

BHARATI VIDYAPEETH
(DEEMED TO BE UNIVERSITY), PUNE, INDIA
PhD Entrance Test – 2022
SECTION-II: Audiology- 50 Marks

Technology in Audiology

- a. Digitization of data and digital systems; Principles and methods of digital signal processing
- b. Fundamentals of communication systems – (i) AM & FM transmission & reception (ii) Digital modulation techniques, (iii) Satellite communication
- c. Transducers and signal generation
- d. Biomedical signals & signal processing: Principles of generation of acoustic stimuli
- e. Signal acquisition and processing techniques
- f. Working principles of EEG / Magnetoencephalography, event related potentials/ evoked potential.
- g. High-fidelity sound reproducing systems: Auditorium acoustics
- h. Artificial neural networks
- i. Speech processing and synthesis models and techniques (linear predictive coding, linear prediction model, LPC-based synthesis) and applications, review of signal processing, Fourier transform and short-time speech analysis(energy, zero-crossing rate, autocorrelation function).
- j. Voice response system, speaker recognition system and speech recognition system: Speech synthesis methods, speech recognition, speaker recognition, speech coding, and speech enhancement.
- k. Basic principles of cepstral analysis, filtering low-time filtering for formant estimation, high-time filtering for pitch estimation, complex cepstrum
- l. Principles of neuro imaging techniques - MRI, fMRI, NIRS, CT, PET, SPECT, TMS and MEG and their technology (working principles, interpretation and implications).
- m. Synching various speech stimuli and events for fMRI acquisition and speech perception in fMRI
- n. Technology available for intra-operative monitoring of sensory and motor functions
- o. Tele-technology: Definition, applications, technology, resources
- p. Transmission of information: transmission of patient images, reports, etc.
- q. Remote consultations and databases
- r. Distance learning- multimedia meeting room / videoconferencing
- s. Software packages and applications in hearing diagnostics and research - MATLAB, Adobe audition, Audacity, PRAAT
- t. Basics features, vectors and matrices, built-in functions and plotting
- u. Editing audio files, applying effects in waveform editor, amplitude compression and modulation effects, filter and equalizer effects, noise reduction/ restoration effects, basic multitrack controls, saving and exporting
- v. Computer based assessment and intervention programs relating to hearing
- w. Calibration and maintenance of equipment

Cochlear Physiology

- a. Macro & microanatomy of cochlea
- b. Homeostatic mechanisms in cochlea
- c. Blood supply to cochlea
- d. Innervations of cochlea

- e. Cochlear regeneration
- f. Evolution of human cochlea
- g. Techniques to study hair cell and basilar membrane physiology
- h. Basilar membrane mechanics and non-linearity
- i. Outer hair cell physiology – different mechanisms involved in hair cell motility
- j. Inner hair cell physiology
- k. Cochlear non-linearity
- l. Efferent control of cochlear hair cells
- m. Nutrients related to sensory cell physiology
- n. Ontogenetic development of cochlea
- o. Phylogentic development of cochlea
- p. Developmental changes in the cochlea; effect of advancing age on cochlea
- q. Comparative physiology of auditory system in non-mammalian species
- r. Classifications of OAEs; mechanism based taxonomy
- s. Characteristics of different types of OAEs
- t. Instrumentation and techniques for recording different types of OAEs
- u. Factors affecting different types of OAEs
- v. Fine structure DPOAEs
- w. Suppression of OAEs: ipsilateral, contralateral, and bilateral
- x. Clinical applications of OAEs
- y. Endocochlear potentials.
- z. Electrocochleography: Instrumentation and technique
- aa. Protocol for recording ECoChG
- bb. Interpretation of ECoChG
- cc. Clinical application of ECoChG

Neurophysiology of Hearing

- a. Auditory nerve
- b. Cochlear nucleus
- c. Superior olivary complex
- d. Lateral lemniscus
- e. Inferior colliculus
- f. Medial geniculate body
- g. Stimulus coding
- h. Non linearity
- i. Action potentials
- j. Neurotransmitters and neuromodulators
- k. Tonotopic organization of auditory brainstem
- l. Coding of simple and complex acoustic signals at auditory brainstem
- m. Role of subcortical structures in sound localization
- n. Anatomy of primary and secondary auditory cortex
- o. Tonotopic organization in auditory cortex
- p. Coding of signals in the at auditory cortex
- q. Association of auditory cortex with other structures
- r. Role of auditory cortex in sound localization
- s. Plasticity of auditory cortex
- t. Efferent auditory pathway: medial and lateral olivo cochlear bundle
- u. Functioning of the auditory efferent system
- v. Role of auditory efferent system in hearing
- w. Protective function of auditory efferent system

Hearing Sciences

- a. Physical description and parameters for generation of sounds: Sine wave and complex signals; Analysis of sound: Spectrum and spectrogram, LTASS; Filters and their properties
- b. Theory of signal detection: Basic concepts and applications of signal detection
- c. Psycho-physical methods - Classical and adaptive methods
- d. Overview of absolute and relative measures: Methods of measuring absolute and relative thresholds; thresholds of audibility (MAP & MAF); Models of loudness.
- e. Loudness perception in normal hearing persons
- f. Effect of hearing impairment on perception of loudness
- g. Dynamic range of hearing, equal loudness contours and loudness scaling.
- h. Recruitment and softness imperceptions
- i. Consequences of altered loudness perception
- j. Factors affecting loudness: Bandwidth, duration, adaptation and masking.
- k. DLI
- l. Theories of pitch perception - simple and complex signals
- m. Pitch scales
- n. Factors affecting pitch perception
- o. Perception of pure-tones by persons with normal hearing and those with hearing impairment
- p. Perception of complex signals by persons with normal hearing and those with hearing impairment
- q. DLF
- r. Critical band concept and power spectrum model
- s. Estimating the shape of auditory filter: Psycho-physical tuning curve; Notched noise; Non-simultaneous masking
- t. Auditory filter shapes in normal hearing and hearing impaired
- u. Masking patterns and excitation patterns in normal hearing and hearing impaired
- v. Central masking
- w. Informational masking
- x. Overshoot phenomena
- y. Co-modulation masking release
- z. Effect of hearing loss on non-peripheral masking

Auditory Perception

- a. Overview of temporal processing: temporal resolution; temporal integration; models of temporal processing
- b. Detection and discrimination of gaps in normals and individuals with hearing impairment
- c. Temporal modulation transfer function in normals and individuals with hearing impairment
- d. Temporal integration in persons with normal hearing and those with hearing impairment
- e. Models of temporal processing in persons with normal hearing and those with hearing impairment
- f. Basic concepts in auditory object perception
- g. Spectral cues for object perception
- h. Temporal cues for object perception
- i. Auditory pattern perception in individuals with normal hearing and those with hearing impairment
- j. Timber perception
- k. Time invariant-pattern and time varying pattern perception
- l. Adaptation vs. fatigue
- m. Methods of studying adaptation
- n. Adaptation in in persons with normal hearing and those with hearing impairment

- o. Neurophysiological basis of adaptation
- p. Factors affecting adaptation
- q. Perception of distance: localization vs. lateralization; localization of pure tones; localization of complex signals
- r. Effect of hearing loss on localization
- s. Monaural localization
- t. Factors affecting localization
- u. Neurophysiology of localization
- v. Binaural hearing - overview
- w. Models of binaural hearing
- x. Masking level difference
- y. Musical scales/Musical notes
- z. Factors affecting perception of music

Auditory Disorders

- a. Congenital malformations of external and middle ear
- b. Diseases of the external ear: otitis – externa, neoplasms of external ear, cerumen, keratosis obturans, injuries, sebaceous cysts, acquired atresia, stenosis of external auditory canal & malignant otitis externa
- c. Diseases of the middle ear cleft: otosclerosis otitis media, non suppurative otitis media, complications of middle ear diseases, neoplasms.
- d. Assessment of middle ear functioning: multicomponent tympanometry, multifrequency tympanometry, wide band reflectance/absorbance, reflexometry
- e. Reconstruction of external and middle ear hearing mechanisms: reconstructive and rehabilitation procedures
- f. Pathophysiology inner ear disorders: ototoxicity, Meniere's, age related hearing loss, Sudden hearing loss, auto immune conditions, hearing loss due to systemic diseases
- g. Audiological profile in persons with above inner ear disorders
- h. Nonaudiological management options
- i. Pathophysiology inner ear disorders due to NIHL and other traumatic injuries
- j. Audiological profile in persons with NIHL and other traumatic injuries
- k. Hearing conservation: National and International guidelines
- l. Nonaudiological management options
- m. Pathophysiology of space occupying lesions of auditory nerve and brainstem
- n. Audiological profile in persons with space occupying lesions
- o. Radiological findings and its correlations with audiological findings
- p. Challenges in diagnosis of space occupying lesion
- q. Management options for space occupying lesion
- r. Pathophysiology of ANSD
- s. Etiology of ANSD
- t. Audiological profile of persons with ANSD and its correlations with pathophysiology
- u. Speech perception in persons with ANSD
- v. Management of persons with ANSD: Aids strategies

Electrophysiological Assessment

- a. Introduction and Classification of AEPs
- b. Neuroanatomy and neurophysiology related to AEPs; dipole orientation and scalp distribution of AEPs
- c. Stimuli for recording AEPs- generation, characteristics and types

- d. Electrodes for recording AEPs
- e. General principles of recording AEPs
- f. Overview to advanced analyses techniques such as independent component and time frequency analyses
- g. Maintenance and Calibration of instrumentation
- h. Acquisition and analysis responses for different stimuli -clicks, tone bursts, chirps, complex stimuli such as speech
- i. New trends in ABR such as Cochlear Hydrops Analysis Masker Procedure (CHAMP) and stacked ABRs, and ABR for chained stimuli,
- j. Factors influencing ABR: Stimuli related, acquisition related, subject related
- k. Clinical applications
- l. Acquisition and analysis of middle latency responses,
- m. Factors influencing middle latency responses: Stimuli related, acquisition related, subject related
- n. Acquisition and analysis of auditory steady state responses (ASSR)
- o. Factors influencing ASSR: Stimuli related, acquisition related, subject related
- p. Post auricular muscle responses
- q. Clinical applications
- r. Overview of exogenous and endogenous cortical evoked potentials
- s. Acquisition and analysis of obligatory cortical auditory evoked potentials, acoustic change complex, T-complex, mismatch negativity, P300, N400, P600, CNV and other endogenous potentials
- t. Factors affecting exogenous and endogenous evoked potentials Stimuli related, acquisition related, subject related
- u. Clinical applications
- v. Physiological tests useful in intraoperative monitoring of auditory function
- w. Effect of anesthetic agents on electrophysiological responses of the auditory system
- x. Recording auditory evoked potentials during surgery; requirements, patient preparation
- y. Guidelines for intraoperative monitoring
- z. Electroneurography

Advances in the Management of Hearing Loss

- a. Application of recent advances in hearing aids and hearing assistive technology : Compression and expansion, directionality, advanced signal processing techniques
- b. including noise reduction algorithms, wireless technology, data logging, trainable hearing aids, occlusion reduction, application of nanotechnology in hearing aids, Personal amplification systems
- c. Techniques to control acoustic feedback, distortion, circuit noise: Electromagnetic interference – measurement, solutions; techniques to improve compatibility of hearing aids with mobile phones
- d. Application of LASER technology in ear mold production, ear mold modifications for enhancing listening comfort – physical and acoustic modifications
- e. Electroacoustic measurement of hearing aids: Variables affecting electroacoustic
- f. measurements and its implications
- g. f) International and Indian standards/legislations for hearing aids and ALDs.
- h. Selection, verification and validation of hearing aids and hearing assistive devices: Pre-selection, selection an assessment of listening needs
- i. Objective procedures for hearing aid fitting (ABR, ALLR, ASSR and others):
- j. Hearing aid programming, optimization, verification and validation
- k. Hearing aid fitting for children : pre-selection, selection, verification and validation: Different protocols used
- l. Hearing aid fitting for persons with different types of hearing loss (Sudden hearing loss, unilateral hearing loss, High frequency hearing loss, Cochlear dead region)
- m. Future trends in hearing aids and HATs: Technology and fitting strategies

- n. Factors affecting speech perception through hearing aids and hearing devices: Auditory plasticity
- o. Methods to improve speech perception through hearing aids and hearing devices: Speech cue enhancement – spectral shape, duration, intensity, enhancement of CVR, speech simplification, re-synthesis, enhancement of perception of telephone speech
- p. Emerging technology for better speech perception
- q. Noise reduction algorithms and nanotechnology in hearing aids
- r. Counseling of users of hearing aid and hearing assistive devices: techniques: Realistic expectations, adjusting to hearing device, other management options
- s. Care and maintenance of hearing aid and hearing assistive devices
- t. Trouble shooting and fine tuning/optimization of hearing aids and assistive devices
- u. Management of children with hearing impairment: Criteria for selecting different auditory listening programs; criteria for transition from one method to the other as a child grows: Adapting AVT techniques for Indian languages and late identified children
- v. Providing group listening training activities for children having different listening skills
- w. Rehabilitation of adults and older adults: auditory listening / speech reading training for older adults: variables that affect the communication and the role of the communication partner: auditory plasticity: Planning training activities; assertiveness training
- x. Quality of life of hearing impaired and its enhancement: Outcomes of different management strategies across age groups: Methods and measures
- y. Management of children and adults with multiply disability: hearing aid fitting considerations, strategies used and the outcome with different strategies for individuals with hearing impairment with visual problems; cognitive problems; neuro-motor problems: educational and vocational placement, role of caregivers and outcome measures
- z. Audiological management of tinnitus: characteristics, assessment of tinnitus, basis and theories of tinnitus, models related to tinnitus management: patho-physiological and neurophysiological model: overview to non-audiological management techniques for tinnitus
- aa. Audiological management techniques for those with normal hearing and different degrees of hearing loss (TRT, counseling, others) and their outcomes
- bb. Audiological management of persons with hyperacusis: Models related to hyperacusis management; overview to non-audiological management techniques for hyperacusis Audiological management techniques for normal hearing and different degrees of hearing loss and their outcomes

Genetics of Hearing and Pediatric Audiology

- a. Basic concepts of genetics
- b. Genes involved in hearing
- c. Gene localization methods, gene mapping
- d. Genetics of hearing impairment, gene database for hearing loss
- e. Genetic evaluation of persons/families with hearing loss, genetic screening
- f. Genotypes and phenotypes of non syndromic hearing loss
- g. Genotypes and phenotypes of syndromic hearing loss
- h. Genetic counseling
- i. Neonatal and infant hearing screening, international and national Protocols to identify middle ear disorders; sensory and neural hearing loss
- j. Screening for hearing loss in school children
- k. Screening for central auditory processing disorders in school children
- l. Issues related to hearing screening
- m. Etiology of hearing loss in children
- n. Behavioral tests of hearing evaluation for children
- o. Physiological tests of hearing evaluation for children

- p. Assessing hearing in children with associated problems
- q. Speech audiometry in children
- r. Development of tests for speech audiometry in children
- s. Issues related to assessment and diagnosis of hearing loss in children
- t. Integration of results of behavioral and electrophysiological assessment of hearing
- u. Correlating results of audiological evaluation with those of otolaryngological, pediatric, psychological and speech-language evaluation
- v. Problems faced by children with hearing loss in preschool and school setup
- w. Challenges/problems faced by children with conductive hearing loss and auditory processing problems
- x. Counseling parents/caregivers regarding hearing impairment, sequel and management
- y. Counseling and management of children with unilateral hearing loss and mild hearing loss

Implantable Auditory Devices

- a. Candidacy for bone conduction implantable devices (BCID), middle ear implants (MEI), cochlear implant (CI), auditory brainstem implant (ABI) and mid brain implant (MBI): evidence from research
- b. Comprehensive Candidacy Assessment for implantable hearing devices (IHD-Audiological and non-audiological).
- c. Safety standards and regulation for IHD.
- d. State and central Government schemes for cochlear implants and other implantable devices.
- e. Pre-requisite to start aIHD program
- f. Comprehensive policy issues relating to IHD
- g. Types of BCID and components (per-cutaneous, trans-cutaneous and intra-oral)
- h. Types of MEI and components
- i. Intra-operative and post-operative measurements/assessment for device function (troubleshooting) and performance outcomes
- j. Programming BCID and MEI
- k. Contra indications and management of device failures and poor performance.
- l. Limitations and future development/requirement
- m. Concepts and types of ci : external components (sound processor- body worn, BTE, off the ear); internal component (electrode type/design, MRI compatibility & reliability);totally implantable cochlear implants.
- n. Expanding criteria- audiological and non-audiological assessment: single sided deafness, ski sloping SN hearing loss, bilateral asymmetric HL; cochlea/nerve anomaly(classification), auditory neuropathy spectrum disorder (ANSD) and multiple disabilities.
- o. Speech/Sound Coding Strategies: Within and across devices; Evidences from research and critical analysis of each strategy; Features for Enhancing Speech and Music perception.
- p. Surgical procedures: posterior tympanotomy, varia technique, hearing preservation technique; surgical complications and management
- q. Intra-operative measurement: device function (impedance/ voltage/ complaine telemetry); patient function (eCAP, eSRT, eABR and facial nerve monitoring); Special consideration in anomalous cochlear/nerve, ANSD and multiple disabilities.
- r. Psychophysics of programming: parameters (pulse width, rate of stimulation, frequency allocation/ re-allocation, map law);pre-requisites for mapping: pre-implant radiological report, post-implant radiological report; discharge report of surgeon; non-physiological objective measures (electrode impedance, compliance, electrode voltage); special considerations in cochlea/nerve anomaly, ANSD, multiple disabilities and SSD; Effect of map parameters on perception of loudness, pitch perception, gap,
- s. Programming technique: evidences from research: behavioral maps; objective maps (eCAP, eSRT&eABR based programming); evidence and target based programming (artificial intelligence);self-

- programming.
- t. Measuring performance and MAP optimization: assessment of benefit: speech and non-speech; electrophysiological measures (EABR and other evoked potentials); optimization of: hearing aid in the contralateral ear for bimodal implants; bilateral cochlear implants; electroacoustic stimulation and SSD.
- u. Complications: identifying and managing device failures; identifying and managing infection, magnet migration, electrode extrusion; identifying and managing poor performance; decision making in subjects with poor performance; special consideration in revision implantation; outcome audit.
- v. Limitations and future developments/requirements (device, techniques and procedures)
- w. Pre-op (ABI and MBI): candidacy for children and adult; audiological and non-audiological assessment; evidences from research for predicting outcome; counseling and expectations; device type and components
- x. Intra-op (ABI and MBI): Surgical procedures – overview; eABR, cranial nerve monitoring; decision making.
- y. Post-op: programming ABI (subjective and objective methods) and technique for pitch ranking, identifying auditory and non-auditory electrodes); MAP optimization (pitch, loudness, auditory and non-auditory sensation); techniques to identify auditory and non-auditory sensation; assessment of benefit: speech and non-speech; role of eABR, aided cortical potentials, PET and fNIRS in programming and monitoring outcomes.
- z. Managing and monitoring subject with ABI: rehabilitation strategy; identifying and managing complications (device failure, infection, trauma, device migration, radio imaging); identify poor performance- auditing outcome; decision making in complications and poor performance

Speech Perception

- a. Basic concepts of speech perception; hearing, listening, perception and comprehension; acoustic cues of different classes of speech sounds
- b. Definition and concept of categorical and continuous speech perception
- c. Normalization in speech perception: Definition and methods used for normalization of vowels and consonants
- d. Coding of speech in the auditory pathway - cochlea, auditory nerve and the central auditory pathway
- e. Theories of speech perception (acoustic, neurological, auditory, motor, analysis-by-synthesis, dual stream, reverse hierarchy theory)
- f. Perception of vowels and diphthongs in normal - major and minor cues
- g. Perception of consonants in normals: Major and minor cues to identify place, manner and voicing features of stops, fricatives, affricates, nasals
- h. Perception of vowels and consonants in the persons with hearing impairment
- i. Perception of vowels and consonants through amplification and implantable devices.
- j. Effects of co-articulation on speech perception:
- k. Perception of segmental features in normal hearing individuals
- l. Perception of suprasegmental cues in normal hearing individuals
- m. Perception of segmental and suprasegmental cues in persons with hearing impairment
- n. Memory and speech perception: Stages of memory, coding and capacity at the different stages; Models of short term memory: Dual coding Model, Modal model, A model for auditory memory and contrast, Working memory model; Role of short term memory in the perception of consonants and vowels
- o. Dichotic listening: Theories and physiological bases: Testing of dichotic listening and the clinical significance of the results; Factors influencing dichotic perception
- p. Music perception: Methods of study of perception of music; Perception of music through amplification and implantable devices.
- q. Infant perception: theories of infant speech perception (universal theory, attunement theory, perceptual learning theory, maturational theory, perceptual magnetic theory); methods of studying infant speech

- perception; perception of consonants and vowels in infants, and comparison with adults
- r. Speech perception in animals: methods of study of speech perception in animals; perception of consonants and vowels; categorical perception and normalization; animal vs. human perception; need for study of speech perception in animals
- s. Methods to study speech perception: EEG/electrophysiological and behavioral methods to study speech perception; study designs; role of cognition in speech perception.

Auditory Processing Disorders

- a. Terminologies and definitions of APD
- b. Underlying neurobiological and neurochemical (genetic) correlates
- c. Relationship between neural maturation - degeneration and auditory processing
- d. Models to explain auditory and spoken language processing: Relationship between the two
- e. Methods of studying auditory processing - Animal studies
- f. Various disorders that lead to APDs (Syndromes, TBIetc): Signs, symptoms and classification
- g. Developmental communication disorders and APDs
- h. Overview of behavioral assessment in APDs
- i. Screening for APDs: questionnaires, checklists and tests
- j. Dichotic test (linguistic and non-linguistic)
- k. Monaural tests (linguistic and non-linguistic)
- l. Psychoacoustic tests for assessment of APDs
- m. Electrophysiological measures and their clinical applications in diagnosing APDs
- n. Correlation between behavioral and electrophysiological measures: implications for diagnosis
- o. Factors influencing assessment of APDs: behavioral and electrophysiological
- p. Management of APDs in children and adults
- q. Direct remediation techniques and meta-cognitive and meta-linguistic approaches
- r. Auditory perceptual training and its methods, applicability and outcome.
- s. Evidence based approach and treatment efficacy
- t. Multidisciplinary approach
- u. Signal enhancement and room acoustics
- v. Aids and appliances - indication and outcome
- w. Factors affecting management of APDs
- x. Electrophysiological and radiological correlates for APDs: implications in management
- y. Imaging and cognitive studies in APDs
- z. Diagnosis and differential diagnosis
- aa. Development of APD test materials (linguistic and non-linguistic)
- bb. Open source software for developing diagnostic tests and intervention modules

Vestibular System and its Disorders

- a) Peripheral vestibular system including semicircular canals, utricle, saccule and vestibular nerve
- b) Central vestibular pathway (brainstem, cerebellum, cortex)
- c) Reflexes involving vestibular system like vestibuloocular reflex, vestibulo spinal reflex and vestibulo colic reflex advise
- d) Other systems involved in maintenance of balance like proprioceptive system, visual system etc.
- a) Techniques and Principles of electronystagmography / videonystagmography, Rotatory chair test, Video Head Impulse test, Sclera Coil search test, Vestibular Evoked Myogenic Potentials: cVEMP, oVEMP, Dynamic Posturography, Craniocorpography, Subjective visual vertical horizontal tests, Vestibular autorotation tests

- b) Screening for vestibular disorders
- c) Questionnaires to assess quality of life in persons with vertigo
- a) Peripheral Vestibular Disorders like Benign paroxysmal positional vertigo, Meniere's disease, Vestibular neuritis, Labyrinthitis, Ototoxicity, vestibular neuropathy
- b) Perilymph fistula, Superior semicircular canal dehiscence, Auditory neuropathy spectrum disorders, Vestibular schwannomas
- c) Central Vestibular disorders like Generalized neuropathy involving multiple systems, Multiple sclerosis, Cranial tumors, Cerebro-vascular accidents involving vestibular cortex and cerebellum, Vertebro-basilar insufficiency, Migraine, Meningitis and encephalitis
- d) Vestibular disorders in children
- e) Age related changes in vestibular system
- a) Benign paroxysmal positional vertigo, Meniere's disease, Vestibular neuritis, Labyrinthitis, Ototoxicity, Perilymph fistula, Superior semicircular canal dehiscence, Auditory neuropathy spectrum disorders, Vestibular schwannomas, Multiple sclerosis, Cranial tumors, , vestibular neuropathy
- b) Quality of life in persons with vestibular disorders
- a) Medical management
- b) Surgical management
- c) Vestibular rehabilitation:
- d) Special considerations for rehabilitation of children with vestibular problems
- e) Vestibular implants

Audiology in Practice

- a. Scope of practice in global and Indian scenario
- b. Professional ethics
- c. Existing acts, legislations, policies related to persons with communication impairment
- d. Role of audiologist in the formulation of acts, regulations and policies
- e. Implementation of acts, legislations, policies and welfare measures relating to persons with hearing impairment
- f. Advocacy groups and rights of citizens
- g. National and international standards related to audiology
- h. Welfare measures provided by State and Central Government for persons with hearing impairment
- i. Need for specialized programs in audiology: Geriatric and persons with multiple disability
- j. Forensic audiology
- k. Health, wellness, and health care - Health promotion and disease prevention, quality of life and healthcare finances
- l. Disability-friendly environment including public education
- m. Prevention and early identification programs including societal participation
- n. Services in different medical / rehabilitation/ research /educational set ups
- o. School based services pertaining to regular and special schools
- p. Community based practice in rural and urban areas
- q. Family empowerment programs
- r. Home based delivery of services
- s. Autonomous practice in audiology
- t. Apps for hearing screening/assessment
- u. Information and communication technology in Audiology practice
- v. Infrastructure for video-conferencing and tele-practice in audiology
- w. Techniques/principles of remote testing for screening and diagnostic assessment for hearing, intervention and counseling
- x. Challenges and limitations of tele-practice in audiology in screening, assessment and evaluation, selection of aids and appliances, therapeutics and counseling.

- y. Medico-legal issues,
- z. Entrepreneurship and planning to set up private practice/clinic for audiology practice:
 - aa. Clinical ethics
 - bb. Documentation in audiology practice: clinical / demographic data, database management and storage
 - cc. ICF framework for documentation / reports
 - dd. Quality control and auditing in audiology practice
 - ee. Documenting and implementing evidence based practice in audiology
 - ff. Understanding team approach: Work in cohesion with other professionals
 - gg. Information resources in audiology including books and journals, both electronic and print - Databases
