

## Syllabus for Speech Pathologist/Audiologist Grade-1

### I Year Course Content

#### STATISTICS AND RESEARCH METHODS

#### SECTION 1

#### A. STATISTICS

#### UNIT 1

Statistics – purpose – approach – methods – measures of central tendency – Dependability of these measures – research applications.

- Measures of variability – types and meaning of various measures – research applications.
- Standard score – normal distribution deviations – skewness and Kurtosis – conditions of applications – limitations in interpretation.

#### UNIT 2

- Theory of probability – principles and properties of normal distribution – binomial distribution – interpretation of data using the normal probability curve – causes of distribution – deviations from the normal forms.
- Correlation – meaning – coefficient of correlation – linear correlation – product moment correlation – rank correlation, biserial correlation, tetracoric correlation partial and multiple correlations – regression equation
- Variance – concept – foundations – assumptions – one way classification. ANOVA MANOVA, ANCOVA, MANCOVA.

## UNIT 3

- Item analysis – item pool – its selection – item difficulty item variance – item conduction – time validity – difficulty index.
- Non – parametric statistics – its nature and condition and application – non parametric analysis of variance and measures of association – tests of difference with correlated and uncorrelated data – tests of similarity.
- Selection appropriate statistics methods in the research, receivers operating characteristics

## SECTION 2

### **B. RESEARCH METHODS**

## UNIT 4

- Methods of research in behavioural sciences – research designs – measuring purpose – principles – needs – applications between group designs and single subject research designs.
- Basic of research – science scientific approach – problems – hypothesis – constructs – variables.
- Types of research- empirical rationale-experimental and export-factor research laboratory experiments - field studies – survey research - fundamental research epidemiology-clinical and applied research.

## UNIT 5

- Technique of sampling – sampling and randomness-principles of randomization – random assignment – methods – random sampling-stratified sampling, incidental sampling – purposive samples of one to tone matched sampling – size of sample.
- Measurement – foundations – types – reliability – validity.
- Variance – implication to research – variance control.
- Techniques of equation – experimental and control groups – matching and randomization – advantages, disadvantages and limitations.
- Research designs – various types of group designs – various types of single subject research designs.
- Analysis and interpretation – principles, indices – cross breaks – factor analysis – multivariate statistics – time series analysis.
- The research report – cardinal characteristics – purpose – structure presentation and writing style.

# CLINICAL LINGUISTICS

## UNIT 1

- Language acquisition, semantics, syntax pragmatics, theoretical issues, theoretical issues, theoretical issues, Deixis and anaphora, definiteness, discourse [focus on understanding normal and disordered language].

## UNIT 2

- Neuro linguistics - Language and the brain - localization – left brain – right brain differences - coding and decoding - Neuro anatomical and Neuro physiological bases of language learning and dysfunction - linguistic and psycho - neuro linguistic models of language pathology

## UNIT 3

- Psycho linguistics and language acquisition – issues involved in language acquisition – motherese / Child directed speech - second language acquisition - language acquisition in bi- ad multi-lingual environments.

## UNIT 4

- Issues in Socio-linguistics-Standard and Non-standard Dialects, Regional and Social Dialects Stylistic Variation of Language, Gender and Language, Registers, Creole, Pidgins, relation between language culture, religion, politics etc. Language Deficiency.

## UNIT 5

- Multilingual and cultural issues. A brief introduction to the major language families of the world - Language Families and Major Languages of India. Linguistic Determinism Linguistic relatively, Sapir-Whorf Hypothesis. Cultural diversity of India, Cultural issues in Verbal and non-verbal communication. Multicultural and multilingual issues in Rehabilitation with special reference to India.

# **SPEECH SCIENCE AND PRODUCTION**

## **Physiology of speech and voice**

### **UNIT 1**

- Physiology of speech – physiology of respiration, purpose of respiration, description of respiratory movements, types of respiration, methods of respiratory analysis
- Physiology of laryngeal function – muscles of larynx, laryngeal movement.
- Vocal fold physiology, neurophysiology of the larynx, vibratory modes of vocal folds.
- Models of vocal fold vibration – one mass model, two mass model, multiple mass model, EGG Model, simple Unitary mass model, triangular Unitary mass model.
- Development of the vocal fold
- Mechanical properties of the vocal fold vibration (stress strain relation, whip like motion, effects of impact stress).

### **UNIT 2**

- Neurophysiological bases of speech, Neuromotor mechanism of the articulatory, phonatory and respiratory systems. Neuro-Physiology of larynx and vocal mechanism in relation to production of voice/speech

### **UNIT 3**

- Aerodynamics of speech production, Upper airway dynamics, lower airway dynamics. Aerodynamics of vowels, aerodynamics of consonants: stops, fricatives and nasals.

## **UNIT 4**

- Acoustics of speech – Acoustic theory of speech production, Acoustic phonetics, Basics, acoustics of vowels and consonants, review and state of the art.
- Spectrography – various types of spectrograms, spectrographic cues for vowels and consonants, identification of place, manner, voicing and aspiration using wide band bar type spectrogram.
- Application of spectrography in basic and applied research.

## **UNIT 5 (15hrs) Techniques of speech processing and analysis**

- Short time speech analysis techniques, speech coding techniques
- Voice response system
- Speaker recognition system and speech recognition system
- Speech synthesis methods
- Speech analysis in forensic sciences.
- Infant cry – History, studies on infant cry analysis, features of infant cry, spectrographic patterns of normal cry and cry in clinical population
- Analysis of laughter, features of laughter, spectrographic patterns of laughter.

# **SPEECH & LANGUAGE PROCESSING**

## **UNIT 1**

- Phonetic perception
- Perception of vowels - formants, F0, band width, duration, factors affecting vowel perception, static and dynamic cues, effect of co articulation.
- Consonant perception, cues for different consonants, static and dynamic cues, factors affecting consonant perception, effect of co articulation.

## **UNIT 2**

- Spoken word recognition- Word under noise, filtered, truncated words, lexical decision, word spotting, phoneme triggered lexical decision, speeded repetition of words, continuous speech, tokens embedded in words and non words, rhyme monitoring, word monitoring, cross modal priming Issues

## **UNIT 3**

- Stages and word recognition -lexical concept, lexical access, phonological encoding, production.
- The input to the lexicon-lexical access from spectra, constraints of temporal structure- Cohort models, interactive models of spoken word recognition – Logogen model lexical and phonetic processing-phonetic characterization task, phoneme restoration studies, phoneme monitoring task, sentence and word processing, Neighbourhood activation model.

## **UNIT 4**

- Visual word recognition - models and theories; word and non word naming, acquired dyslexia and role of phonology in word recognition.
- Sentence comprehension and processing of components of language - parallel and serial models of processing, modularity and information sources, accounts of parsing, parsing issues, ambiguity in parsing, strategies for disambiguation. Reference and anaphora. Discourse comprehension and expression.

## **UNIT 5**

- Sentence processing – basic capacities for perceiving phonetic contrasts - native language contrasts, foreign language contrasts, coping with variability in speech signal.
- Role of memory and attention
- Prosodic organization in native language
- Related developments in speech perception
- Processing of phonological, morphological, syntactic, semantic and pragmatic aspects of language.

## **VOICE AND FLUENCY DISORDERS**

**UNIT 1** Recent advances in measurement, assessment and management of voice and its disorders

- Voice Evaluation; perceptual and instrumental.
- Aerodynamic tests - vital capacity, mean airflow rate, maximum duration of sustained blowing.
- Tests for assessing functions of the resonatory system; acoustic analysis, psychoacoustic evaluation and tests for laryngeal measurements (model frequency, frequency range, F0 perturbation, intensity, intensity range, Amplitude perturbation, glottogram, harmonic analysis) and other measures (LTAS, nasality measurements etc using instruments)
- Measurement of vocal fold vibration - invasive procedures - stroboscopy, videokymography; noninvasive procedures - EGG, inverse filtering.

## **UNIT 2**

- Pathophysiological changes in different voice disorders.
- Acoustic, aerodynamic and perceptual aspects of pathological voices
- Paediatric voice disorders
- Effects of ageing in voice
- Neurogenic voice disorders- Differential diagnosis and management.
- Endocrinal Voice disorders and voice disorders related to transsexuals.
- Issues related to professional voice and its care

### **UNIT 3**

- Laryngectomy & Pathophysiology of larynx
- Treatment-medical, surgical and therapeutic (including radiation therapy, chemo therapy, pre-postoperative counseling)
- Rehabilitation team of laryngectomee: Considerations in rehabilitation – adjustment to disability, reaction to alaryngeal speech etc
- Acoustical, perceptual and physiological aspects of alaryngeal speech
- Factors influencing intelligibility of alaryngeal speech

### **UNIT 4**

- Dimensions of fluent speech- review of recent advances and findings regarding –  
1. Development, 2 theories, 3. Spontaneous recovery
- Perspectives in fluency disorders (developmental, childhood and adult)
- Neuro anatomical, neurophysiologic and auditory processing aspects of fluency disorders.
- Current linguistic theories, linguistic and metalinguistic aspects of fluency disorders.
- articulatory dynamics, laryngeal dynamics, prosodic, speech motor control viewpoints in stuttering.
- Nature, characteristics, differential diagnosis, and current status of:
  - Normal Non fluency
  - Cluttering
  - Neurogenic stuttering
  - Drug-Induced stuttering

### **UNIT 5**

- Assessment and diagnosis.
- Severity of stuttering –theoretical foundations and methods
- Prevention, relapse of stuttering, Naturalness, QOL and related issues
- Review of recent advances of therapy in stuttering.
- Evidence based management of children and adults with stuttering.
- Efficacy and out come measures of stuttering therapy



# PSYCHO PHYSICS

## UNIT 1

- Theory of signal detection,
- Concept and application including ROC
- Methods in psycho Physics classical & adaptive
- MAP & MAF underwater hearing, relation to calibration Loudness perception, equal loudness level contours loudness and loudness level, scaling
- Factors affecting loudness, Theories, models of loudness
- Weber's Law, Differential sensitivity for intensity, absolute and relative DL,
- Loudness perception in pathological ears, recruitment, dynamic range, loudness adaptation
- Florentine theory of softness imperceptions,
- Relevance in clinical Audiology

## UNIT 2

- Critical band concept,
- equivalent rectangular band concept,
- frequency resolution, excitation pattern,
- Masking, PTC, using simultaneous and non simultaneous maskers, central masking, pulsation threshold, profile analysis, MDI
- Clinical application

## UNIT 3

- Temporal perception,
- Temporal acuity, temporal DL, temporal order,
- Gap detection (in broad band noise, in narrow band noise, sinusoid) temporal integration
- Duration discrimination
- Temporal modulation transfer function
- Factors affecting temporal perception
- Clinical application.
- Adaptation and fatigue,
- Levels of adaptation & physiology
- Methods to study
- Parameters affecting

- Clinical applications
- Path physiology of fatigue

#### **UNIT4**

- Pitch perception, factors affecting
- Ohm's law, Neurophysiologic basis
- Theories and models, consonance
- Dissonance, pitch of complex tones
- Differential sensitivity for frequency, Absolute and relative DLF's, methods to study,
- Timbre perception - Factors affecting
- Object perception – Object identification, , auditory scene analysis,
- Clinical application

#### **UNIT 5**

- Binaural hearing
- MLD
- Lateralization, binaural integration, binaural advantage
- Binaural DLF,DLI, DLT, squelch, beats, rotating tones
- Time intensity trade
- Durlach and Jeffress models
- Clinical application
- Space perception
- Localization
- Minimal audible angle
- Role of pinna
- Cone of confusion
- Monaural localization
- Clinical application

# AUDITORY PHYSIOLOGY

## UNIT 1

### 1) External ear:

- Anatomy & Physiology of lower animals and humans. Role of pinna & external auditory meatus in hearing. Resonance properties of external ear & auditory canal
- Non auditory physiology external ear
- Developmental changes
- Application to clinical audiology
- Temporal bone anatomy – role in hearing

### 2) Middle ear:

- Anatomy & physiology.
- Middle ear transformer action
- Impedance
- Acoustic and non acoustic reflex pathways
- Anatomy and physiology of the Eustachian tube

## Unit 2- Cochlea: Anatomy in lower animals and humans

- Macro & Microanatomy
- Blood supply
- Innervations
- Cochlear fluids – origin, absorption, composition, dynamics and functions
- Cochlear models
  - Physiology of the Cochlea
    - Modes of bone conduction
    - Cochlear mechanics – basilar membrane mechanics – historical and current status
    - Cochlear transduction
    - Cochlear electrophysiology

- Cochlear non-linearity-two tone suppression, otoacoustic emission & other recent advances
- Proteins in the cochlea
- Pathophysiology & perception
- Repair, regeneration, protection in the cochlea
- Theories of hearing
  - Historical aspects
  - Place theory – resonance & non-resonance
  - Frequency theory
  - Travelling wave theory
  - Other recent advance motor theory etc

### **UNIT 3 – Auditory nerve**

- Structure and tonotopic organization
- Structure and contents of internal auditory meatus
- Refractory period, adaptation, firing rates, types of responses
- Electrophysiology – action potential, generation and properties
- Stimulus coding, frequency, intensity, time, complex signals, speech
- Non linearity

### Vestibular System

- Anatomy and physiology of vestibular structures and vestibular nerve
- Integration of senses in balance
- Vestibule ocular reflex
- Vestibule spinal reflex

### **UNIT 4 - Brain stem**

- Anatomy of CN, types of cells distribution
- Anatomy of SOC, LL,IC,MGB
- Non classical pathway
- Tonotopic organization
- Neurophysiology at different levels

- Localization
- Stimulus coding, neurotransmitters
- Medial and lateral efferent effect on cochlear physiology ,Auditory Nerve and CN
- Plasticity

#### **UNIT 5 – Auditory cortex**

- Anatomy and tonotopic organization of primary and secondary auditory areas and efferent pathways, neurotransmitters
- Neurobiological relationship between auditory cortex and other areas
- Neurophysiology of auditory areas
- Stimulus coding – frequency, intensity and time
- Role of auditory cortex in localization
- Plasticity

## **II Year**

### **LANGUAGE ACQUISITION AND LANGUAGE DISORDERS IN CHILDREN**

#### **UNIT 1**

Critical review of current theories of language acquisition and its applications to assessment and intervention. Overview of genetic, neuro anatomical and neurophysiological correlates of language development.

#### **UNIT 2**

Language development in exceptional circumstances extreme deprivation, bilingual language acquisition, visual handicap, Mental retardation, Williams's syndrome, hearing loss, language learning disabilities and dysphasia and acquired childhood aphasia.

#### **UNIT 3**

Contemporary concept and issues in Autism Spectrum disorders, SLI, and LD.

#### **UNIT 4**

- Cross cultural consideration in assessment and management of developmental language disorders
- Specific assessment and intervention approaches for various developmental language disorders

**UNIT 5** Dyslexia, Neurobiology of reading and writing, Metalinguistics - Phonological awareness, reading etc. Evaluation and treatment approaches.

# ADULT LANGUAGE DISORDERS

## UNIT 1: Neuroanatomical and Neurophysiological correlates

- Anatomy of the Central Nervous system
- Focus on speech, language and hearing related areas; cerebral hemispheres, cerebellum, cranial nerves, brainstem, spinal cord (surface as well as deep structures) and circuits, pathways and blood supply to Central Nervous system.
- Neuronal organization (area as well as function) in human beings and animals.
- Concepts and studies related to : Hemispheric lateralization, Hemispheric Asymmetry
- (Structural + Functional) cerebral plasticity, cerebral maturation & its significance in development.
- Physiology of nerve conduction, Types of synapses, Types of neurotransmitters, Synthesis and activation of neurotransmitters; neurotransmitters in normal and disordered population.

Neuroanatomical organization in bilinguals and multilingual

## UNIT 2

- Neurophysiology of aphasia and related disorders. Language and cerebral dominance. Connectionist explanation of aphasia. Lesion size, lesion location and localization syndromes. Speech language and the brain
- Assessment and diagnosis in Neuro communication disorders. General principle. Testing of verbal comprehension, non verbal skills, verbal expression, and functional communication. Test interpretation, testing right hemisphere function and assessing the bilingual client,
- Different perspectives on aphasia, (linguistic, neurological, cognitive etc), pragmatics. Aspects of bilingual aphasia in illiterates and sign language users.

### **UNIT 3**

- Advances in aphasia rehabilitation, (psychological sociolinguistic and pragmatic approaches) and treatment efficacy
- Acquired reading and writing disorders

### **UNIT 4: Neurobiology of Ageing and neurocognition**

- Neuroanatomical changes with aging, structural changes, morphological changes, microscopic anatomic changes, neurochemical changes.
- Neurophysiological changes with aging: cerebral blood flow, EEG changes, Evoked Potential changes, Sleep studies.
- Neurocognitive models
- Role of attention and memory – STM, LTM
- Other processes – Abstraction, Reasoning, Logical aspects, organization, planning and executive processes

### **UNIT 5**

Dementia and communication. causes, types and language changes, assessment treatment and long term management

Traumatic brain injury, consequences of TBI, cognitive-linguistic issues in communication assessment, rehabilitation outcomes.

Other adult language disorders (characteristic assessment, intervention and issue in primary progressive aphasia, sub cortical aphasia, schizophasia and RHD.



# CLINICAL PHONOLOGY AND MOTOR SPEECH DISORDERS

## UNIT 1

- Phonological processes- review and recent advances, different types, its analysis, phonological process patterns in various communication disorders, International Phonetic Alphabet transcription.
- Phonological awareness - development, assessment and clinical implications. Recent studies.
- Phonotactics and metalinguistic abilities in phonological disorders.
- Co-articulation – nature, definitions and kinds. Models – feature based, syllabic and allophonic based, target based, phonologically based.
- Physiological studies on co-articulation- effects of co-articulation (position and juncture effect, transition effect, direction effect); Co-articulation in Speech Disorders.

## UNIT 2

- Application of phonological theories in evaluation and management of phonological disorders
- Metaphon theory and therapy
- Management of co-articulation in speech disorders and remediation.

## UNIT 3

- Neurophysiology and functional development of sensori-motor control
- Sensory motor processing in speech / correlates of oral sensori-motor dynamics –  
(a) Neural substrates and findings in dysarthria and apraxia.

## **UNIT 4**

- Recent advances in diagnosis, assessment and management of Dysarthria
- Recent advances in diagnosis, assessment and management of Apraxia.

## **UNIT 5**

- Dysphagia – Anatomical & Maturational considerations, Role of respiration. Physiology of suck- swallow- breath sequence, overview of phases of swallowing, Development of feeding skills, Alternate methods of nutritional intake.
- Disorders of swallowing in children and adults
- Etiological classification: Medical, GI tract, respiratory, CNS/PNS damage, cardiac effects, structural, abnormalities and iatrogenic.
- Assessment – Clinical examination, subjective evaluation of swallow function, feeding skills, GERD. Objective methods - Radiological and Instrumental evaluation
- Multidisciplinary management of dysphagia - Issues and concerns, Medical and Non-medical treatment.

# **SPEECH PERCEPTION AND ITS DISORDERS**

## **UNIT 1**

- Theories and models of speech perception (motor, neurological, auditory, acoustic, analysis by synthesis and TRACE)
- Basic Issues in speech Perception-linearity, segmentation. Lack of invariance. Variability or perceptual constancy in speech. Invariant feature and cue based approaches.
- Speech processing in the auditory system. Overview of the anatomy of the auditory system, peripheral and central mechanisms in the analysis of speech – place representation, intensity model, multistage representation and categorical perception.

## **UNIT 2** Speech intelligibility and perception of supra-segmentals

1. Methods: Subjective (perceptual tests), Objective (Articulation Index, Speech intelligibility index. Speech transmission index)
2. Comparison of two methods
3. Factors influencing – stimulus based, subject based, transmission based factors
4. Clinical application – in evaluation , rehabilitation and research
5. Perception of segmental and supra-segmental cues through
  - a. The visual modality
  - b. The tactile modality

## **UNIT 3**

1. Perception of vowels, semivowels, and diphthongs in individuals with hearing impairment
2. Perception of consonants in individuals with a hearing impairment
3. Effect of type, degree and audiogram configuration in perception of vowels and consonants
4. Speech perception through hearing aids using signal enhancing features
5. Dichotic listening- Theories, Factor affecting, Clinical application
6. Infant Perception, perception of consonants and vowels, suprasegmentals in infants, comparison of adult and infant perception, universality in perception, word perception, lexical neighbourhood.

## **UNIT 4**

1. Perception of segmental and suprasegmental cues through cochlear implants
  - a. Effect of number of channels,
  - b. Effect of coding strategy,
  - c. Effect of implant model
  - d. Effect of number of electrodes and stimulation rate
2. Perception of segmental and suprasegmental cues through auditory brainstem implants
3. Perception of segmental and suprasegmental cues through Middle ear implant and BAHA
4. Comparison of perception through different devices

## **UNIT 5**

1. Speech perception in noise (Effect of types of noise, different signal-to-noise ratio, different degrees of hearing impairment )
2. Effect on children, adults, geriatrics, peripheral hearing impairment, (C)APD reverberation times, Degrees of hearing impairment.
3. Combined effect of noise and reverberation
4. Effect of non-native accent on speech perception
5. Short term memory and speech perception, stages of memory, theories, perception of consonants and vowels in short memory, animal perception, consonant and vowel perception.
6. Animals versus human perception.

# DIAGNOSTIC AUDIOLOGY

## UNIT 1: Biomedical signals and signal processing

1. Principles of generation and calibration of acoustic stimuli
  - Pure tone, tone bursts, clicks, filtered clicks and warble tones
  - Acoustic / physical characteristics of all stimuli
  - Generation, gating and filtering of stimuli
  - Calibration of pure tones
2. Electrodes and transducers
  - Signal acquisition technique from electrodes and transducers
  - Signal processing techniques such as differential application
  - Common mode rejection, artefact rejection, filtering, signal averaging, etc.
  - Addition and subtraction of waves

Installation and calibration Audiological diagnostic instruments

## UNIT- 2

1. Hearing screening
  - Cost benefit analysis
  - Sensitivity vs specificity,
  - Efforts of WHO and Govt of India,
  - Genetic counseling,
  - Public awareness programs
2. OAE
  - Origin, classification, principles in recording of OAEs,
  - Protocols for infants, protocols for cochlear pathology
  - Contralateral suppression
  - Interpretation
  - Factors affecting
  - Clinical application

### **UNIT 3**

#### 1. Immittance

- Principle and instrumentation
- Tympanometry – low and high frequency tympanometry, Single and multi component, Multiple frequency tympanometry, Variables effecting tympanometry
- Reflexometry – Auditory reflexes (AR), non-auditory reflexes, adaptation of auditory reflexes, ARLT, reflex averaging, reflex sensitization, temporal summation of acoustic reflex, binaural summation of AR
- Factors affecting measurement,
- Application of Immittance
- Acoustic reflectometry- principles and application

### **UNIT- 4 :**

#### 1. Early AEP – ECOCHG, ABR, SN 10, FFR, ASSR

- Generators
- Principles of recording
- Factors affecting recording / interpretation
- Correlation with FMRI, PET
- Electrical ABR
- Clinical disorders

#### 2. MLR and LLRs, MMN, P300, N400, T complex

- Generators
- Principles of recording
- Factors affecting recording/interpretation including PAM and applications
- Correlation with FMRI, PET
- Electrical LLR
- Clinical disorders

#### 3. Vestibular testing and ENG

### **UNIT 5**

#### 1. Pathophysiological and audiological findings in different pathologies related to

- External and middle ear diseases,
- Blast, barotraumas, NIHL
- Meniere's disease,
- Acoustic neuroma,
- Auditory dysynchrony,
- Ototoxicity,

1. Tests to evaluate tinnitus and hyperacusis  
Nonaudiological tests in diagnosis of auditory disorders  
Auditory disorders in those with multiple problems, (C)APD  
Comprehensive report writing,  
Audiologist as a witness, medico-legal aspects  
legislations related to field of audiology  
Audiological practice in rural areas  
Audiological practice in ENT, Neurological set-ups

## **HEARING DEVICES**

### **UNIT 1: Fundamentals of Digital Signal processing and communication system**

1. Analogue and digital system
  - Analogue signal and digital signals
  - Analogue to digital and digital to analogue converters
  - Need and advantages of digital systems and digital signal processing
2. Principles of digital signal processing
  - Digital signal processor – how it works?
  - Basics of HR and FIR filters and their applications in speech and hearing
3. Fundamentals of communication systems
  - AM transmission and reception and its application in speech and hearing
  - FM transmission and reception and its application in FM hearing aids
  - Digital modulation techniques such as delta modulation, PCM, PPM, PWM and their application in speech analysis
  - Satellite communication and its application in tele-rehabilitation

### **UNIT 2 : Advances in technology of hearing aids**

1. Principles and working of
  - Analog, programmable and DSP based hearing aids.
  - Technology of channel separation
  - Techniques of non linear amplification and their implementation in hearing aids.
  - Noise reduction using microphone technology

## 2. Evaluation of hearing aids

- Electro acoustic characteristics
- National and international standards
- Hearing aid evaluation systems and recent advances

### **UNIT-3**

#### 1. Selection of special features in hearing aids with reference to specific clients

#### 2. Tinnitus maskers and their utility

#### 3. ALDs

- Types: Auditory based, visual based and tactile based ALDs
- Recent advances

### **UNIT-4**

#### 1. Cochlear implant

- Description, types designs and features
- Surgical procedure and biological safety in brief
- Speech processing strategies
- Assessment strategies
- Post operative measurement – NRT.ESRT, EABR
- Mapping
- Outcomes

### **UNIT-5**

#### 1. Middle ear implant, BAHA, Brainstem implant

- Description
- Selection
- Assessment
- Management
- Outcomes.



# **ADVANCES IN THE MANAGEMENT OF PERSONS WITH HEARING DISORDERS**

## **UNIT 1**

### **1. Habilitation of infants and children with hearing impairment**

- Early intervention programs
- Importance (effect of auditory deprivation and role of auditory plasticity), rationale, Role of care givers
- Process of informed decisions regarding: selection of method of rehabilitation, choice of amplification, language issue, selection of educational options
- Alternate modes of intervention: CBR, correspondence programs, distance mode intervention, telepractices
- Outcome measures
- Audit of facilities in India
- Formal education: Pre-school, School, College and vocational training programs
- Role of audiologist in formal education
- Technological needs in formal education
- Tele-rehabilitation

## **UNIT 2**

### **1. Management of special groups in respect to amplification / implantable devices, placements and role of caregivers**

- Children and adults with multiple handicap (deaf-blind, neuro-motor, cognition problems, reading-writing problems)
- Outcome measures
- Management of children, adults, and geriatrics in respect to amplification / implantable devices, role of caregivers
- Mild-to-moderate hearing loss, unilateral hearing loss
- Sudden hearing loss, progressive hearing loss, fluctuating hearing loss
- Psychosocial measures, Assertiveness training
- Communication strategies
- Outcome measures

## **UNIT 3**

### **1. Management of tinnitus**

- Application of audiological findings in management of tinnitus
- Neurophysiological model
- Techniques of management including tinnitus retraining therapy
- Amplification and maskers
- Counselling

## 2. Management of hyperacusis

- Application of audiological findings in management of thinnitus
- Neurophysiological model
- Thchniques of management including tinnitus retraining therapy
- Counselling

## **UNIT 4**

### 1. Legislations related to education issues of persons with hearing impairment

- International declarations (such as Biwako millennium framework, Salamanca statement)
- National acts / policies / schemes (such as PWD act, National Trust Actt, Sarva Shiksha Abhiyan, DPEP scheme, ADIP Scheme)
- Measures to implement legislations, schemes, Policies
- Role of audiologist

## **UNIT 5**

### 1. Management of CAPD cases:

- Choice of management based on audiological test results,
- Environmental modifications,
- Devices
- Auditory perceptual training,
- Communications strategies,
- Cognitive \ language management,
- Measuringoutcomes

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