

# Kalyan Singh Super Specialty Cancer Institute

कल्याण सिंह अति विशिष्ट कैंसर संस्थान

C.G. City, Sultanpur Road, Lucknow-226002

सी.जी. सिटी, सुल्तानपुर रोड, लखनऊ-226002

(An Autonomous Institute of the Govt. of Uttar Pradesh)

(उत्तर प्रदेश सरकार का स्वायत्तशासी संस्थान)

Email: executiveregistrar.ksssci@gmail.com

## Advt. No KSSSCI/ER-20/1-9/2023-24

### PART (A) – General Aptitude

#### For all posts of Advt. No KSSSCI/ER-20/1-9/2023-24

**(NOTE: EXAMINATION WILL BE CONDUCTED IN ENGLISH LANGUAGE ONLY)**

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

### Indicative Syllabus: For General Aptitude

**A] Reasoning:** It would include questions of both verbal and nonverbal type. This component may include questions on analogies, similarities and differences, spatial orientation, problem solving, Analysis, judgement, decision making, discrimination, observation, relationship concepts, arithmetical reasoning and figural classification, arithmetic number series, nonverbal series, coding and decoding, statement conclusion, etc. the topics are, symbolic/ number analogy, figural analogy semantic classification, symbolic/Number Classification, Figural Classification, semantic series, number series, Figural series, problem solving, word building, coding & decoding, Numerical operations, symbolic operations Trends, space orientation, space Visualization, Venn diagrams, Drawing inferences, Punched hole/pattern-folding & unfolding. Figural pattern- Folding and completion, indexing. Address matching, Date & city matching, Classification of centre codes/roll numbers, small & capital letters/numbers coding, decoding and classification, Embedded Figures, Critical thing, Emotional Intelligence, Social Intelligence, Other sub topics, if any.

**B] General Knowledge:** Questions in this component will be aimed at testing the candidate's general awareness of the environment around him and its application to society. Questions will also be designed to test knowledge of current events and of such matters of everyday observations and experience in the scientific aspect as may be expected of any educated person. The test will also include questions relating to India and its neighboring countries especially pertaining history, culture geography, economic scene general policy & scientific research.

**C] Mathematics Aptitude:** The questions will be designed to test the ability of appropriate use of numbers and number sense of the candidate. The scope of the test will be computation of whole numbers, decimals, fractions and relationship between numbers percentage, Ration & Proportion, Square roots, Averages, Interest, Profit & Loss, Discount, Partnership, Elementary Surds, Graphs of Linear Equation, Triangle and its various kinds of centres, Congruence and similarity of triangles, Circle and its chords, tangents, angles subtended by chords of a circle common tangents to two or more circles, Triangle, Quadrilaterals, Regular polygons, Circle, Right Prism, Right circular cone, Right circular cylinder, Sphere, Hemispheres, Rectangular Parallelepiped, Regular right pyramid with triangular or square base, Trigonometric

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ration, Degree and radian Measures, Standard Identities, Complementary Angles, Heights and Distances, Histogram, Frequency, polygon, Bar diagram & pie chart.

**D] General English:** Candidates ability to understand correct English, his basic comprehension and writing ability would be tested, Questions in this computer will be designed to test the candidates understanding and knowledge of English language and will be based on spot the error, fill in the blanks, synonyms, antonyms, spelling/detecting mis-spelt words, idioms and phrases. One word substitution, improvement of sentences, active/passive voice of verbs, conversion into direct/indirect narration, shuffling of sentence parts, shuffling of sentences in a passage, comprehension passage and any other English Language questions at the Level of Matriculation /Higher Secondary.

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## **Part – B (Core Subject)**

### **Syllabus for the post of Uro-dynamic Technician**

#### **Advt. No KSSSCI/ER-20/01/2023-24**

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1. Anatomy and Physiology of the Urinary System:
  - Structure and function of the kidneys, bladder, ureters, and urethra.
  - Blood supply and innervation of the urinary system.
  - Normal urinary tract function and micturition reflex.
2. Urological Disorders and Pathophysiology:
  - Common urological conditions such as urinary incontinence, urinary tract infections, benign prostatic hyperplasia (BPH), and bladder dysfunction.
  - Understanding the underlying pathophysiology of urological disorders.
3. Urodynamic Testing Techniques:
  - Principles and procedures of urodynamic testing, including uroflowmetry, cystometry, pressure-flow studies, electromyography (EMG), and video urodynamics.
  - Indications, contraindications, and limitations of urodynamic tests.
4. Urodynamic Equipment and Instrumentation:
  - Types of urodynamic equipment, including catheters, pressure transducers, uroflow meters, EMG electrodes, and infusion pumps.
  - Calibration, setup, and maintenance of urodynamic equipment.
5. Patient Preparation and Care:
  - Pre-procedural assessment and preparation of patients for urodynamic testing.
  - Ensuring patient comfort, privacy, and dignity during urodynamic procedures.
  - Infection control measures and maintaining a sterile environment.
6. Data Acquisition and Analysis:
  - Techniques for accurate data collection during urodynamic testing.
  - Interpretation of urodynamic tracings and parameters.
  - Documentation and reporting of urodynamic test results.
7. Clinical Applications and Integration:
  - Integrating urodynamic findings with patient history, physical examination, and other diagnostic tests.
  - Collaborating with urologists, urogynecologists, and other healthcare professionals in the diagnosis and management of urological conditions.

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### 8. Quality Assurance and Safety:

- Quality control measures to ensure the accuracy and reliability of urodynamic tests.
- Adherence to safety protocols and guidelines to minimize risks during urodynamic procedures.

### 9. Patient Education and Counseling:

- Providing information to patients about urodynamic testing, including the purpose, procedure, and potential outcomes.
- Counseling patients on lifestyle modifications, bladder training, and other strategies for managing urological symptoms.

### 10. Professionalism and Ethics:

- Upholding ethical principles, patient confidentiality, and professional conduct in urodynamic practice.
- Continuous professional development and staying abreast of advancements in urology and urodynamic technology.

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## Part – B (Core Subject)

### Syllabus for the post of CSSD Assistant

#### Advt. No KSSSCI/ER-20/02/2023-24

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#### Basic Anatomy:

1. General Introduction–Definition of Anatomy & Physiology–Types of Anatomy (including systemic) – Definition of topographic term/term used to describe the body.–Description of Various regions of the body.
2. Cells and tissues of body and general histology.
3. Anatomical description of the following:-Skin and breast–Ontology–Joints–Ligaments–Fasciae and Bursae–Musculoskeletal system–Cardiovascular system–Respiratory system–Lymphatic system–Blood and blood forming organs–congenital system–Endocrine system–Organs of special senses (ear, eye, etc.)–Digestive system–Embryology

**Basic Physiology-** Introductory Lectures or specialization of tissues. Homeostasis and its importance in mammals. Blood and lymphatic system Cardiovascular system Excretory system, skin and temperature regulation Respiratory system Digestive system and metabolism Endocrinology Reproductive system Nervous system Special senses Muscles

#### Basic Pathology and Microbiology –

- Definitions and Classification of diseases
- Inflammatory diseases–viral and fungal
- Inflammatory diseases–Parasitic
- Degenerative diseases–Fatty degeneration, Amyloid etc
- Tumors–Definition, etiology& classification

#### Operation theatre techniques:

- Operation theatre techniques
- Surgical Procedures Organize and set up trolleys for theatre Tracking and recall of equipment and items Surgical Instruments
- Criteria for Purchase and Maintenance
- Checking in and out of loan instruments
- Decontamination Process
- Scientific Principles
- Recommended Practices

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## Disinfection:

- Principles of Disinfection
- Cleaning of equipment
- Use of detergents
- Ultra Sonic washers /Mechanical cleaning apparatus
- Cleaning of catheters and tubings, cleaning glass ware, cleaning syringes and needles
- Preparation and Supplies for Terminal Sterilization

## Cleaning, Washing, Packaging and assembly line:

- Precautions while handling instruments and line Assembly and packing
- Packaging selection and Materials used for wrapping and packing assembling pack contents. · Types of packs prepared.
- Inclusion of trays and gallipots in packs.
- Method of wrapping and making use of indications to show that a pack of container has been through a sterilization process date stamping.

## Sterilization methods:

- Different Methods of Sterilization
- High Temperature Sterilization–Dry Heat Moist heat sterilization
- EO gas sterilization
- H<sub>2</sub>O<sub>2</sub> gas plasma vapour sterilization
- Endoscopes and their Sterilization
- Sterilization Recommended Practices for Flash Sterilization
- Use of Sterilization indicators like in different process
  - a) Biological Indicator
  - b) Chemical Indicator
  - c) Bowie Dick Test
  - d) Thermal Tape
  - e) Incubator to test Biological indication. Efficiency 60 min/90 min.

## Classification of CSSD working areas as per:

- Colour Code
  - a) Red Colour Dirty Area
  - b) Yellow Colour/Blue Clean Area
  - c) Green Sterilized area

## Sterilization record keeping:

- Sterile storage Call back system in case of detection of failure HVAC system
- Records & register maintenance

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### **Quality assurance:**

- Quality assurance
- Biological indication and quality control
- Quality measurement methods and its standards

**Quality Standards:** International Organization for Standardization (ISO) standards  
Water Quality and its impact in CSSD process Biomedical waste disposal protocols.

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## Part – B (Core Subject)

### Syllabus for the post of Dental Technician Gr-II

Advt. No KSSSCI/ER-20/03/2023-24

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#### 1. Applied Physics:

Specific gravity, density, properties of matter, including cohesion, capillarity, surface tension viscosity, elasticity, diffusion, and osmosis.

Heat: Temperature and its measurements Thermometers and Pyrometers. General account of expansion by heat of solids, liquids and gases, Thermostats, Pressure gas and hydraulic. Boyle's and Charles Laws. Unit of heat, thermal capacity and specific Heat, Change of State; Latent heat; Melting Point. Properties of vapours, conduction, convection and radiation. Principles of electro-technology applied to dental work room, small motors, constructional features and characteristics, electric furnaces, heaters, thermostats, pyrometers, spot welders, electroplating, electroforming, and anodizing, Wiring regulations relating to low voltage supplies.

#### Exercises/ Demonstrations:

- Balance - weighing correctly to a milligram.
- Determination of specific gravity by the principle of Archimedes (Solids and liquids).
- Determination of surface tension of a liquid by capillary rise.
- Determination of Linear expansion of solids (level method).
- Determination of the specific heats of solids and liquids by the method of mixtures.
- Small motors-constructional features. and characteristics (Demonstration only)
- Determination of the electro-chemical - equivalent of copper.

#### 2. Applied Mechanics:

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

#### Exercises/Demonstrations:

- Verification of the parallelogram and triangle laws of forces.
- Inclined plane Determination of mechanical advantage.
- Determination of Young's Modulus by bending of beams.



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## 3. Applied Chemistry:

Distinction between physical and chemical change; elements, mixtures, and compounds; composition of the atmosphere; Oxygen oxides, burning and rusting; water solvent properties and crystallization; action of water on metals; composition of water hydrogen; Laws of chemical combination; meaning of chemical symbols valency; simple chemical equations; acids, bases and salts.

Electrolysis, The ionic theory of solution. The electropotential series, electroplating, General characteristics of the metals including an elementary study of the common metals and their alloys with special reference to those used in the dental workroom.

Alcohol, ethers, aldehydes and ketones, fatty acids, and their more important derivatives, amines. Simple treatment of carbohydrates, fats, and proteins, Benzene and its homologs. General characteristics of aromatic substances. Synthetic resins and plastics used in Dentistry.

### Exercises/Demonstrations:

- Tests for Acids and alkalis radicals.
- Acid-base titration- Neutralisation of acids with alkalis. Titration of N/ 10 NaOH with N/10 H<sub>2</sub>SO<sub>4</sub> Phenolphthalein or Methyl red as indicator.
- Total Nitrogen determination in organic nitrogenous materials, digestion and distillation.
- Total Nitrogen determination in Inorganic (ammoniacal) solutions (or salts) by direct distillation with Mg.
- Determination of Phosphorus in inorganic materials by precipitation.
- Determination of Potassium in aqueous solution by perchlorate method.
- Electrolytic deposition (electrolysis and electroplating of metals).
- Deposition of Copper by electrolysis of copper Sulphate solution.
- Calculation of E.C.E.

## 4. Applied Oral Anatomy:

Elementary anatomy and structure of denture/bearing area.

Human dentition and occlusion.

Functions of teeth and morphology of Crowns of teeth.

Muscles of mastication and facial expression.

Mastication deglutition and phonation.

Movements of temporomandibular joint.

### Exercise/Demonstrations:

- Tooth Carving in wax and plaster. (Crown and root, scale and enlarged models)

## 5. Dental Mechanics (Primary):

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Infection control measures for impressions and models.

Impression Preservation and Boxing-in.

Cast Preparation, Trimming, including Orthodontic casts.

Cast duplication - various methods.

Construction of special trays – spacers

Bite blocks- base plates and wax rims.

Articulators: Classification, daily uses, and care of articulators.

Adjustments, Mounting of casts.

Articulation, Occlusal plane, protrusive balance, working bite, balancing bite, curve of space, compensating curve, lateral curve.

Principles of selection of teeth.

- Setting of teeth and wax finishing.
- Flasking, Dewaxing, Packing, curing and deflasking.
- Finishing and polishing of dentures.

Additions, repairs, relining and revasing of dentures.

- Immediate denture construction.

- Making of acrylic teeth.

Kennedy's classification of partial dentures.

- Principles of partial denture, design, clasp surveyor, surveying, path of insertion and removal. Establishment of clasp seat. Clasp's parts, classification, function and reciprocation.

- Principles of wire bending, Preparation of wrought clasps, occlusal rests, and lingual bars.

## 6. Dental Mechanics (Final):

Casting machines: Centrifugal and pressure casting machines, Furnaces, Principles of casting.

Casting techniques of partial denture (Skeletal) Clasps, bars, occlusion rest. Setting of teeth and completion of dentures on metal skeletons.

Mechanical principles of Orthodontic appliances, anchorage, force, tissue changes and retention.

• Stainless steel wire-preparation of clasps, springs and Arch wires for Orthodontic appliances.

Use of various types of expansion screws.

**Designing** –Implant-supported Prosthesis (if facilities available for Dental Implants

Ceramic, laminates and Veneers.

**Fabricating**—Maxillofacial prostheses such as eye, nose ear, cheek, obturator, and splint

-Indirect Resin Restoration preparation techniques.

-Porcelain firing techniques

Preparation of removable Orthodontic appliances, Activators, and Retention appliances and Oral screen.

Construction of fixed Orthodontic appliances, bands, tubes, and arches. Soldering and spot welding-Soldering of clasps, tags, Straighteners, and lingual bars.

Inlays and Crowns-classification and construction facing & backings. Casting Procedures.

Principles of bridge work-types of abutments - abutments and pontics construction of bridges using porcelain and acrylic pontics.

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## 7. Dental Materials and Metallurgy

### Dental Materials:

Composition, Properties, Uses, Advantages & Disadvantages of the following materials:-  
Plaster of Paris; Dental Stone, Die Stone

Investment Materials,

All Impression Materials,

Tray Materials,

Denture Base Materials, both for cold curing and heat curing, Tooth Materials Waxes,

Base Plates,,

Zinc Oxide,

Dental Luting Cements

Dental Ceramics and indirect resin restoration materials.

### Dental Metallurgy:

- Metallurgical Terms,

General

- Study of:

(a) Metals used in Dentistry, particularly Gold, Silver, Copper, Zinc, Tin, Lead and Aluminum.

(b) Alloys used in Dentistry particularly, Casting Gold Wrought Gold Silver Alloys, Stainless Steel, Chrome Cobalt Alloys.

- Heat treatment-annealing and tempering.

Solders, Fluxes, Anti Fluxes.

Tarnish and Corrosion.

Electric Deposition.

- Dental implant materials

## 8. BASIC KNOWLEDGE.OF COMPUTERS

General office routine economics, record-keeping services, Professional referrals and computing skills;

Record keeping of materials indented and Audit of use.

- Receipt and dispatch of work from clinicians

## 9. Anatomy, General & Dental :

General structure of mucous membrane (tongue, pharynx, lips), bones, muscles, blood vessels, lymphatics, glands & nerves. Blood and nerve supply in relation to the face in general and teeth and associated structures in particular.

Elementary knowledge of the development of the jaws and teeth. Structure, nomenclature, and morphology of human teeth.

Eruption; resorption & occlusion of teeth.

Relationship of teeth with investing tissues.

Muscles of mastication and facial expression.

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Temporomandibular Articulation.

Course and distribution of Vth and VIIth Cranial nerves.

## **10. Physiology & Histology, General & Dental:**

Cell structure of the human body.

Brief description of the histology and function of various dental and oral tissues e.g. Gingiva, Periodontal membrane, Alveolar process, Cementum, Enamel, Dentine, Nasmyths membrane, Pulp, etc.

Salivary glands, ducts, and their functions.

Composition and function of Saliva.

Blood Composition & Functions.

Mastication, deglutition & Phonation.

General outlines of the physiological processes of the human body-particularly circulatory.

## **11. Pharmacology, General & Dental:**

Brief description, nomenclature, derivation, dosage, pharmacological action and therapeutic uses of drugs commonly used in dentistry (Obtundent, astringent, mouth wash, antiseptics)

## **12. Pathology & Microbiology General & Dental:**

General Principles of Pathology -

Inflammation, degeneration, and repair.

Application of general principles of pathology to tooth and surrounding tissues. Dental Anomalies.

Attrition, Abrasion, and Erosion.

Oral manifestation of systemic diseases like diabetes, syphilis, anaemia, vitamin deficiencies, and infectious diseases like AIDS & Hepatitis B.

Infection Control in Dental Operatory and Bio-Medical Waste Management and Handling.

Neoplasm with reference to the oral cavity.

Elementary knowledge of Bacteriology, Asepsis, Infection, Immunity, Brief description of Pathology and Bacteriology of Dental Caries and Gingival Infections.

## **13. Dental Radiology:**

Fundamental and elementary principle of Dental Radiology including X- Ray machine, its components and maintenance.

Basic knowledge of Radiovisiography technique & extra-oral radiographs including Panoramic (Ortho-pantographs and cephalograms).

Automatic Film processing

Cataloging & Indexing of IOPA Films.

Knowledge of occlusal, bitewing, and digital radiography.

Technical aspects of Dental Radiographs i.e. the taking, processing, and mounting of

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dental Radiographs.

Characteristics of an acceptable image, factors that influence finished radiographs, and rules of radiation protection. Radiation Hazards.

## **14. Food & Nutrition:**

Basic 'food chemistry' in relation to general and Oral Health.

Physical nature of diet in the prevention of dental diseases.

Carbohydrates, fats, proteins, vitamins, minerals, and water in relation to dental and oral health. General food requirements for growth, maintenance, and repair of the body.

Assessment & charting of individual diet & counseling.

Effect of malnutrition on oral health.

Special diet and its administration in maxillofacial injury cases.

## **15. Dental Hygiene & Oral Prophylaxis (Primary and Final)**

Definition of Hygiene.

Objectives of Dental Hygiene.

Oral Prophylaxis - Various methods.

Oral Prophylaxis: treatment system

Stains on teeth - extrinsic, intrinsic and their management.

Dental plaque.

Brushing & Flossing Technique

Dental Calculus

Technical knowledge of ultrasonic scaling

Brief description and the role of Oral Prophylaxis in Gingivitis, Periodontitis, Periodontal and Alveolar abscess.

### **Clinical:**

Instruments, technique of Oral Prophylaxis

Destaining and polishing of teeth.

Topical application of fluorides.

Care of oral cavity and appliances during treatment of maxillofacial cases.

## **16. Dental Health Education, Community Public Health Dentistry & Preventive Dentistry:**

Definition of Health and Dental Health.

Aims and objectives of Dental Health Education.

Dental Health and Children.

Steps in the preventive program, patient counselling.

Dental Health Education-Parents, mothers (anti and post-natal), infants pre-school

Children and grownup Handicapped children.

Dental caries- Prevalence and Prevention.

Prevention by fluoridation.

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Periodontal Diseases.

Saliva in relation to dental health and disease.

Dietary habits and Dental Health.

Habits and Malocclusion.

Oral Cancer.

Brief outline of historical background of public Health, History of dentistry and Public Health Services. Dental Health Team in relation to community health.

Technical knowledge of Topical Fluoride Application.

## **Practical:**

Preparation of models of jaws and teeth-normal and pathological dental conditions.

Designing, drawing and painting of posters on 'dental health education.

Procedure for arranging. Short talks, skits, and features on dental and oral health, and visual aids.

Collection of Oral Health-related statistics by conducting a small survey of an area.

## **17. DENTAL ETHICS, JURISPRUDENCE AND ORIENTATION IN DENTISTRY**

Difference between ethics and law, types of law.

Legal impositions in relation to dental practice, code of ethics.

Unlicensed practice of dentistry.

Regulatory and professional organisation.

Place and function 'of dental profession in the society and discussion of economic problems involved therein.

Social factors in Dental Progress, income, and living standard of people.

Objective and scope of dentistry.

Dental specialties

## **18. BASIC KNOWLEDGE OF COMPUTER**

General office routine economics, record-keeping services, Professional referrals and computing skills.

## **19. DENTAL MATERIALS**

General knowledge of various materials used in Dentistry such as impression material, gypsum products, waxes, investing materials, and various filling materials, Temporary and Permanent cements, orthodontic materials and implant materials, materials used in maxillofacial and surgical prosthesis.

Recognition and knowledge of various dental equipment and stores used in dental establishment.

Organization of dental stores, storage and accounting, handling, and maintenance of dental items, assembly, and minor repair of dental equipment

# **Kalyan Singh Super Specialty Cancer Institute**

कल्याण सिंह अति विशिष्ट कैंसर संस्थान

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## **Part – B (Core Subject)**

### **Syllabus for the post of Medical Lab Technologist**

**Advt. No KSSSCI/ER-20/04/2023-24**

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

#### **Anatomy & Physiology**

- a) Musculo skeletal system: Bones: types, structure and functions
- b) Digestive System: Gross anatomy of digestive organs, Physiology of Digestion, Digestive juices-Secretion, Composition and functions
- c) Respiratory System: Gross anatomy of respiratory organs, Physiology of respiration, Oxygen and Carbon dioxide transport
- d) Cardiovascular System: Gross anatomy of heart and blood vessels
- e) Excretory System: Gross anatomy of excretory organs, Function of Kidneys, mechanism of urine formation, Structure and function of Kidney
- f) Reproductive System: Gross anatomy of Male & Female reproductive organs, Physiology of menstruation
- g) Cerebro spinal fluid: Formation, composition of CSF
- h) Endocrine System Gross anatomy of endocrine organs: Brief description of Endocrine hormone and their functions

#### **Biochemistry**

- a) introduction and scope of Biochemistry, cleaning and care of laboratory glass ware and equipments, preparation and storage of Distilled water, Analytical balance, calorimeter, spectrophotometer, pH Meter, flame photometer, S.I. unit of measurement, Preservation and disposal of biological sample, Basic statistics - mean, median, modes, SD, CV, normal reference ranges. Acid and base, pH, buffer solution, indicator, standard solution, storage of chemicals, water, electrolytes, acid base balance.
- b) Carbohydrate, Lipids, Proteins-Classification, Properties, Biological importance, functions. Amino acids, nucleic acids, Enzymes, Co-enzymes-Definition, classifications, Biological role/importance.
- c) Glycolysis, TCA-cycle, Electron transport chain, Pentose Phosphate Pathway, Glyconeogenesis, Gluconeogenesis, Cori-cycle, Blood sugar and its regulation.
- d) Fatty acid, cholesterol, lipoproteins, Purine ribonucleotide-Biosynthesis, utilization, Ketone bodies formation and its utilization.
- e) Amino acids, vitamins, mineral-classification, Biological role, deficiency state. Transamination, Deamination, Biological importance of catecholamine, GABA, Serotonin, Histamine, Melanin.
- f) Tumour markers. Brief history, classifications, clinical applications,

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## g) Laboratory test (AFP, CEA, PSA)

- Liver function test, renal function test.
- Thyroid function test, Enzymes and co-enzyme in diagnosis of the diseases, Hormone analysis.
- Cardiac function test
- Qualitative test for Carbohydrates, lipids, proteins, Bence Jones's Protein
- Estimation of Serum electrolytes, and bicarbonates Blood sugar
- Quantitative test for organic constituent (Urea, uric acid, creatinine) in organic constituent (sodium, Potassium, calcium, ammonia, chloride, Phosphate, bicarbonate and sulphate in urine with clinical significance and study of abnormal constituent or urine (glucose, Protein ketone bodies, blood, bile salt, bile pigments
- Radio Immuno Assay (RIA)
- Enzyme Link Immuno sorbent Assay (ELISA)
- Chromatography (thin layer paper, gas, liquid Electrophoresis, gelelectrophoresis, liquid electrophoresis)

## Microbiology

- a) Introduction, brief history of Microbiology, origin of microbial life theory of spontaneous generation.

### Safety measures in microbiology

- Classifications and nomenclature of bacteria (five kingdom concept)
  - Sterilization-Principle, methods, antiseptic, disinfectants.
  - General characteristic of Bacteria, anatomy of bacteria (shape, size, components)
  - Growth and nutrition of bacteria, classification of bacteria on the basis of nutritional requirements, measurement of cell mass and factor affecting growth.
  - Cultivation of microbes (Bacteria)
  - Culture technique (media preparation and inoculation)
  - Isolation of Pure cultures (streak plate, spread plate, pours plate and serial dilution)
  - Identification of microbes by colony morphology.
- b) Bacteriology, Normal Micro flora of human body, Germ theory of diseases, microbial infection (types, sources and transmission)
- Bacterial toxin (Endotoxin & exotoxin)
  - Bacterial morphology, isolation, identification, Pathogenicity, Lab diagnosis (Culture, Biochemical test, Hanging drop method for motility, Anaerobic, aerobic culture methods of staphylococcus, streptococcus, Neisseria Gonorrhoea, N. meningitidis, Clostridium tetani & C. perfringens
  - E.coli, Vibrio cholera, Salmonella typhi, Shigella, Mycobacterium/ Mycobacterium tuberculosis, Spirochetes-Treponema pallidum.
  - Collection, preservation, transportation of clinical specimens for



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## microbialinvestigation

- Bacteriological methods of examination of blood, faeces, pus, sputum, throats wab and urine
  - Antibiotic sensitivity test (Disc diffusion and broth dilution methods)
  - Hospital acquired infections and their control.
  - Waste disposal and management
- c) Instruments & Glass ware:
- Autoclave, Incubator, Laminar Airflow,
  - Hot air oven, water bath, vortex shaker,
  - Petri dish, test tube, screw cap tube, glass spreader/L-rods, Pasteur pipettes.
- d) Medical Mycology:
- Classification and nomenclature of fungi
  - General characteristics, structures, reproduction, cultivation
  - Medically important Division of fungi
  - Morphology, culture characteristics, Pathogenicity, Lab diagnosis of Common Pathogenic fungi, (As per gillus Sp., Candida Sp., Cryptococcus Sp., Dermatophytes, Penicillium sp.)
- e) Immunology
- Introduction, Antigens (Types and properties) Antibodies/Immuno globintypes and properties)
  - Antigen-antibody reactions and their applications (Agglutination, precipitation, complement fixation and neutralization tests)
  - Immunity (Innate & Acquired)
  - Hypersensitivity
  - Immunodeficiency diseases
- f) Serology
- Quality control measures in serology
  - Common serological technique and their applications (VDRL, Widal, RA test, ASO, Pregnancy test, Hbs Ag and HCV, HIV, mantoux test)
- g) Medical Virology
- Classification, nomenclature, general characteristics (Morphology, chemical, biological properties and multiplication)
  - Cultivation of viruses (chick embryo, cell culture and animals)
  - Bacteriophages (lytic and lysogenic cycles)
  - Morphology, cultural characteristics, Pathogenicity and Laboratory diagnosisof

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the following viruses

- Poliomyelitis
- Mumps
- Measles
- Hepatitis A,B,C
- Cytomegalovirus
- Rabies
- HIV/AIDS

## h) Molecular Biology

- Introduction
- ONA & RNA
- Isolation of DNA (Genomic & Plasmid)
- Plasmids (types and Importance)

## i) Principles, methods and application of

- ELISA, Immunofluorescence test, Western Blot
- PCR

## Parasitology

### a) Introduction, classification, characteristics of human parasites

- Collection, storage and transportation of specimens, preservation of parasites
- Morphology, transmission, life cycle, Pathogenicity and Lab. Diagnosis of:-

Entamoeba histolytica, Giardia Lamblia, Trichomonas vaginalis, Leishmaniadonovani and L. tropica.

Plasmodia species, Toxoplasma gondii, nematodes-Intestinal flukes, Blood flukes, Lung flukes, Liver fluke.

### b) Common vectors of human diseases (mosquito, flies, ticks and fleas)

## Pathology & Clinical Pathology, Basic Lab. Techniques & Instruments

### a) Pathology-definition, Branches

- Acute and Chronic inflammation (definition, characteristics)
- Sub acute, granulomatous inflammation (definition, characteristics)
- Changes in inflammation
- Chemical mediators of inflammation

### b) Cell Injury

- definition, causes, Ischaemia, necrosis
- apoptosis, degeneration, dehydration

### c) cellular adaptation of growth and differentiation (Atrophy, Hypertrophy, Hyperplasia, Metaplasia, Dysplasia, Anaplasia)

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- d) Neoplasia (Benign and Malignant, definition, characteristics, etiology, spread)
- e) Cell of Immune System (B&T lymphocytes, macrophage, dendritic and langerhan's cells, NK Cells)
- f) Laboratory organization, role of laboratory technicians and responsibilities, safety measures, instruments, reporting and recording, common laboratory accidents and its preventions, handling of infectious materials, preventions and disposal, reagents and its storage.
- g) Types of solution (isotonic, hypotonic, hypertonic) quality control - (Principles and types)
- h) Routine examination and clinical significant of -
  - Urine
  - Stool
  - Body fluids (Ascitic fluid, pleural fluids, pericardial fluid, synovial fluids, CSF seminal fluids, sputum)
  - Medico legal importance of semen analysis and abnormal morphology of sperm

## Haematology

Blood- components, collection, anticoagulants, preparation of smears & quality Haemoglobin, TLC, DLC with absolute count, WBC, Red cell Indices, Reticulocytes (methods of estimation, clinical significant)

Erythropoiesis, Granulopoiesis, Megakaryopoiesis (normal, abnormal & clinical significant) Blood parasites, bone marrow smears

- (a) Haemoglobin (normal and abnormal, Biosynthesis, Haemoglobin opathies and its investigation)
- (b) RBC-structure, erythropoietin, functions
- (c) WBC-Physiology, pathological variation
- (d) Platelets-functions, purpuras, investigation of disorders, thrombocytosis, thrombocytopaenia
- (e) Haemostasis (Coagulation) Normal mechanism, abnormal, investigation of abnormal
- (f) haemostasis) Thrombosis-definition, causes (f)
- (g) Leukaemia definition, classification (FAB), Acute & Chronic leukaemias, Lab. features of Acute & Chronic leukaemia (AML, ALL, CML, CLL) Aleukaemic Leukaemia, Leukaemoid reaction, Myelodysplastic syndrome (definition Lab. features)
- (h) Anaemias (Normochromic, Normocytic, Megaloblastic, Micracytic hypochronic, Anaernia of infections, Haemolytic Anaemias) Definition, classification, causes, laboratory, features and investigations)
- (i) Thalassaemia (Trait, Minor, Major), Sideroblastic Anaemia, Pancytopaenia, Aplastic Anaemias, Pure red cells aplasia (Definition, causes, lab. investigation etc)
- (j) Coagulation disorders, lab, diagnosis, causes, haemophillia, DIC
- (k) lymphoma-definition, causes, classification, lab, features/diagnosis

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- (l) Myeloma-definition, causes, classification, lab, features/diagnosis
  - (m) Polycythaemia-definition, causes, classification, lab. features/diagnosis
  - (n) Purpuras-definition, causes, classification, lab. features/diagnosis
  - (o) Staining-Leishman's stain, MGG, Giemsa's, PAS, Sudan B-Black, Iron, Fats, MAP, Acid Phosphatase, Esterase (Principle, composition, methods & results)
- (ii) Blood Banking & immuno Haematology
- (a) Introduction
    - Blood bank organization, equipment, donor registration
    - Blood groups-types, technique of grouping
    - Donor's selection, collection of blood
    - Preservatives (storage), laboratory screening of blood for transfusion
  - (b) Cross matching, compatibility testing, Coomb's test, Transfusion reaction, Antigens, Antibodies (properties, production), Complements, Sensitization, Agglutination, Haemolysis, Neutralization, Precipitation, Complement fixation, Immune response.
  - (c) Diseases transmitted through blood and their screening (c , Haemolytic diseases of new born.
  - (d) Blood component preparation and its uses, Haemaphereis, Massive transfusion, Autologous transfusion, exchange transfusion.

## Histopathology- Basic & Technique

- (a) Cells and tissues - definition, cells and its organelles, function, cell cycle, mitosis meiosis, Epithelial tissues, definition, classifications & functions, Connective tissues (bone & cartilage), Muscle tissues, Nerve tissues
- (b) Histology of different systems & organs - Respiratory system, Alimentary system, Excretory systems, Reproductive system (male & female), Endocrine system.
- (c) Histopathology technique -
  - Sample reception, registering, labeling
  - Fixative & fixation, (definition, classification, details of fixative, aims & object, fixation and preservation)
  - Decalcification (definition, methods & test of end point decalcification)
  - Grossing (definition, material required)
  - Processing of tissues (manual & automatic)
  - Waxes (types of waxes)
  - Microtomies (types of microtome, knives, honing & stropping)
  - Dehydration, clearing, impregnation, embedding or blocking (definition chemicals used etc)
  - Section cutting, mounting, labeling
- (d) Demonstration of (staining)
  - Nucleic acids
  - Lipids
  - Proteins
  - Nerve cells

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- Muscles
  - Bone
  - Carbohydrates
  - Amyloid
  - Pigments
  - Micro organism & parasites
- (e) Biopsies of
- Renal biopsy, Lymph node biopsy
  - Liver biopsy, muscle biopsy
  - Kidneys, nerves fibres, skin biopsy  
(Processing, fixation, blocking, staining)
- (f) Museum technique
- (g) Immunohistochemistry (definition, purposes)
- (h) Staining
- Theory, progressive & regressive, metachromasia, mordants, Accentators
  - Staining preparation, procedures of -
  - Haematoxyline and Eosin stain
    - MGG stain connective tissue stains,
    - Giemsa's stain; mucicarmine stains
    - Z.N. stain
- PAS stain

## Cytology (Basic, technique)

- (a) Definition of cytology, material for operation and establishment of cytology laboratory, role of cytology in the diagnosis, branches of cytology
- (b) \*Reception, registration, numbering and supply of material for collecting specimens.
- \*Preparation of cytological smears
  - \*Cytological fixation - aims & objects, chemical use for cytological fixation & methods of fixation, Progressive changes of the cells
  - \*Nuclear criteria of malignancy
- (c) \*Exfoliative cytology-definition, source of samples for exfoliative cytology
- \*Body cavity fluid (Pleural effusion, Pericardial effusion, Ascitic fluids, sputum, urine, synovial fluids, CSF, Pus and Abscess)
    - Methods of collection, fixation, methods of cytopreparations & staining
    - -Clotted & blood fluids (methods of cytopreparations)
    - Cellular components in Benign and malignant effusion, acute and chronic inflammations
- (d) Interventional cytology. (FNAC) Fine Needle Aspiration Cytology
- Definition
  - Application, methods
  - Role of FNAC
  - Common sites
  - Advantage & disadvantage, limitations
  - Complications, precaution & contra-indications

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- Preparation of smears
- General properties of wet and dry smears
- Imprint, crush smears, biopsy sediments, cell block preparations
- (e) Aspiration of specific lesion eg. cyst, thyroid, lung, peritoneum, prostate, testis, radiological imaging aids for FNAC
- (f) Methods of collection, fixation and cytopreparation of samples from Female Genital tracts, Respiratory tracts, Gastro-intestinal tracts, urinary tracts etc.
- (g) Staining
  - Pap's stain
    - Chemical requirements, preparation of various chemicals for pap's stain
    - Various pap's stain methods
    - Types of haematoxyline and its preparation
    - Stain maintenance
    - Preparation of graded alcohols (50%, 60%, 70%, 80%, 85%)
    - Preparation of 0.5% Hcl, Lithium Carbonate, EA modified, 0.2% Hcl, 1% Ammonium hydroxide in 70% ethanol, Orange G-6
  - Bismark Brown, EA-50, EA-36
    - Procedures of Pap's stain
    - MGG stain
    - Giemsa's stain
    - Modified pap's stain
    - PAS stain, Alcian Blue Staining
    - Mayers & South Gate Mucicarmine stain
    - Gram's stain
    - ZN stains

Quality controls (Internal & External) definition, methods, advantage

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## **Part – B (Core Subject)**

### **Syllabus for the post of Technical Assistant (Neuro-otology)**

**Advt. No KSSSCI/ER-20/05/2023-24**

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

#### **INTRODUCTION TO HUMAN COMMUNICATION:**

History and development of the profession of Speech-Language Pathology (SLP) specifically in India

- Interdependency & interrelation between communication, hearing, speech, and language. Function of communication, speech and language
- Modes of communication (Verbal & Non-verbal)
- Characteristics of good speech
- Interactive bases of human communication

Nervous system: Divisions and functions of the nervous system, nerve cell, receptors and synapse, types of nerve fibers. Peripheral nervous system. Brief description of spinal cord and CSF.

- Structure of the brain and divisions: general and lobes of cerebrum. Reticular formation, Basal ganglia and cerebellum. Reflex action and common reflexes. Cranial nerves, distribution and supply with the special reference to II, V, VII, IX, X, XII., Nerve tracts (motor and sensory), Brodmann's area, anatomy of the nervous system related to speech and language.

Basic Acoustics of speech

- Vibrating system – simple harmonic motion – simple vibrating system – system with two or more masses – system with many modes of vibrations – vibration spectra. Waves – What is a wave? Progressive waves – sound waves – wave propagation – Doppler effect – reflection, diffraction, interference, absorption. Resonance of a mass spring vibrator- standing waves – partials, harmonics and overtones – Acoustics impedance – Helmholtz resonator – sympathetic vibrations.  
Mechanism of speech and language production
- Anatomy and physiology of laryngeal system • Development of voice • Bases of pitch and loudness change mechanism

Mechanism of speech and language production

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- Semantics: A brief introduction to different types of meaning homonyms, synonyms and antonyms.
- Morphology: Morpheme – bound and free, process of word formation, content and function words.
- Syntax: grammatical and syntactic categories, sentence types, Syntactic analysis.
- Pragmatics: Introduction to verbal and non-verbal communication and other indicators, intent of communication.
- Theories and models of language Acquisition – Behavioral, Nativistic, Cognitive, Linguistic, Pragmatic, Biological and Information processing model.
- Developmental issues in communicative development – genetic, neurological, medical, behavioural, social and psychological.
- Bilingualism / multilingualism in children; Bilingual Language learning contexts at home and school situations, compound / coordinate context and others.
- Definition, Etiology, Characteristics, Classification and Impact of Hearing Impairment,
- Mental Retardation, Cerebral Palsy
- Definition, Etiology, Characteristics and classification of Autism Spectrum Disorders/Pervasive Developmental

Definition, Etiology, Characteristics, Classification and Impact of Specific Language Impairment • Learning Disability • Acquired aphasia in childhood • Traumatic Brain Injury • Multiple disabilities Introduction to assessment procedures, differential diagnosis and management

## INTRODUCTION TO HEARING & HEARING SCIENCES:

Origin of Audiology • Its growth in India • Scope of Audiology, Branches of Audiology • Audiovestibular system: Anatomy of the external, middle and internal ears. Ascending and descending auditory and vestibular pathways. • Physiology of the external, middle & inner ear, central hearing mechanisms, cochlear microphonics, action potentials, theories of hearing (AC & BC) , Theory of bone conduction • Vestibular system: Functions of utricle, saccule and vestibular apparatus. Posture and equilibrium. Tests of posture and equilibrium • Causes of hearing loss Genetic (congenital, late onset, progressive, syndromic / non- syndromic), Non-Genetic (Congenital/acquired)

Role of hearing (threshold concept, binaural hearing, head shadow, pinna shadow effect, MAF, MAP – Curve for threshold of hearing) • Sound Pressure, Power and Loudness. Physical and psychophysical scales, Equal loudness contours, Frequency weighting curves, combined sources, Pitch and Timbre. Physical and psychophysical scales. Fourier analysis of complex Tones • dB concept: power and pressure formulae: zero dB reference for pressure and power calculation of actual SPL, reference and dB values with any to given values, calculation of overall dB when two signals are superimposed. • Phones and Sones: relation between phones and sones; use of phone and sonograph; computation of relative loudness of two given sounds using these graph. Frequency and intensity, their psychological correlates: dL for frequency and intensity



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Calibration: Biological and instrumental for AC & BC transducers • Procedure • interpretation • precautions to be taken while testing • Audiometric room construction • Acoustics of Rooms. Sound propagation in outdoors and indoors. • Direct, early and reverberant sound. Calculation of reverberation time. • Air absorption. Background noise.

Basic concepts of AC & BC testing

- Pure Tone audiometry • Need and scope • Instrumentation, Different types of transducers • Standards • Permissible ambient noise levels for audiometric testing
- Classification of audiograms • Sound field & closed field testing • Factors affecting AC & BC testing • Screening Vs Diagnostic pure tone testing • Extended high frequency testing & its interpretation • Masking: Definition, types of masking, types of noises, critical band concept, • Terminology related to masking: Test ear, non-test ear, masker, maskee, crossover, cross hearing and shadow curve • Interaural attenuation; Factors affecting IA; Criteria for masking during AC & BC • Factors determining amount of masking noise, AB gap in masked ear, masking dilemma in bilateral symmetrical conduction hearing loss. • Fusion Inferred Test (FIT) • Types and degrees of hearing loss
- Tuning fork tests: Tuning fork tests (Rinne, Weber, Bing, Schwabach), interpretation, merits & demerits. • Speech audiometry • Orientation to speech audiometry • Need for speech audiometry • Speech recognition threshold, speech identification score, UCL, MCL, dynamic range, articulation index • Tests developed in India and abroad • Factors affecting speech audiometry • Limitations of speech audiometry • Masking for speech audiometry • PI-PB function

**MANAGEMENT OF THE HEARING IMPAIRED:** Definitions and goals of rehabilitation & aural rehabilitation Early identification and its important in aural rehabilitation • Unisensory Vs Multisensory approach • Manual Vs oral form of communication for children with hearing impairment • Total communication Methods of teaching language to the hearing impaired • Natural method • Structured method • Computer aided method Educational problems, of children with hearing impairment in India • Educational placement of hearing impaired children • Criteria for recommending the various educational placements • Factors affecting their outcome • Counseling the parents and teachers regarding the education of the hearing handicapped • Parent Infant Training Programme (PIP) & Mother's Training Programme, Home training – need, preparation of lessons; correspondence programs (John Tracey Clinic, SKI-HI), follow up

Introduction to hearing aid technology: Parts of hearing aids & its functions • Type of hearing aids: - Body level Vs ear level - Monaural Vs Binaural Vs Pseudobinaural - Directional hearing aids, modular hearing aids Classroom amplification devices; Group amplification systems– hard wired, induction loop, FM, infrared rays. • Setting up class rooms for the hearing handicapped • Classroom acoustics preferential seating and adequate illumination

Ear moulds: Importance, types (hard, soft), procedure of making each type of ear mould, styles of ear moulds, criteria for selection of one style over the other, ear mould modifications, EAC of hearing aid along with ear mould. • Importance of counseling for users & parents – importance of harness, BTE loops. Tips to facilitate acceptance of

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hearing aids, battery life, battery charger. Counseling for geriatric population, Trouble shooting of hearing aids

## ENT:

- Anatomy & Physiology of external, middle & inner ear, auditory pathways, vestibular pathway. Diseases of the external middle and inner ear leading to hearing loss: Congenital malformations, traumatic lesions, infections, management of middle ear and Eustachian tube disorders. Other causes of hearing loss – Facial paralysis, Tumors of the cerebello-pontine angle, Acoustic neuroma. Infection and management of inner ear diseases. Cochleovestibular diseases and its management.
- Anatomy & Physiology of pharynx & oro-peripheral structures Causes of speech disorder, Disorders of the mouth, Diseases of tonsils and adenoids. Oesophageal conditions: Congenital abnormality – Atresia, Tracheo- oesophageal fistula, Stenosis, Short oesophagus. Neoplasm – Benign, Malignant, Lesions of the oral articulatory structures like cleft lip, cleft palate, submucosal cleft, Velopharyngeal incompetence.
- Anatomy & Physiology of larynx – physiology of phonation / physiology of respiration. Congenital diseases of the larynx – difference between an infant and an adult larynx. Stridor – causes of infantile stridor. Disorders of structure – Laryngomalacia, Bifid epiglottis, Laryngeal web, Atresia, fistula, Laryngeal cleft, Tumors and Cysts, Laryngitis, Laryngeal trauma and Stenosis. Neuromuscular dysfunctions of the larynx – Vocal cord palsy, Spastic dysphonia, Hypothyroidism, gastro oesophageal reflux disorders, Laryngectomy, artificial larynx, oesophageal speech, tracheo oesophageal puncture.

## PSYCHOLOGY RELATED TO SPEECH AND HEARING:

Introduction to psychology- Definition, History and perspectives, Branches and scope, application of psychology in the field of speech and hearing. • Introduction to Clinical psychology – Definition, Perspectives and models of mental disorders Psychology of learning – Introduction, Definition of learning, Theories of learning, Classical conditioning, Operant conditioning and Social learning. Application of learning theories in the field of speech and hearing (therapeutic, educational and rehabilitative applications).

Cognitive Psychology – Introduction, Definition and theoretical perspectives (David Rumelhart and David Mc Clelland, Noam Chomsky, George miller, Allan Newell). • Applications of cognitive psychology in the field of speech and hearing. • Neuropsychology – Introduction, definition, principles of neuropsychological assessment, diagnosis and rehabilitation. • Applications of neuropsychology in the field of speech and hearing.

Psychodiagnosis – Case history taking, Mental status examination, behavioural analysis, psychological testing. Counselling- Meaning and definition, types of counselling, Counselling in rehabilitation practice. Developmental psychology: • Introduction, Definition, Principles, Motor development, Emotional development •

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Cognitive development- Definition, Piaget's theory • Play as a therapeutic tool • Personality development- Introduction, Stages.

## **SPEECH LANGUAGE DIAGNOSTICS AND THERAPEUTIC:**

Speech language diagnostics Client history – definition, description, utility & need. Essential factors to be included in the client history form – comparison of adults vs. children's history – usefulness of the client history, Basic terminologies and concepts • Introduction to diagnostics • Terminologies in the diagnostic process • General principles of diagnosis • Diagnostic setup and tools

Diagnostic approaches and methods • Approaches to diagnosis

Diagnostic models

– SLPM, Wepman, Bloom and Lahey • Types of diagnoses – Clinical diagnosis, direct diagnosis, differential diagnosis, diagnosis by observation, diagnosis by exclusion, diagnosis by treatment, instrumental diagnosis, provocative diagnosis, provisional diagnosis;

advantage/disadvantages • Team approach to diagnosis • Characteristics of a good clinician as diagnostician

Speech therapeutics

Basic concepts of therapeutics • Terminologies in speech therapeutics • General principles of speech and language therapy • Speech therapy set-up • Individual and group therapy • Integrated and inclusive education, Procedures for speech-language therapy • Approaches to speech and language therapy – formal, informal and eclectic approaches • Types of speech and language therapy • Planning for speech and language therapy – goals, steps, procedures, activities Techniques for: Speech and language therapy for various disorders of speech and language Importance of reinforcement principles and strategies in speech and language therapy, types and schedules of rewards and punishment.

Clinical documentation and professional codes • Documentation of diagnostic, clinical and referral reports Introduction to parent counselling, facilitation of parent participation and transfer of skills, follow-up • Evaluation of therapy outcome • Ethics in diagnosis and speech language therapy • Self- assessment and characteristics of a clinician

## **ARTICULATION AND PHONOLOGICAL DISORDERS:**

Review of phonological development and articulatory mechanism • Fundamentals of Articulatory phonetics

Definition and types of coarticulation • Transcription methods in perceptual analysis • Phonological processes – types, language specific issues, identification and classification of errors. Distinctive features – types, language specific issues, identification of errors and analysis. • Acoustic aspects of production and perception of speech sounds; use of spectrograms • Factors related to articulation and phonological disorders: •Structural •Cognitive – Linguistic •Neurological •Psychosocial •Social •Metalinguistic

Assessment procedures: Types of assessment, sampling procedures, scoring procedures, criteria for selection of instruments for assessment. • Assessment of Oral peripheral mechanism • Speech sound discrimination, stimulability and oral stereognosis. • Analysis and interpretation of data: • Intelligibility and severity judgments • Normative data • Error patterns. • Characteristics of disordered phonology and differential diagnosis

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Intervention: Stages of treatment and measuring improvement, long term goals, short term goals and activities for achieving goals in cases with misarticulation. • Issues in maintenance and generalization. • Team approach and

professional communication (inter, intra professional and client oriented) • Approaches to treatment: motokinesthetic, traditional approaches integral stimulation, phonological, distinctive feature, minimal contrast therapy, learning theories, programmed, paired – stimuli. • Computerized intervention packages, metaphon therapy

Cleft Lip and Palate • Etiological factors • Embryology of the Face and Palate • Types of Cleft lip and Palate, Classification systems • Syndromes • Velopharyngeal mechanism- muscles and function; inadequacy, incompetency and insufficiency • Speech and Language problems of individuals with Cleft • Associated problems of individuals with Cleft • Diagnostic procedures and Instruments used in Assessment of speech in Cleft palate • Team Management: Composition, responsibilities and co-ordinator • Treatment concepts • Treatment procedures for speech • Prosthetic speech appliances for patients with Cleft palate, Glossectomy and Mandibulectomy • Effect of partial and Total Glossectomy on speech Characteristics of Glossectomy speech • Rehabilitation of speech • Prosthetic fitting, design, assessment • Dysphagia specific to glossectomy and mandibulectomy: assessment and rehabilitation

## MOTOR SPEECH DISORDERS:

- Introduction to neuromotor organization and sensorimotor control of speech - Motor areas in cerebral cortex, motor control by subcortical structures, brainstem, cerebellum and spinal cord. - Central nervous system and peripheral nervous system in speech motor control. - Centrifugal pathways and motor control - Neuromuscular organization and control - Sensorimotor integration - Introduction to motor speech disorders in children- Dysarthria and Developmental apraxia of Speech
- Definition, causes and classification - Neuromuscular development in normals and children with cerebral palsy - Reflex profile - Associated problems - Speech and language problems of children with cerebral palsy - Assessment of speech in cerebral palsy- objective and subjective methods - Differential diagnosis of cerebral palsy - Management: Introduction to different approaches to neuromuscular education (Bobath, Phelps and the others); Speech rehabilitation in cerebral palsy- Verbal approaches: vegetative exercises, oral sensorimotor facilitation techniques, Compensatory techniques- correction of respiratory, phonatory, resonatory and articulatory errors; Team approach to rehabilitation; Neurosurgical techniques for children with cerebral palsy
- Different types of Cerebral palsy: - Disorders of muscle tone: Spasticity, rigidity, flaccidity, atonia - Disorders of movement: Hyperkinesias and dyskinesias- Ballismus, tremor, tic disorder, myoclonus, athetosis, chorea, dystonia, hypokinesias – Disorders of coordination- Ataxia Syndromes with motor speech disorders Examples: - Juvenile progressive bulbar palsy - Congenital supranuclear palsy - Guillain- Barre syndrome - Duchenne muscular dystrophy
- Apraxia of speech in children or developmental apraxia of speech - Definition - Description: verbal and non verbal apraxia - Differential diagnosis- dysarthria and other developmental disorders of developmental apraxia of speech- Facilitation

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techniques for oral motor movements, speech therapy techniques, generalization of speech

- Definition - alternative and augmentative communication (AAC). Application of alternative and augmentative communication methods in developmental dysarthrias and developmental apraxia of speech- Symbol selection, techniques for communication, assessment for AAC candidacy, choosing an appropriate system and technique, training communication patterns, effective use of AAC

## Adult Motor Speech Disorders

### DYSARTHRIA AND APRAXIA:

Definition and classification of dysarthria in adults. b) Types of dysarthria in adults. c) Neurogenic disorders learning to dysarthria in adults. • Vascular disorders – dysarthria following strokes, CVA, cranial nerve palsies and peripheral nerve palsies. • Infection condition of the nervous system – eg. Meningitis polyneuritis and neuro syphilis. • Traumatic conditions – Traumatic brain injury and dysarthria • Toxic conditions – dysarthria due to exogenic and endogenic causes. • Degenerative and demyelinating conditions – multiple sclerosis, Parkinson's disease, motor neuron diseases, Amyotrophic lateral sclerosis. • Genetic conditions – Huntington's chorea, Guillian – Barre syndrome. • Others leading to dysarthria

Anoxic conditions, metabolic conditions, idiopathic conditions and neoplasm.

Assessment of dysarthria Instrumental analysis • Physiological and Electrophysiological methods • Acoustics • Advantages and disadvantages of instrumental analysis of speech in dysarthria. Perceptual analysis – measures, standard tests and methods, speech intelligibility assessment scales, advantages and disadvantages of perceptual analysis of speech in dysarthria. e) Differential diagnosis of dysarthria from functional articulation disorders, apraxia of speech, aphasia and allied disorders.

Management of dysarthria - Medical, surgical and prosthetic approaches - Speech therapy • Vegetative exercises • Oral sensori motor facilitation techniques • Compensatory approaches

Correction of respiratory, phonatory, articulatory and prosodic errors. • Strategies to improve intelligibility of speech.

Apraxia of speech in adults • Definition of verbal and nonverbal apraxia of speech • Different types, characteristics and classification • Assessment of apraxia of speech – standard tests and scales, subjective methods and protocols

Management of apraxia of speech – different approaches • Improving intelligibility of speech.

Dysphagia: • Definition • Phases of normal swallow • Etiology of swallowing disorders • Assessment and Intervention

### DIAGNOSTIC AUDIOLOGY:

Introduction to Diagnostic Audiology: - Need for test battery approach in auditory diagnosis & integration of results of audiological tests. - Indications for administering audiological tests to identify Cochlear pathology, Retro-cochlear pathology, functional hearing loss, Central processing disorders. 2. Tests to differentiate between cochlear & retro- cochlear pathology - ABLB, MLB -SISI - Test for adaptation - Bekesy Audiometry - Brief tone audiometry - PIPB function

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Immittance Audiometry - Introduction - Principle of Immittance audiometry - Instrumentation - Tympanometry – Tympanometric peak pressure, static immittance, gradient/tympanometric width. - Reflexometry – Ipsilateral & contralateral acoustic reflexes, special tests - Clinical application of Immittance evaluation - Immittance evaluation in the pediatric population Unit 3 4. Auditory Brainstem Response

## Central Auditory Disorders

Test findings in subjects with central auditory disorders

Operational characteristics, types and specifications.

Microphones as transducers.

Measuring Instruments

Multi-meter. Cathode ray oscilloscope. Sine wave generator. Function Generator, Frequency counter, Measuring microphones, Sound Level Meter, Integrated Sound Level Meter, Artificial ear, Artificial Mastoid, Couplers, Hearing aid test box, Measurement of different types of sound

Electroacoustic Characteristics & measurements for hearing aids

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## Part – B (Core Subject)

### Syllabus for the post of Ophthalmic Technician Gr-I

#### Advt. No KSSSCI/ER-20/06/2023-24

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

- Anatomy of eye
- Physiology of eye: Anterior chamber, Posterior chamber, Colour Vision & visual Field
- General consideration of different terms used in ophthalmology.
- Common diseases of eyelids
- Common diseases of conjunctiva
- Common diseases of sclera / Common diseases of iris & ciliary body
- Common diseases of Cornea
- Glaucoma & Cataract
- Anatomy and physiology of Orbit
- Examination of eye - General examination of eye including :
  - Visual acuity
  - Accommodation
  - Colour vision
  - visual Fields
- Principle of Retinoscopy & methods
- Refraction techniques including prescription of glasses,
- Errors of refraction (Computerized and Non-computerized techniques)
  - Myopia
  - Hypermetropia
  - Astigmatism
  - Presbyopia
  - Aphakia / Pseudophakia
  - Anisometropia
  - Anisokonia
- Physical optics
- Properties of light
- Principles of refraction
- Lenses and their combinations
- Spectacles designs & fitting
- Keratometry
- Cross Cylinder
- Contact lenses
  - Indications

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- Types
- Uses
- Fitting
- Ocular Pharmacology
- Orthoptics
- Ophthalmic Instruments & appliances ➤ Investigative Ophthalmology
- Eye Bank
- Community Ophthalmology
- Management Of Ophthalmic Operation Theater



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## **Part – B (Core Subject)**

### **Syllabus for the post of Technician (Radiology)**

#### **Advt. No KSSSCI/ER-20/07/2023-24**

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

1. Basic Anatomy & Physiology
2. Basic Bio-Chemistry, Microbiology and Pathology
3. General Physics
4. Radiation Physics, Radiation safety and protection
5. Darkroom Techniques
6. General Radiography Techniques
7. Special Radiography Techniques
8. Interventional Radiology Techniques
9. CT, MRI, USG Techniques and procedures
10. General Principles of Hospital Practice & Patient care
11. Computer and its applications in Radiology
12. Quality Assurance and Quality control
13. Knowledge of various regulatory bodies (like AERB, ICRP etc.) norms and regulation including PNDDT Act.

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## **Part – B (Core Subject)**

### **Syllabus for the post of Technician (Radiotherapy)**

#### **Advt. No KSSSCI/ER-20/08/2023-24**

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

1. Introduction to healthcare delivery system
  - a. Healthcare delivery system in India at primary, secondary and tertiary care
  - b. Community participation in healthcare delivery system
  - c. Health system in developed countries.
  - d. Private Sector
  - e. National Health Mission
  - f. National Health Policy
  - g. Issues in Health Care Delivery System in India
2. National Health Programmes
3. Introduction to AYUSH system of medicine
4. Health scenario of India- past, present and future
5. Demography & Vital Statistics
6. Epidemiology

#### **Medical terminologies and record keeping**

1. Derivation, prefixes, and suffixes.
2. Conventions for combined morphemes and the formation of plurals.
3. Form medical terms utilizing roots, suffixes, prefixes, and combining roots.
4. Interpret basic medical abbreviations/symbols.
5. Utilize diagnostic, surgical, and procedural terms and abbreviations related to the integumentary system, musculoskeletal system, respiratory system, cardiovascular system, nervous system, and endocrine system.
6. Interpret medical orders/reports.
7. Data entry and management on electronic health record system.

#### **Basic computers and information science**

Introduction to computer: Introduction, characteristics of computer, block diagram of computer, generations of computer, computer languages.

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Input output devices: Input devices (keyboard, point and draw devices, data scanning devices, digitizer, electronic card reader, voice recognition devices, vision-input devices), output devices (monitors, pointers, plotters, screen image projector, voice response systems). Processor and memory/ Storage Devices: Sequential and direct access devices, magnetic tape, magnetic disk, optical disk, mass storage devices. Introduction of windows / Introduction to MS-Word / Introduction to Excel/ Introduction to power-point: introduction, creating and manipulating presentation, Computer networks: introduction, types of networks (LAN, MAN, WAN, Internet, Intranet), network topologies (star, ring, bus, mesh, tree, hybrid), components of network.

## **Medical law and ethics**

1. Medical ethics - Definition - Goal - Scope
2. Introduction to Code of conduct/ Confidentiality/ Malpractice and negligence / Autonomy and informed consent - Right of patients/ Care of the terminally ill- Euthanasia
3. Organ transplantation
4. Medico legal aspects of medical records
5. Professional Indemnity insurance policy
6. Development of standardized protocol to avoid near miss or sentinel events / obtaining an informed consent

## **Communication and soft skills**

1. Basic Language Skills: Grammar and Usage.
2. Business Communication Skills/ Basic concepts & principles of good communication /Special characteristics of health communication/ Types & process of communication
3. Barriers of communication & how to overcome

## **Introduction to Quality and patient safety**

1. Quality assurance and management -
  - a. Concepts of Quality of Care
  - b. Quality Improvement Approaches
  - c. Standards and Norms
  - d. Quality Improvement Tools
  - e. Introduction to NABH guidelines
2. Basics of emergency care and life support skills - Basic life support (BLS) is the foundation for saving lives following cardiac arrest. Fundamental aspects of BLS

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include immediate recognition of sudden cardiac arrest (SCA) and activation of the emergency response system, early cardiopulmonary resuscitation (CPR), and rapid defibrillation with an automated external defibrillator (AED).

### 3. Bio medical waste management and environment safety:

- a. Definition of Biomedical Waste
- b. Waste minimization
- c. BMW – Segregation, collection, transportation, treatment and disposal (including color coding)/ Liquid BMW, Radioactive waste, Metals / Chemicals / Drug waste
- d. Modern technology for handling BMW / Use of Personal protective equipment (PPE)
- e. Monitoring & controlling of cross infection (Protective devices)

Infection prevention and control - The objective of this section will be to provide a broad understanding of the core subject areas of infection prevention and control and to equip AHPs with the fundamental skills required to reduce the incidence of hospital acquired infections and improve health outcomes. Concepts taught should include –

- a. Evidence-based infection control principles and practices [such as sterilization, disinfection, effective hand hygiene and use of Personal protective equipment (PPE)],
- b. Prevention & control of common healthcare associated infections,
- c. Components of an effective infection control program, and
- d. Guidelines (NABH and JCI) for Hospital Infection Control

### 4. Antibiotic Resistance and antibiotic stewardship

5. Disaster preparedness and management- The objective of this section will be to provide knowledge on the principles of on-site disaster management

### Professionalism and values

1. Professional values- Integrity, Objectivity, Professional competence and due care, Confidentiality

### Research Methodology and Biostatistics: Basic concepts

### Elementary mathematics & physics

#### 1. Elementary Mathematics

- a. Calculation of percentage, Profit & Loss, Simple interest, compound interest, time & work, Ratio & proportion, Surds, Indices, Logarithm, Inverse Square Law,
- b. Geometry of triangles, similar triangles, Properties of Triangles.
- c. Trigonometry: Height & Distance.

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- d. Graphical Representation of Exponential and Inverse exponential functions, Linear and semi log graphs.
2. Basic Physics, Electrostatics, Magnetism & Current Electricity
    - a. Units & Dimension, Newton's Laws of Motion, Velocity & Speed, Force, Momentum etc.
    - b. Coulomb's Law, Electric field & potential, Capacitance, Ohm's Law, Heating effect of current, Biot-Savart law, Definition of Tesla and Gauss, Magnetic field due to circular coil. Elementary Principles of-Magnetization of Materials by electric current, Electromagnets. Lorentz force. Magnetic flux. Electromagnetic induction, mutual and self-inductance. Transformer, Eddy current. Alternating Current, RMS and Average Current. Variation of Voltage and current in AC circuit consisting only Resistor, Only Induction and Only Capacitor. Power factor of the AC circuit. Instruments: Electrometer, Galvanometer, Ammeter, & Voltmeter.

## **Human Anatomy and Physiology: Basic and Applied**

### **Radiographic Anatomy**

Emphasis on plain and cross-sectional radiographic anatomy

1. Surface anatomy
2. Plain film / conventional radiographs
3. Mammography
4. Computed Tomography (CT)
5. Magnetic Resonance Imaging (MRI)
6. Ultrasound
7. Nuclear medicine
8. Digitally Reconstructed Radiographs (DRR)
9. Portal imaging

### **Oncology Science**

1. Pathology- general pathology of tumours
2. Malignancies- local and general effects of tumours and its spread
3. Carcinogenesis
4. Co-morbidities
5. Etiology and epidemiology
6. Genetics
7. Prevention
8. Early detection
9. Signs and symptoms

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10. Public awareness on early signs and symptoms
11. High risk groups
12. Staging of tumours

## **Principles of Radiation and Radiotherapy Techniques**

1. 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
2. Application of radiotherapy in benign conditions
3. Application of radiotherapy in malignant condition
4. Single and multiple field techniques for all treatment sites (from Head to Feet) with appropriate immobilizing device(s).
5. Fix, Rotation, Arc and Skip therapy procedures.
6. Use of Rubber traction, POP, Orfit, Body Frame in treatment technique.
7. Evaluation of patient setup for simple techniques.
8. Use of Beam Modifying devices, such as wedges, Tissue compensators, Mid Line Block (MLB) in the treatment of respective sites.
9. Customized shielding blocks and its properties.
10. Asymmetric jaws
11. Motorized wedges
12. Simulation procedures including CT simulation

## **Radiation Quantities, Units and Detection/Measurement**

1. Radioactivity, Flux, Fluence, Kerma, Exposure, Absorbed Dose, Equivalent Dose, Weighting Factors, Effective Dose, Natural Background Radiation, Occupational Exposure Limits, Dose limits to Public.
2. Detection and measurement of radiation - Ionisation of gases, Fluorescence and phosphorescence, Effect on photographic emulsion, Ionisation chambers, Proportional Counters, G.M. Counters, Scintillation Detectors, Liquid scintillator, Pocket Dosimeters, TL Dosimeters and their use in personnel monitoring badges. Advantages and disadvantages of various detectors, appropriateness of different types of detectors for different types of radiation measurement.

## **Basic Radiation physics**

1. Atomic Structure, Nucleus, Atomic No., Mass No., Electron orbit and energy levels, Isotopes and isobars, Radioactivity, Radioactive decay, Half-life, Particle radiation, Electromagnetic Radiation, Production of X-rays, Continuous X-ray spectrum, Bremsstrahlung radiation Characteristic X-rays, Filters, Quality of X-rays, Effect of voltage and current on the intensity of X-rays, Properties of X-rays.
2. Interaction of Radiation with Matter: Photoelectric effect, Compton Effect, Pair production, Ionisation of matter, Energy absorbed from X-rays, X-rays Scattering,

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X- rays transmission through the medium, linear and mass attenuation coefficient, HVT and TVT, Interaction of charged particle and neutrons with matter.

## Radiotherapy Equipment

1. Brachytherapy- Design features, Radiation sources, Technique, High dose-rate (HDR), Low dose- rate (LDR), Pulsed dose-rate (PDR), various types of applicators.
2. Teletherapy Machines & Accessories:
  - Telecobalt Machines
  - Medical linear accelerators.
  - Tomotherapy
  - Machine properties.
  - Beam directing, modifying and defining devices.
  - Other accessories.

## Radiation safety

- Radiation Hazard evaluation and control
- Radiation Emergency Preparedness
- Regulatory requirements

## Patient care, positioning and immobilization

1. Principles of positioning and immobilization
  - Positioning aids- Breast boards, Lung boards, Belly boards, Head-and-neck fixation devices, Vacuum packs, Stereotactic systems
  - Internal organ motion control- Bite blocks, Gating systems, Active breathing control, Diaphragm compression, Prostate immobilization, Tracking systems. Laser/ positioning systems
  - Marking systems
  - Isocentre determination
  - Reference points
  - Treatment couch
  - Image acquisition for planning (and/or verification)
  - Modalities for image acquisition for planning
  - Simulation- Conventional Simulation, CT Simulation, Virtual Simulation
  - Image processing and archiving
  - Treatment verification
  - Protocols- Imaging protocols: development and implementation, Non-action levels (NAL), On-line/off-line corrections, Matching/co-registration procedures, Geometric uncertainties, Documentation, Adaptive radiotherapy

## Radiotherapy Equipment

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- Familiarization with treatment planning systems-external beam planning and brachytherapy
- Various types of phantoms including the water-phantoms, RFA
- Various types of dosimeters including in-vivo dosimeters
- EPID and other on-board imaging systems
- Record and Verify Systems, Oncology Information Systems, Image/Patient data archiving, storage and transfer.
- CT Simulator

## Quality Assurance in Radiotherapy

### Basic Radiotherapy Physics

Historical developments in Radiotherapy, Physical components of Telecobalt Unit / Linear Accelerator Unit/ Remote After Loading Brachytherapy Unit / Gamma Knife Unit / Simulator /Brachytherapy units 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.

### Biological Effects of Radiation

The Cell, Effect of ionising radiation on Cell, Chromosomal aberration and its application for the biological dosimetry, Somatic effects and hereditary effects, stochastic and deterministic effects, Acute exposure and Chronic exposure, LD50/60. Role of RTT in managing the acute effects of radiation.

### Clinical Radiobiology

- Cell kinetics
- Cell cycle control mechanisms
- Tumour biology
- The five 'R's of radiobiology
- Tissue structure and radiation effect
- The Linear Quadratic (LQ) model
- Tumour control probability (TCP), Normal Tissue Complications Probability (NTCP) models
- Acute and late side effects
- Sensitizers/protectors/side effect reduction
- Fractionation
- Treatment combinations



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- Treatment scheduling
- Mould Room /Motion Management Techniques

Mould room and motion management techniques are essential part of modern precision radiotherapy. An RTT has to be competent in designing various types of moulds for patient immobilization and applicator fixation (in brachytherapy) as well as in various motion management techniques:

- Historical evolution of the mould materials and techniques to make moulds
- Thermoplastic moulds
- Breath hold, motion reduction, tracking and gating techniques

## Special RT Techniques and Recent advances

- Wedges-tissue compensator-irregular field-SSD&SAD technique-oblique field-are rotational and moving field
- Mantle field-irregular field-Hemi body irradiation-whole body irradiation-total body skin irradiation Special techniques in Radiation Therapy, (SRT) – Stereo tatic Radio surgery (SRS) –. Methods – BRW and CRW frames – angiographic localizer box – preparation of target sheets – Quality Assurance – Isocentric check – Treatment execution – care to be taken – check list.
- Conformal Radiotherapy: Principles of 3 D treatment.
- Recent developments in radiotherapy and treatment techniques

## Radiological/Nuclear Medicine/Other Imaging Techniques in Radiotherapy Planning

- 2D (radiography, fluoroscopic, USG), 3D (CT, MRI) and functional (PET/SPECT) imaging and their application in radiotherapy planning
- Understand Gross Tumour Volume (GTV), Clinical Targe Volume (CTV), Internal Target Volume (ITV), Planning Target Volume (PTV), Organs at Risk (OAR) delineation
- Conduct image fusion at the treatment machine console
- Do bony matching
- Do soft tissue matching for estimating the preliminary data for applying shifts
- Prepare documentation
- The RTT should understand the principles of: Four-dimensional (4D) planning and be familiarized with IMRT and IGRT planning.

## Radiotherapy treatment delivery

- Orthovoltage / superficial
- Supervoltage / Megavoltage
- Brachytherapy

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- Stereotactic radiotherapy- Stereotactic radiosurgery, Stereotactic radiotherapy, Cranial Extra cranial (Stereotactic body radiotherapy SBRT), Total Body Irradiation (TBI), Total Skin Electron Irradiation (TSEI), Radiation therapy with neutrons, protons, and heavy ions

Operational Issues in Radiotherapy.

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## **Part – B (Core Subject)**

### **Syllabus for the post of Senior Administrative Assistant**

#### **Advt. No KSSSCI/ER-20/09/2023-24**

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

- Characteristics of computers
- computer organization including RAM, ROM
- File system
- Input devices
- Software understanding
- Relationship between hardware and software
- Operating system
- MS office
- Information technology and society Indian IT act
- Digital signatures
- Application of information technology in Government
- E-office management

**(NOTE: EXAMINATION WILL BE CONDUCTED IN ENGLISH LANGUAGE ONLY)**