Syllabus for the Post of Technical Assistant (Neuro-otology) (Core Subject)

Advt No. I/10/7/Rectt/2026-27

(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

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, behavioral, 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 aphasias 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 • Audio vestibular 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

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 o Natural method o Structured method o 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 counselling for users & parents – importance of harness, BTE loops. Tips to facilitate acceptance of hearing aids, battery life, battery charger. Counselling for geriatric population, Trouble shooting of hearing aid

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- esophageal 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 traumaand 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.

Psychodiagnositcs – 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 • 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

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 contras 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, myoclons, 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 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 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