of Introspection, observation and experimentation.
- (3) Concepts of normality and abnormality: Causes of abnormality, Criteria for abnormality. Broad classification of Current model of abnormal behaviour - Medical model, Psychodynamic model, Behaviouristic model & Humanistic model ,and Cognitive model
- (4) Hereditary and Environment
 - (a) Relative importance of heredity and environment
 - (b) Physical characteristics intelligence and personality.
 - (c) Nature vs. nurture controversy
- (5) Learning- Types of Learning
 - (a) Trial and error
 - (b) Classical Learning
 - (c) Instrumental learning
 - (d) Insight for Learning
- (6) Memory
 - (a) Steps of memory
 - (b) Measurement of memory
 - (c) Causes of forgetting
 - (d) Concept of STM and LTM
- (7) Perceptual Process
 - (a) Nature
 - (b) of perceptual process
 - (c) Structural and functional factors in perception
 - (d) Illusion and Hallucination
- (8) Emotion
 - (a) Emotion and feeling
 - (b) Physiological changes
 - (c) Theories of emotion (James-Lange and Cannon-Bard)
- (9) Reaction to loss: Reaction to loss, death and bereavement: shock and disbelief, development of awareness, restitution, and resolution. Stages of acceptance as proposed by Kubler-Ross.
- (10) Stress: Physiological and psychological changes, relation to health and sickness: Psychosomatics, professional stress, burnout.
- (11) Compliance: Nature, factors, contributing to non-compliance, improving compliance.

- (12) Motivation
 - (a) Motive: need and Drive
 - (b) Types of motive: Physiological, Psychological and Social
- (13) Intelligence Definition: theory and assessment
- (14) Personality: Definition: Types and measurements
- (15) Child Psychology
 - (a) Concept of child Psychology
 - i. Meaning: nature and subject matter of child Psychology
 - ii. Practical importance of studying child Psychology for rehabilitation professionals
 - i. Methods of studying child development
 - i. Baby Biography
 - ii. Case History
 - iii. Behavior rating

Applied Psychology

(1) Rehabilitation Psychology:

- (a) Interpersonal Relationships, Family & Social relationships, acceptance about the disability – its outcome in relation to different diagnostic categories psychological aspects of multiple handicapped, contribution of psychology in Total Rehab.

(I) BIOMECHANICS & KINESIOLOGY

(1) Essential Concepts:

- (a) Motion and forces, Axis and planes, Mechanical lever, lever in Human body.
- (b) Force distribution-linear force, resultant force & equilibrium, parallel forces in one plane concurrent force.
- (c) Newton's law – Gravity and its effects on human body
- (d) Forces and moments in action
- (e) Concepts of static equilibrium and dynamic equilibrium
- (f) Composition and resolution of forces
- (g) Friction
- (h) Pulleys

(2) Joint Structure and Functions

- (a) Basic Principles of joint structure and function.
- (b) Tissues present in and around joints including fibrous tissue, bone cartilage, connective tissue, ligaments, tendons etc.
- (c) Classification of joints.

(3) Muscle Structure and Functions

- (n) Mobility and Stability functions of muscle
- (d) Elements of muscle structures and its properties.
- (e) Types of muscle contraction and muscle work.
- (f) Classification of muscles and their functions
- (g) Group action of muscles, coordinated movement.

(4) Kinematics and Kinetics- Concept of following joints:

- (a) Upper Extremity
 - i. Scapulo-shoulder Joint
 - ii. Elbow Joint
 - iii. Wrist Joint & Hand
- (h) Lower Extremity
 - i. Hip & pelvis
 - ii. Knee joint
 - iii. Patello femoral joint

- iv. Ankle and foot
 - (i) Temporomandibular joint
- (5) Biomechanics of Vertebral Column:
- (6) Biomechanics of Gait:
 - (a) Gait cycle, Spatio-temporal parameters of gait, Kinematics and Kinetics of human gait, Determinants of gait, Gait deviations in various orthopedic /neurological conditions
- (7) Posture:
 - (a) Anatomical aspects of posture, factors affecting posture, Assessment of posture, Types of posture, Postural deviation.

(J) COMMUNITY MEDICINE

- (1) Introduction to community health.
- (2) General concepts of health diseases, with reference to natural history of disease with pro-pathogenic and pathogenic phases. The role of socio-economic and cultural environment in health and disease. Epidemiology, definition and scope.
- (3) Public health administration an overview of the health administration set up at Central and state levels.
- (4) The national health programme -highlighting the role of social, economic and cultural factors in the implementation of the national programme.
- (5) Health problems of vulnerable groups-pregnant and lactating women, infants and pre- school children, occupational groups.
- (6) Occupational Health-definition, scope occupational disease prevention of occupational disease and hazards.
- (7) Social security and other measurement for the protection from occupational hazard accident and diseases. Details of compensation acts.
- (8) Family planning – objectives of national family planning programmes and family methods. A general idea of advantage and disadvantages of the methods.
- (9) Mental health emphasis on community aspects of mental, role of Occupational Therapy in mental health problems such as mental retardation etc.
- (10) Communicable disease- an overall view of communicable disease, classification according to principle mode of transmission, role of insect and other factors.
- (11) International health agencies.
- (12) Community medicine and rehabilitation epidemiology, habitat, nutrition, environment anthropology.
 - (a) The philosophy and need of rehabilitation
 - (b) Principles of physical medicine
 - (c) Basic principles of administration or organization

(K) CLINICAL ORTHOPAEDICS

- (1) Fractures and dislocations of upper limb, lower limb and spine.
- (2) Deformities: Common congenital and acquired deformities of foot, knee, hip, shoulder, elbow and wrist including hand and spine. Infective conditions and lesion of joints and bones. Osteomyelitis, tuberculosis, pyogenic infection, T.B. Joints.
- (3) Arthritis – Osteoarthritis, Rheumatoid arthritis, cervical and lumbar spondylosis, Ankylosing spondylitis.
- (4) Soft tissue involvement – Sprains, strains, Tenosynovitis and contractures.
- (5) Operative Procedures, Amputation Common sites, causes & management, Arthroplasty of joints, joint replacement (total and partial), Osteotomy.
- (6) Bone and joint tumors- classification, clinical features and management of benign and malignant bone and joint tumors.
- (7) Peripheral nerve injuries-their management.
- (8) Trauma and trauma care.
- (9) Reconstructive surgeries for rehabilitation of Poliomyelitis,

Leprosy, crushinjuries

- (10) Principle of Tendon transfer and its procedure.
- (11) Pediatrics musculo-skeletal conditions and management.
- (12) Neck and Low back ache, Sciatica, PIVD , brachial neuralgia etc.
- (13) Sports injuries and its management.
- (14) Radiological examination.

(L) OCCUPATIONAL THERAPY IN ORTHOPAEDICS

- (1) Introduction- Brief review of orthopedic conditions.
- (2) Application of occupational therapy principles and techniques in evaluation and treatment of the following orthopedic conditions to include:-
 - (a) Fracture, dislocations and soft tissue injuries – Upper extremity, lower Extremity and spine.
 - (b) Deformities – Congenital and acquired deformities of Upper extremity, lower Extremity and spine.
 - (c) Inflammatory condition of joints and bones. – R.A., Ankylosingspondylitis & other major conditions.
 - (d) Metabolic diseases – Rickets, Osteomalacia Osteoporosis, gout etc.
 - (e) Amputations - Pre & Post operative occupational therapy treatment.
 - (f) Degenerative & Infective conditions-Osteoarthritis of major joints, Spondylosis, Spondylolisthesis, PID, periartitis Shoulder, T.B. Spine Bone & Major joints, Perthe's disease , Cumulative Trauma Disorder.
 - (g) Supportive and corrective appliances in the rehabilitation of orthopedic cases.
 - (h) Adapted devices in the rehabilitation of orthopedic case.
 - (i) Activities of daily living, testing and training in A.D.L.
 - (j) Poliomyelitis: Post polio residual paralysis and post polio syndromes.
 - (k) Cerebral palsy reconstructive surgeries including limb lengthening procedure and orthotic management.
 - (l) Total Hip and Knee replacements occupational therapy treatment. (m) Pain Management in Occupational Therapy.
- (3) Functional bracing : Definition, concept of functional bracing, objectives and scientific basis of functional fracture bracing, importance in healing of fractures, advantages over conventional bracing, materials used, indications & contraindication of functional bracing.

(M) GENERAL MEDICINE INCLUDING PEDIATRICS

General Medicine

- (1) Introduction of Medicine.
- (2) Diseases of Respiratory System
- (3) Physiology, clinical presentation in relation to diseases, chronic obstructive pulmonary disease
 - (a) Bronchial asthma
 - (b) Pneumonia

- (c) Bronchiectasis
- (d) Pleural effusion & Emphysema thoraces
- (e) Pneumothorax
- (4) Diseases of Kidney
 - (a) Physiology, clinical presentation in relation to
 - (b) ARF
 - (c) CRF
- (5) Hematological Diseases.
 - (a) Anemia
 - (b) Physiology, clinical presentation in relation to Hemophilia
- (6) Endocrine & Metabolic Diseases.
 - (a) Vit. D & Calcium metabolism, Parathyroid gland disorders
- (7) Nutritional Diseases
 - (a) Physiology, clinical presentation in relation to Obesity
- (8) Connective Tissue Diseases
 - (a) Physiology, clinical presentation in relation to Rheumatoid arthritis
 - (b) Gout & other connective tissue disorders
- (9) Infectious Diseases
 - (a) Tetanus
 - (b) Leprosy
- (10) HIV & AIDS
- (11) Cardiac Conditions
 - (a) Basic anatomy of heart, Coronary circulation and development of heart.
 - (b) Normal cardiac contraction and relaxation: mechanism and diagnosis.
 - (c) Physiology, clinical presentation in Ischemic heart disease.
 - (d) Physiology, clinical presentation in Congestive heart failure.
 - (e) Physiology, clinical presentation in Peripheral Vascular disease & Deep vein thrombosis.

Pediatrics

- (1) Describe growth and development of child from birth to 12 year including physical, social, adaptive development.
- (2) List the maternal and neonatal factors contributing to high risk pregnancy. The neonate: inherited diseases.
- (3) Briefly describe community programmes: International (WHO), national and local for prevention of poliomyelitis, blindness, deafness, mental retardation and hypothyroidism. Outline the immunization schedule for children.
- (4) Cerebral palsy: Define and briefly outline etiology of prenatal, per-natal and postnatal causes, briefly mention pathogenesis, types of cerebral palsy (Classification), findings on examination, general examination of C.N.S, Musculoskeletal and respiratory system.
- (5) Briefly outline associated defects: Mental retardation, microcephaly, blindness, hearing and speech impairment, squint and convulsions.
- (6) Prevention: Appropriate management of high risk pregnancies, prevention of neonatal and postnatal infections, metabolic problems.
- (7) Muscular Dystrophy: Outline various forms, modes of inheritance and clinical manifestation, physical finding in relation to disabilities progression of various forms and prognosis. Describe treatment goals in forms which are fatal and which are not fatal.
- (8) Spina bifida, meningomyelocele: Outline development, clinical features lower limbs, bladder and bowel control, complications UTI & hydrocephalus.

- (9) Still's disease: Classification, pathology in brief, physical findings, course & prognosis. Outline treatment, prevention and correction of deformity.
- (10) Acute C.N.S. infections: Classify (Bacterial and viral) and outline the acute illness & Physiology, clinical presentation.
- (11) Normal diet of new born and child: List dietary calorie, fat, protein, mineral and vitamin requirement in a normal child and in a child with malnutrition.
- (12) Lung infections: Physiology, clinical presentation in relation to bronchiectasis, lung abscess and bronchial asthma, cystic fibrosis
- (13) Intensive pediatric care & Physiology, clinical presentation.

(N) REHABILITATION MEDICINE

1. Introduction to Rehabilitation medicine
2. Definition concerned in the phases of disability process, explanation of its aims & principles. Scope of rehabilitation.
3. Definition concerned with the causes of Impairment, Functional limitation and Disability
4. Disability Prevention. Limitation & Rehabilitation.
5. Present Rehabilitation Services
6. Legislations for rehabilitation services for the Disabled and P.W.D. acts & Recent Amendments.
7. Rehabilitation Team & its members, their role.
8. Community & Rehabilitation including C.B.R. Advantages of C.B.R. over I.B.R.
9. Contribution of Social Worker towards rehabilitation
10. Vocational evaluation & Goals for disabled, role of Vocational Counselor.
11. Rural rehabilitation incorporated with Primary Health Centre
12. Principles of Communication & its problems and management.
13. Behavioral problems in the Disabled its principle of management.
14. Architectural barriers possible modifications in relation to different disabled conditions.
15. Achieving functional independence
16. Occupational rehabilitation
17. Concepts in geriatric rehabilitation
18. Disability evaluation
19. Visual disability: Definition and classification, mobility techniques, community
20. Socio-economic Rehabilitation:
 - (a) Outline of Social and Vocational Counseling
 - (b) Outline the social implications of disability for the individual and for the community
 - (c) Pre-vocational Evaluation & Role of V.C. Govt. & NGO
 - (d) Discuss methods and team involvement in pre-vocational evaluation and training.
21. Functional Assessment scales & its clinical uses eg, functional independent measure, Sylvan index, PEDI, Gross Motor Function, VAS, ASIA, BBS, Modified Ashworth.
22. Ethics
 - (a) The implications of and confirmation to the roles of professional conduct

- (b) Legal responsibility for their actions in the professional context and understanding liability and obligations in case of medico legal action
 - (c) A wider knowledge of ethics relating to current social and medical policy in the provision of health care
23. Prosthesis and Orthosis
- (a) Definition and Basic Principles
 - (b) Designing and Construction of Upper & Lower extremity Orthosis & Spinal Orthosis.
 - (c) Prescription and design of footwear & its modification
 - (d) Ambulatory Aids & Assistive Devices
 - (e) Measurement and P.O.P. cast techniques
 - (f) Low cost thermo-labile material for construction of orthosis.
24. Wheelchair:
- (d) Type and modifications of wheelchair
 - (e) Wheelchair Mobility
 - (f) WHO Guideline
 - i. Assessment
 - ii. Prescription
 - iii. Training

(O)
PSYCHIAT
RY

- (1) Introduction, A brief history of psychiatry, with two special references to India and to ancient Indian medicine and its relationship with psychiatry. History taking in psychiatry including mental examination and assessment.
- (2) Functional units of mind, Id ego and super ego - Their functions and interactions.
- (3) Role of defense mechanisms in normal and abnormal behavior.
- (4) Causes of mental disturbances:
 - (a) Hereditary factors.
 - (b) Embryonic development factors.
 - (c) Birth injury.
 - (d) Endocrine disease.
 - (e) Systemic diseases / accidents.
 - (f) Cerebral diseases.
 - (g) Emotional factors.
 - (h) Stresses related to cultural factors.
- (5) Preventive measures: In relation to consanguineous marriages, adequate ante-natal care, obstetric care, mother and child services, psychological services (eg. child guidance, counselling services)
- (6) Criteria for classification and definition of psychiatric illness.
- (7) Psychological reactions of a patient during admission and treatment: anxiety, shock, denial, suspicion, questioning, loneliness, regression, shame, guilt, rejection, fear, withdrawal, depression, egocentricity, concern about small matters, narrowed interests emotional over reactions, perceptual changes, confusion, disorientation , hallucinations, delusions, illusions, anger, hostility, loss of hope.
- (9) Description of the various clinical syndromes including etiology,

clinical features, course, treatment, and prognosis.

- (a) Schizophrenic and other Psychotic disorders
- (b) Mood disorders
- (c) Anxiety disorder including Phobias
- (d) Somatoform disorders
- (e) Dissociative disorders
- (f) Factitious disorders
- (g) Eating and sleep disorders
- (h) Psychosomatic illness
- (i) Personality disorders
- (j) Substance related disorders
- (k) Sexual dysfunction and gender identity disorders
- (l) Organic Brain Syndrome
- (m) Psychiatric disorders of childhood
- (n) Psychiatric disorders of adolescence
- (o) Psychiatric disorders of old age
- (10) Legal aspects related to psychiatric patients.
 - (a) Civil responsibility.
 - (b) Criminal responsibility.
 - (c) Testamentary capacity.
- (11) Symptoms of mental illness:
 - (a) Disturbances of consciousness.
 - (b) Disturbances of reasoning and judgement.
 - (c) Disturbances of memory.
 - (d) Disturbances of thought and perception.
 - (e) Disturbances of volition.
 - (f) Disturbances of motor behaviour.
 - (g) Disturbances of speech.
 - (h) Disturbances of affect.
- (12) Methods of treatment:
 - (a) Individual and group psychotherapy
 - (b) Physical Methods: ECT and related side effects, Psychosurgery.
 - (c) Psychopharmacology and related side effects,
 - (d) Social and rehabilitation.

(P) OCCUPATIONAL THERAPY IN PSYCHIATRY

1. History of psychiatric occupational therapy.
2. Frames of Reference & treatment techniques of psychiatric conditions :
 - (a) Cognitive behavior.
 - (b) Behavioural and behavior modification
 - (c) Psychoanalytical.
 - (d) Occupational behavior and Model of Human Occupation
 - (e) Therapeutic use of self.
 - (f) Projective techniques.
 - (g) Mosey's adaptive skills.
 - (h) Cognitive disability
3. List and describe the various attitudes applied by the therapist in different conditions.
4. Analyze activities with reference to psychiatry and psychodynamics of activities.

5. Describe in detail the assessment of a client including specific methods used in the following:
 - (a) Observation.
 - (b) Interest checklist.
 - (c) Interview.
 - (d) Personality questionnaire.
 - (e) ADL
 - (f) Vocational and Pre-vocational
 - (g) Social dysfunction rating scales – to learn any one scale
6. Help students to identify their client's psychiatric problems in relation to the practical situations observed in OT. Eg. Restlessness manifesting as decreased concentration and attention.
7. Counseling: Guidelines and practical demonstration.
8. Discuss OT assessment, treatment aims, plan and methods of treatment for the following conditions:
 - (a) Schizophrenic and other Psychotic disorders
 - (b) Mood disorders
 - (c) Anxiety disorder including Phobias
 - (d) Somatoform disorders
 - (e) Factitious disorders
 - (f) Dementia
 - (g) Conversion and dissociate reaction
 - (h) Obsessive Compulsive disorder.
 - (i) Psychotic aspects of AIDS
 - (j) Learning Disorder.
 - (k) Autism
 - (l) Eating and sleep disorders
 - (m) Psychosomatic illness
 - (n) Personality disorders
 - (o) Substance related disorders
 - (p) Seizure disorders
 - (q) Organic Brain Syndrome
 - (r) Mental Retardation
 - (s) Down syndrome
9. Review psychiatric problems of childhood and apply OT principles and techniques.
10. Outline the types of therapeutic groups and briefly discuss the value of group therapy in psychiatry.
 - (a) Group Therapy.
 - (b) Arts & activity Therapy.
 - (c) Recreational Therapy.
 - (d) Attitude Therapy.
 - (e) Industrial Therapy.
 - (f) Music Therapy.
 - (g) Milieu Therapy
11. Explain precautions to be observed by the therapist in a psychiatric unit, with reference to each condition; including handling of tools and materials, grouping and attitude of the therapist.
12. Occupational Therapy as an adjunct to:
 - (a) Chemo Therapy

- (b) Insulin Therapy
 - (c) E.C.T.
 - (d) Psycho Therapy
13. Outline the following psychiatric setups and the role of OT in each.
- (a) Therapeutic community
 - (b) Half Way Homes
 - (c) Geriatric units.
 - (d) Sheltered workshops
 - (e) Day care centers.
 - (f) Government mental hospitals and psychiatric institutions
 - (g) Family therapy units
 - (h) Psychiatric rehabilitation

(Q) OCCUPATIONAL THERAPY IN PEDIATRICS

Psychological Aspects

- (1) Psychological reactions to disability in childhood and Occupational Therapy role.
- (2) Psychological aspects of hospitalization, and Occupational therapy role.

Treatment Approaches

- (1) Play Therapy.
- (2) Creative activities.

Frames of References

- (1) Bobath NDT.
- (2) Rood's neuromuscular facilitation.
- (3) Ayre's Sensory Integration Approach.
- (4) Biomechanical frame of reference
- (5) Developmental FOR
- (6) Peto's - conductive Education.
- (7) PNF

Occupational Therapy Application

- (1) Cardio respiratory conditions of childhood.
- (2) Cerebral palsy
- (3) Visuo- perceptual and Visuo- motor dysfunction
- (4) Muscular dystrophy
- (5) Erb's palsy
- (6) Poliomyelitis
- (7) Spina bifida and hydrocephalus.
- (8) Arthrogryphosis and other congenital orthopaedic disorders.
- (9) Stills disease.
- (10) Early intervention for congenital neurological disorders (High risk infants)
- (11) Nutritional disorders,
- (12) Mental retardation and Down's syndrome.
- (13) Congenital Syndromes and Chromosomal abnormalities
- (14) Specific learning disabilities
- (15) Pervasive Developmental Disorder
- (16) Attention Deficit Hyperactivity Disorder

- (17) Behaviour disorders.
- (18) Visual / auditory loss.
- (19) Speech and communication disorders.
- (20) Acquired Immuno Deficiency Syndrome.
- (21) Seizure disorders
- (22) Haemophilia
- (23) NICU

Occupational Therapy Intervention for specific areas of dysfunction

- (1) Oromotor dysfunction
- (2) Pre writing and writing skills
- (3) Psychosocial dysfunction
- (4) Postural Control

Pediatric Splinting and Adaptive Devices:

- (1) Including, seating devices, Adaptations for feeding, Mobility and Ambulatory devices, Indication and use of splint for correction of CDH

Practical

- (1) Complete evaluation of pediatrics case
- (2) General viva
- (3) File of case study.

(R) OCCUPATIONAL THERAPY IN NEUROLOGY & NEUROSURGERY

Neurology:-

A. Frame of references:

- (a) Brunnstrom
- (b) Motor relearning program
- (c) Motor control

B. Conditions:

- (1) Acute infection of nervous system-Encephalitis, meningitis, Transverse myelitis, neuro-syphilis, Tabes dorsalis.
- (2) Cerebral palsy, hydrocephalus.
- (3) Poliomyelitis
- (4) Cerebro – vascular accidents.
- (5) TBI
- (6) Epilepsy.
- (7) Common affection of peripheral, spinal & cranial nerves, Myasthenia gravis.
- (8) Myopathy & Muscular dystrophies.
- (9) Lesion- pyramidal and extra pyramidal, cerebellar systems, cortical lesion, vestibular.
- (10) Motor neuron diseases.
- (11) Degenerative Neurological conditions, Parkinsonism, syringomyelia, Chorea-athetosis.
- (12) Multiple sclerosis.
- (13) Peripheral N. injuries & Neuropathies.
- (14) Dysphagia
- (15) Spinal cord tumours & Spinal Cord Injury

Neurosurgery:

- (1) Pre & post operative occupational therapy management of neurosurgery conditions and complications following nerve repairs /

nerve grafting.

- (2) Pre & post operative occupational Therapy management in head injury, braintumor, craniotomy.
- (3) Management of pain syndrome.

(S) OCCUPATIONAL THERAPY IN MEDICAL AND SURGICAL CONDITIONS

Occupational Therapy in Medical Conditions

- (1) Introduction – Brief review of medical condition and treatment and role of Occupational Therapy in the rehabilitation of patient with various diseases.
- (2) Methods of evaluation in Occupational Therapy.
- (3) Therapeutic activities techniques & Frame of reference in Occupational Therapy.
- (4) Aims and Principal of Occupational Therapy.
- (5) Developmental aspects of childhood.
 - (a) Physical, emotional intellectual and social development of the child.
 - (b) Guide for development testing.
 - (c) Average development achievement. (From birth to 10 year age)
 - (d) Objective and function of Occupational Therapy in
 - i. Arthritic conditions
 - ii. Leprosy
 - iii. Cerebro-Vascular accidents.
 - iv. Cardiac – diseases (congenital and acquired)
 - v. Geriatric condition
 - vi. Cerebral palsy, minimal cerebral dysfunction – perceptual motordysfunctions in a brain – damaged child
 - vii. HIV
 - viii. Pulmonary condition.
 - ix. Hemophilia.
- (6) Assessment and diagnostic functions of Occupational Therapy.
- (7) Home care programme in severely disabled and A.D.L. in adults.

Occupational Therapy in Surgical Conditions

- (1) Introduction – Brief review of surgical conditions
- (2) Methods of evaluation in Occupational Therapy.
 - a) Role of Occupational Therapy
 - b) Hand injures – emphasis or rehabilitation of Hand and reconstruction.
 - c) Thoracic surgery – Pre and postoperative management in respect of rehabilitation.
 - d) Plastic surgery – basic principal and applications.
 - e) Radical Mastectomy & Role of Occupational Therapy in Obstetrics & Gynecology
 - f) Supportive and corrective application in the rehabilitation of surgical case.
 - g) Adaptive devices in the rehabilitation of surgical cases.
 - h) Activities of daily living testing and training in A.D.L.
 - i) Burns: Define the term “Burns”, classify burns depending on various aspect, describe stage of burns explain role of O.T. in burns patients including assessment, describe O.T. treatment in pregraft postgraft & rehab phase.

- j) Cancer rehabilitation: Describe preventive, restorative, supportive and palliative aspects in radical mastectomy and head and neck cancer. Explain the concept of hospice, family systems and the need for treatment of the family as the unit care.
- k) Vascular Condition: Explain peripheral vascular diseases their complications & role of O.T. in their management.

SYLLABUS M.A. (PSYCHOLOGY)

A. COGNITIVE PSYCHOLOGY

1. **Attention:** Concepts and Mechanisms, Selective Attention: Determinants and Theories – Broadbent, Treisman and Deutsch and Deutsch, Norman Models, Sustained Attention, Theories Expectancy, Signal Detection, Arousal, Habituation; Intensive Properties of Attention, Fluctuations of Attention, Attention Span.
2. **Perception:** Form Perception: Figure formation – backward masking; theories of Form Perception: Gestalt, Ecological optics (Gibson), Multi-level Expectancy (Hebb), Information Processing (Broadbent): Space Perception, Time Perception and Movement Perception.
3. **Learning:** Process and Methods; Theories – Classical and Operant Conditioning, Hull, Tolman and Guthrie.
4. **Memory:** Models of memory: Structural and levels of processing models, Tulving's Episodic, Autobiographical and Procedure models; McClelland's PDP approach; Sensory Memory, Iconic and Echoic memories – Measures and empirical features; Short-term Memory; Methodology, Size and Codes, Long-term memory: Determinants of Accuracy – interference, Context and Encoding Specificity, Autobiographical Memory: Flash back memories, Eye-witness Testimony, Memory improvement.
5. **Problem Solving and Reasoning:** Classification of Problems, Newell and Simon's theory, Problem-solving approaches, Means-end heuristics and the analogy approach and other strategies. Types and errors in reasoning processes: deductive and inductive

hypotheses testing, theories of thought processes.

B. PSYCHOLOGY OF PERSONALITY

1. **Personality:** Meaning and Definitions of Personality: Factors influencing Personality: Physical Factor, Chemical Factor, Social Factor, Heredity Factor.
2. **Classification of Personality:** Trait and Type Theories (Allport and Sheldon).
3. **Theories of Personality**
 - i) Classical Psycho-analysis: (Freud, Adler, Jung) and Post-Freudian (Sullivan).
 - ii) Factorial Approach to Personality: Cattell
 - iii) Humanistic Approach: Maslow and Rogers.
 - iv) Behaviouristic Approach: Skinner and Eysenck.
 - v) Social Learning Approach: Miller and Dollard, Rotter and Bandura, Mischel's cognitive-behavioural theory.
4. **Personality Development:** Methods of Study- Longitudinal and Cross-Sectional, Stages of Development (Erikson), Cognitive Development (Piaget) and Moral Development (Kohlberg).
5. **Special Study of Adolescent.**
6. **Personality Assessment:** Subjective, Objective and Projective- Concepts, Merits and Demerits; Personality Test – Rorschach Ink-Blot, TAT, MMPI, 16 PF.

C. BIOLOGICAL FOUNDATIONS OF BEHAVIOUR AND NEUROPSYCHOLOGY

1. **Sensory Processes:** Physiological Bases of Vision: Structure and Functions of Eye, Visual Adaptation and Acuity, Colour Vision, Theories of Colour Vision, Audition: Structure and Functions of Ear. Theories of Audition, Gustatory and Kinesthetic Sensations; Anatomy of Gustatory Receptors, Kinesthetic sensation and types.
2. **Structure and organization of central nervous system:** The Spinal Cord, Division of the Brain, The Brainstem, The Cerebellum, The Cerebral Cortex.
3. **Neurone:** Microscopic structure, the nerve impulse and synaptic transmission, chemical and metabolic aspects, the resting potential,

excitation and spike potential.

4. **Introduction to Neuropsychology:** Brain and behavior relationship.
5. **Frontal lobes:** Temporal lobes, Parietal lobes and Occipital lobes, Functional specialization, Disturbances in function of various lobes and syndromes.
6. **Cerebral dominance:** Handedness, Split-brain, Divided Visual Fields, Dichotic Listening Studies, Sex difference in cerebral organization.
7. **Neuropsychological Assessment:** Luria-Nebraska and Halstead-reitan Neuro-psychological Test Batteries, Psychophysiological recording.

D. METHODS OF BEHAVIOURAL RESEARCH-I

1. **Psychological Research:** Meaning, Nature, Need and Importance of Psychological Research.
2. **Major Approaches to Psychological Research:** Descriptive Research, Survey Research, Experimental Research, Ex-Post Facts Research, Laboratory and Field Research, Action Research.
3. **The Research Process:** Selection of Research Problem, Survey of Related Literature, Aims of the Study, Formulation of Hypotheses; Data Collection, Analysis of Data, Findings, Interpretations and Conclusions.
4. **Population and Sample:** Meaning and Definition of Population, Sample and Sampling, Methods of Sampling: Probability Sampling and Non-Probability Sampling; Errors in Sampling.
5. Measures of Central Tendency; Measures of Variability and Percentile.
6. Normal Distribution Curve: Characteristics; Application: Determination of standard score from raw score; Determination of percent of cases between the given standard scores from the mean, Determination of standard scores from the mean against the given percentage; Determination of cases below the given standard scores, Determination of percent and number of cases scoring below/above a certain raw score.

7. Chi-square: Meaning and Assumption; Application: Testing deviation of observed frequencies from expected frequencies against equal probability or null-hypothesis, Testing deviation of observed frequencies from expected frequencies against normal distribution hypothesis, testing hypothesis of independence when observed frequencies are given in 2x2 contingency table.
8. Correlation: Product-moment correlation: Ungrouped data and grouped data (Scatter Diagram); Rank difference correlation coefficient: merits and demerits; biserial correlation coefficient, Point-biserial correlation coefficient, tetrachoric correlation coefficient; Phi-coefficient.
9. Measurement and Evaluation: Meaning and Concept of Measurement and Evaluation, Difference between the concept of measurement and evaluation: Level of Measurement: Nominal, Ordinal, Interval and Ratio.
10. Psychological Tests: Intelligence (Verbal and Non-Verbal); Achievement (Teacher-Made and Standard) Test, Aptitude Test.
11. Construction and Standardization of Test: Planning the test, Writing test items, Testing the test items (Item analysis), preparing final draft, establishing reliability, validity and norms.
12. Test Parameters:
 - a) Reliability: Concept, Methods of estimating reliability Test-retest, split half, parallel form and rational equivalence.
 - b) Validity: Concept, Methods of estimating validity-content, face, construct, concurrent; predictive and factorial.
 - c) Norms: Concept, types of norms age norms, grade norms, percentile norms, standard score norms.
13. Testing Significance of Statistics: Significance of Statistical Averages and Variability; Standard Error of proportions,

Percentages and Pearson's Correlation Coefficient.

The standard Error of Difference between Uncorrelated Mean, Median, Standard Deviation, Proportions, percentages; The Significance of Difference between the Correlation Coefficients.

14. Analysis of Variance: Meaning, Assumptions of Analysis of Variance, One-Way and Two-Way Analysis of Variance only.
15. Factor Analysis: Introduction, Thurstone's centroid method, extraction of factors (upto two factors only); Communality and its estimation (concepts only): Putting highest of the column; Rotation (Orthogonal rotation only): Interpretation of factors.
16. Non-Parametric Statistics: Difference between parametric and non-parametric statistics; runs test, sign test and median test.

E. APPLIED SOCIAL PSYCHOLOGY

1. Theoretical foundation of social psychology: Psychoanalytic, cognitive and behaviouristic theories.
2. Interpersonal relations and influence: Affiliation, Interpersonal attraction and gender identity, compliance and obedience, conformity, prosocial behavior and interpersonal conflict.
3. Groups: Types, social facilitation, group dynamics, leadership and political behavior.
4. Social cognition and person perception: categorization of schemes, casual judgment, attribution rules, schemas in perception, impression formation.
5. Attitude: concept, formation and change, individual differences in persuasibility. Attitude scaling. (Likert and Thurston)
6. Current social problems: Aggression and violence conflict resolution, isolation and crowding, personal space, noise, cognitive overload, prejudice and intergroup relations, socio-economic deprivation.

F. PSYCHOPATHOLOGY

1. Classification Systems in Psychopathology

W.H.O. classification (ICD-10) and multiaxial systems (DSM-IV-TR), Theoretical background/approaches to psychopathology, (i) Psychodynamic; (ii) Behavioural; (iii) Cognitive; (iv) Phenomenological;

(v) Biological and (vi) Sociocultural; Diagnosis-Purposes of Diagnosis, reducing undesirable variability; multiaxial model, evaluation of diagnostic system, Models for the description of abnormal behavior; Medical psychodynamics and learning models; Recent advances and research methods in psychopathology.

2. Theories and Models of Anxiety Disorder

Panic, Phobic, OCD, post-traumatic, GAD, (b) Somatoform disorders, (c) dissociative disorders, Schizophrenia and other psychotic disorders, Schizophreniform, Schizoaffective, delusional, brief psychotic disorders, Mood disorders, Depressive unipolar and bipolar disorders.

3. Psychophysiological Disorders

Theories: Personality disposition, CHD, Asthma, Allergy, Eczema, Itching, Rheumatoid Arthritis, Peptic Ulcer, Diabetese and Menstrual Disorders.

4. Disorders of Personality

Adjustment disorder, (b) Impulse control disorders (c) substance related disorders (d) Eating disorders and Sleep disorders; Sexual and gender identity disorders.

5. Organic Mental Disorders

Changing views of brain function and dysfunction. Neuropathological considerations: Common syndromes.

G. PSYCHODIAGNOSIS

- 1. Psychodiagnosis:** Introduction and rationale, factors influencing psychological testing pits all of psychological testing.
- 2. Case-history and Mental status examination.**

3. **Tests of Primary Mental Abilities:**

- a) Attention and Concentration
- b) Perception
- c) Memory
- d) Thinking and Reasoning
- e) Intelligence

4. **Tests of Differential Diagnosis**

- a) Tests of Thought Disorder
- b) Questionnaire for Differential Diagnosis
- c) Rating Scales

5. **Personality Tests:** Rorschach Test, Interview and Adjustment Test.

6. **Neuropsychological Assessment:** Psychophysiological assessment: Assessment of psychophysiological indices of arousal/anxiety (e.g. GSR, EMG and ECG) and to correlate with those of subjective reports of the same.

H. DEVELOPMENTAL PSYCHOLOGY

1. Development: Nature principles and determinants of development, Various development periods. Study methods of developmental psychology (cross-sectional and longitudinal).
2. Prenatal development: Periods of prenatal development. Factors affecting prenatal development.
3. Physical development: Infancy, childhood, puberty and adolescence developmental hazards at different stages.
4. Emotional development: Concept and development.
5. Cognitive development: Concept and development (Piaget).
6. Social development: Development of social behavior, Role of socialization, Development of self concept, Moral development.
7. Middle and old age: Characteristics, Problems and adjustment.
8. Development Assessment: Use of development schedule and various tests related to developmental psychology.

I. ORGANIZATIONAL BEHAVIOUR

1. **Organizational Psychology:** An overview of the field; History of the

Organizational studies.

2. **Social Organization:** Definition, Nature of social system and its components; Organization in relation to environment.
3. **Organizational Role-Taking:** Organization as a system of role.
4. **Leadership-Approaches:** Nature of organizational leadership; Types of leaders; Role of leaders in decision-making.
5. **Organizational Conflict:** Definition, Conflict as process, Models of conflict and conflict management.
6. **Organizational Effectiveness:** Efficiency of Organizations, Job-satisfaction; Work stress and Quality of work life.

J. PSYCHOLOGY OF LEARNING DISABILITY

1. Learning Disability: Nature and concept; Characteristics and behavioural manifestation; Types: reading, writing and arithmetic disabilities; Causes of learning disability: biological, Behavioural and sociological.
2. Disorders of reading, writing and arithmetic: oral reading characteristics, theories; written language characteristics, theories; arithmetic disorder characteristics theories.
3. Diagnostic Process: Identification and assessment of various learning disabilities; differential diagnosis.
4. Remediation of Learning Disabilities: Principles and strategies for remediation; Training strategies and planning of intervention programmes for reading, writing and arithmetic skills.
5. Development of Basic and Specific Skills: readiness, perceptual-motor, language comprehension and expression.

K. CLINICAL PSYCHOLOGY OF CHILDHOOD DISORDER

1. Developmental Perspective of child clinical psychology: Models and clinical practice.
2. Diagnostic Assessment of Children: Strategies of Interview, Behavioural assessment, Projective Testing and Neuropsychological assessment.
3. Problem of Childhood and Adolescence: Fears and anxiety, Sleep disorders, Psychosomatic problems, Suicidal behavior, Stereotyped and self-injurious behavior, Aggressive and delinquent behavior.
4. Other Neurotic Disorder: Autism, Toilet problems, Attention deficit disorder, Sexual problems. Eating disorders, School problems, Language disorders, Adolescent-parent problems.

5. Intervention Strategies: Parent training: Behaviour therapy with children, Psychotherapy with children, Biofeedback with children, Prevention of disorders in children.

L. PSYCHOTHERAPY AND COUNSELLING

1. Psychotherapies: Definition and objectives, Psychotherapeutic relationship, interviewing, Counselling and psychotherapy.
2. Models of Psychotherapy and Counselling: Psychoanalytic, Supportive, Rational emotive and Clientcentred approaches.
3. Family Therapy including marital and parental counselling; Group therapy.
4. Behaviour Therapy: Relaxation and desensitization procedures; Autogenic training: Yoga and mental health.
5. Operant procedures: Contingency management, reinforcement, token economy, Modelling, Avoidance conditioning and aversive techniques.
6. Biofeedback procedures: Electromyograph, galvanic skin response.

M. REHABILITATION PSYCHOLOGY

1. **Rehabilitation Psychology:** Nature and Scope; Concept of rehabilitation for disabled people, exceptionality and labeling people with disabilities; Concept of impairment, disability and handicap;
2. **Mental Retardation:** Definition and classification; causes and prevention of mental retardation; characteristics: intellectual, adaptive behavior, academic achievement, Screening and assessment, Early identification; intervention strategies-skill training, socialization, behavior modification and parent counselling.
3. **Hearing Impairment:** Definition and classification; causes and prevention of hearing impairment; characteristics: Speech and communication; hearing evaluation; assessment of speech and language problems; intervention strategies; aural rehabilitation, speech and language training.
4. **Visual Impairment:** Definition and classification; causes and prevention of visual impairment; characteristics: Educational achievement, Social development, orientation and mobility; assessment and intervention strategies-Mobility and daily living skill.
5. **Physical disability:** Definition and classification; causes and prevention of physical disability; Assessment of physical disorders; Intervention strategies: Orthosis and prosthesis; activities for daily living.

6. **Family in Rehabilitation:** Family crisis-the impact of disabilities on the family: husband-wife, parent child relationships; Family intervention strategies.
7. **Rehabilitation Programmes in India:** Role of Govt. and NGOs; Child guidance centre, Special schools and vocational rehabilitation centres, Organizing rehabilitation programmes for the disabled people.

N. COMMUNITY MENTAL HEALTH

1. Community mental health: Development of community orientation.
2. Historical trend in mental health ideology.
3. Basic concepts: Population and prevention; Mental health prevention.
4. Principles and methods of community intervention: Crisis intervention, consultation, nonprofessional community psychology, mental health education.
5. Theory and research in community psychology: Ecology, Epidemiology of mental health and general system theory.
6. Strategies of organizing a community mental health programme.

O. COMPUTER APPLICATIONS IN PSYCHOLOGY

1. Introduction to Computers: Developmental history generation of computers, Characteristics of a computer, types of computers.
2. Computer Hardware: Organization of Computers, Peripheral devices, Input/Output devices, Memory system, Care of computer system, Peripheral and storage media.
3. Computers software and operating systems: Introduction of O.S., DOS and Windows (Brief Introduction), Word processing, Spreadsheets, Type of computer software, Relationship between hardware and software.
4. Developmental issues in the design of courseware: Role of multimedia courseware in education, authoring system and languages, Development of courseware through authoring tools, use of computers for educational management, library, examination.
5. Computer Networks (LAN, MAN and WAN) and topologies used in networking.
6. Common software tools: Graphical tools, Mathematical and Statistical tools, Presentation tool (Power point).

7. Data Base Management Systems: Basic concept of data base, Common DBMS commands, Expressions, Report, Label, Programming in foxpro, Brief introduction of Ms Access.

Syllabus for Driver HMV/LMV

Traffic Rules and Signaling

- Basic Road Rules, driving methods and speed limits
- Understanding Signals:
 1. Traffic Police hand signals
 2. Hand signals while driving
 3. Traffic light signals
 4. Road map reading
- Knowledge of traffic signages for road safety
- Fitness to drive:
 1. First aid kit
 2. Good health & Road safety
 3. Driving under influence of drugs/liquors
- Difficult driving condition:
 1. Driving on wet surface
 2. Driving in fog
 3. Night driving
 4. Running on pavement
 5. Brake failure
 6. Towing
- 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 and offence related
 1. Registration
 2. Licensing
 3. Insurance

Motor parts and its repair

- Locating various parts of vehicle
- Knowledge of daily inspection
- Knowledge of fault diagnosis in tyre and it's changing procedure
- Knowledge of different starting methods
- Knowledge of dash board's symbols
- Knowledge about air bleeding procedure of brakes and clutches

ह. / -
परीक्षा नियंत्रक ।