

Syllabus for Speech Pathologist/Audiologist **Grade-02 and Speech Therapist**

BACHELOR OF AUDIOLOGY AND SPEECH – LANGUAGE PATHOLOGY (BASLP)

YEAR 1

B 1.1 INTRODUCTION TO HUMAN COMMUNICATION

Unit 1

1. History and development of the profession of Speech-Language Pathology (SLP) specifically in India
1. Major work activities of the SLP
2. Various settings of service delivery
3. Other professions concerned with communication disorders
4. Human communication:
 - Definition and component
 - Interdependency & interrelation between communication, hearing, speech, and language.
 - Function of communication, speech and language
 - Modes of communication (Verbal & Non-verbal)
 - Characteristics of good speech
5. Interactive bases of human communication
 - genetic bases
 - psychological & cognitive bases
 - social bases
6. Speech as an overlaid function
7. Pre-requisites and factors affecting language and speech development

Unit 2

1. 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.

Unit 3

Mechanism of speech and language production- I

- Anatomy and physiology of respiratory system: Detailed study of trachea, larynx, oropharynx and nasopharynx.
- Respiration for life and speech

- Physiology: External and internal respiration. Mechanism of respiration-internal and external influence, nervous control, Lung volumes (vital capacity-tidal volume, residual air, artificial respiration.(in brief)
- Composition of gases. Exchange of gases in the lungs and tissues. Hypoxia, asphyxia and cyanosis. Regulation of respiration. Respiratory efficiency test and artificial respiration.

Unit 4

1. 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.

2. Mechanism of speech and language production- II

- Anatomy and physiology of laryngeal system
- Development of voice
- Bases of pitch and loudness change mechanism

Unit 5

Mechanism of speech and language production- III

- Anatomy and Physiology of Articulatory system
- Development of Articulation
- Anatomy and Physiology of Resonatory system

B 1.2 SPEECH - LANGUAGE DEVELOPMENT AND DISORDERS

Unit 1

Development of speech and Language: Development of language

- 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.

Unit 2

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.

Unit 3

Definition, Etiology, Characteristics, Classification and Impact of

- Hearing Impairment
- Mental Retardation
- Cerebral Palsy
- Seizure disorders

Introduction to assessment procedures, differential diagnosis and management.

Unit 4

Definition, Etiology, Characteristics and classification of

- Autism Spectrum Disorders/Pervasive Developmental Disorders
- Attention Deficit Disorder/ Attention Deficit Hyperactive Disorder

Introduction to assessment procedures, differential diagnosis and management.

Unit 5

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.

B 1.3: INTRODUCTION TO HEARING & HEARING SCIENCES

Unit 1

- Origin of Audiology, Its growth & development (since World War II)
- 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)
 - Importance of case history in identifying the cause of hearing loss

Unit 2

- 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

Unit 3

- 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.
 - Loudspeaker placement and directivity.
 - Sound images and multiple sources.
 - Sound field in listening rooms. Quadraphonic sound.
 - Listening with earphones. Pressure field, free field and diffused field.
 - Audiometric test rooms – Basic requirements concept and structure – transmission loss,
 - NRC rating – Standards for sound treated rooms – Basic requirements, concept and structure – standards.
 - Classrooms of hearing impaired children – Basic requirements, concept and structure – standards.

Unit 4

- 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

Unit 5

- **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

B.1.4 MANAGEMENT OF THE HEARING IMPAIRED

Unit 1

- 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

Unit 2

- Methods of teaching language to the hearing impaired
 - Natural method
 - Structured method
 - Computer aided method

Unit 3

- 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

Unit 4

- 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

Unit 5

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

B 1.5 BASIC MEDICAL SCIENCES RELATED TO SPEECH & HEARING PART A (UNIT 1) ANATOMY

Unit 1

- (a) General introduction, definitions, Coronal / saggital / plane) Planes. Definition of anatomy, morphology, physiology, histology, embryology.
- (b) Definition of Cell and organelles, tissue, organ system, specialized tissues like nervous tissue, vascular tissue, muscle and bone tissue.
- (c) Nervous system: Definition of neuron, synapse, reflex action, bio electrical phenomena, action potential, depolarisation, division and functions of the nervous system, brain – general lobes, reticular formations, basal ganglia, cerebellum, circle of willis, cranial nerves, spinal cord, CSF – formation & flow.
- (d) Circulatory system: Definition of capillaries, arteries, veins, cardiac cycle, blood brain barrier, aneurysm, vascular shock – its reference to aphasia / speech disorders.
- (e) Respiratory system: General outline, detailed study of trachea, larynx and nasopharynx,

PART B (UNIT 2) PHYSIOLOGY

Unit 2

- (a) Definition of inflammation, infection, tumor – benign & malignant, tissue healing.
- (b) Mechanism of respiration – internal and external influence, nervous control – vital capacity – tidal volume, residual air, artificial respiration (in brief).
- (c) Genetics :introduction – structure of DNA and RNA, karyotyping, family tree (pedigree chart), symbolic representation, inheritance, autosomal dominant, autosomal recessive, sex chromosomal disorders, structural aberrations, mutation (in brief).

- (d) Endocrine system: Definition of hormone, functions of thyroid hormone, growth hormone, androgen, testosterone and its influence in voice disorders.

PART C (UNIT 3, 4, 5) ENT

Unit 3

- (a) 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.
- (b) Other causes of hearing loss – Facial paralysis, Tumors of the cerebello- pontine angle, Acoustic neuroma. Infection and management of inner ear diseases. Cochleo-vestibular diseases and its management.

Unit 4

- (a) Anatomy & Physiology of pharynx & oro-peripheral structures

Causes of speech disorder, Disorders of the mouth, Tumors of the jaw and oral cavity, nasopharynx and pharynx, pharyngitis, Diseases of tonsils and adenoids.

- (b) 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.

Unit 5

- (a) Anatomy & Physiology of larynx – physiology of phonation / physiology of respiration.
- (b) 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.

B.1.6 PSYCHOLOGY RELATED TO SPEECH AND HEARING

Unit 1

- 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

Unit 2

- 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).

Unit 3

- 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.

Unit 4

- Psychodiagnosites – Case history taking, Mental status examination, behavioural analysis, psychological testing.
- Counselling- Meaning and definition, types of counselling, Counselling in rehabilitation practice.

Unit 5

- Developmental psychology:
- Introduction, Definition, Principles, Motor development, Emotional development
- Cognitive development- Definition, Piaget's theory
- Play as a therapeutic tool
- Personality development- Introduction, Stages, Hazards

B 1.1.1: COMPUTER FUNDAMENTALS

Unit 1:

General features of a computer. Generation of computers. Personal computer, Desktop and laptop workstation, mainframe computer and super computers. Computer applications – signal processing, data processing, information processing, commercial, office automation, industry and engineering, healthcare, education, graphics and multimedia

Unit 2:

Computer Organization, Central processing unit, Computer memory, primary memory and secondary memory. Secondary storage devices – magnetic semiconductor and optical media. Input and output units. OMR, OCR, MICR, scanner, mouse, Modem.

Unit 3:

Computer hardware and software. Machine language and high level language.

Application software. Computer program. Operating system. Computer virus, antivirus, and computer security. Elements of MS-DOS and Windows OS. Computer arithmetic. Binary, Octal and hexadecimal number systems. Algorithm and flowcharts. Illustrations. Elements of a database and its applications

Unit 4:

Word processing and electronic spread sheet. An overview of MS-WORD, MS- EXCEL and MS-POWERPOINT (image, file formats, audio and video file formats, print file formats). Elements of Basic programming. Simple Illustrations.

Unit 5:

Network of computers. Types of networks, LAN, Intranet and Internet, Internet Applications. World wide web, e-mail, browsing and searching. Search engines, Multimedia applications. Case study : Networking of speech and hearing clinic, networking for tele-rehabilitation.

Second Year

B.2.1. SPEECH LANGUAGE DIAGNOSTICS AND THERAPEUTICS

A. Speech language diagnostics

Unit 1

1. 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
2. Basic terminologies and concepts
 - Introduction to diagnostics
 - Terminologies in the diagnostic process
 - General principles of diagnosis
 - Diagnostic setup and tools

Unit 2

1. Diagnostic approaches and methods

- Approaches to diagnosis – importance of diagnosis in client history, essential factors to be included according to the conditions/disorders. Methods of taking case history.
- Interview – principles and techniques
- Self-reports, questionnaire, observations.
- 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

B. Speech therapeutics

Unit 3

1. 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

Unit 4

1. 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
2. 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

Unit 5

(15 hrs)

1. 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.

B 2.2 ARTICULATION AND PHONOLOGICAL DISORDERS

Unit 1

- 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.

Unit 2

- 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

Unit 3

- 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

Unit 4

- 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

Unit 5

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

B.2.3 VOICE AND LARYNGECTOMY

Unit 1

1. Characteristics of normal voice: Physiological, acoustical and aerodynamic correlates
2. Development: Birth to senescence; including age-related changes
3. Theories of phonation
4. Classification of abnormal voice
5. Voice disorders in other conditions:
 - Voice disorders related to resonatory problems
 - Voice problems in conditions like Cerebral palsy, Hearing impairment, mentally retardation, Cleft lip and palate
 - Voice problems in Endocrine disorders

Unit 2

Etiology, incidence, prevalence, signs and symptoms of:

- Organic voice disorders: Laryngeal cancer also to be included here
- Non-organic voice disorders: eg: Functional disorders (Psychosomatic- Functional aphonia and physiological- voice abuse)
- Congenital voice disorders
- Neurological voice disorders

Unit 3

1. Evaluative procedures and Instrumentation for:
 - Invasive procedures – endoscopic procedures
 - Non-invasive (Acoustic, perceptual, aerodynamic, Electro Glotto Gram, Inverse filtering procedures)
2. Comparison of normal and abnormal voice patterns based on the above procedures

Unit 4

Laryngectomy:

- Types and characteristics of laryngeal surgery
- Assessment of a laryngectomee and associated problems
- Management of laryngectomee: a) Esophageal speech: anatomy, candidacy, different types of air intake procedures, speech characteristics of esophageal speech; b) Tracheo-esophageal speech: anatomy, candidacy, different types of TEP, fitting of prosthesis, speech characteristics, complications in TEP; c) Artificial larynx: different types, selection of artificial larynx, speech characteristics; d) Pharyngeal speech, buccal speech, ASAI speech, gastric speech; e) Pre and postoperative counseling

Unit 5

1. Medical/Surgical procedures in the treatment of voice disorders
2. Voice therapy – various techniques
3. Professional voice users: Definition, types, characteristics, importance of vocal hygiene and professional voice care

B 2.4: MOTOR SPEECH DISORDERS

Part A: Childhood Motor Speech Disorders

Unit 1

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

Unit 2

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

Unit 3

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

Unit 4

Apraxia of speech in children or developmental apraxia of speech

- Definition
- Description: verbal and non-verbal apraxia
- Differential diagnosis- dysarthria and other developmental disorders
- Management of developmental apraxia of speech- Facilitation techniques for oral motor movements, speech therapy techniques, generalization of speech

Unit 5

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

Part B: Adult Motor Speech Disorders

DYSARTHRIA AND APRAXIA

Unit 1

- a) Definition and classification of dysarthria in adults.
- b) Types of dysarthria in adults.
- c) Neurogenic disorders leading 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.

Unit 2

d) 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.

Unit 3

f) 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.

Unit 4

g) 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.

Unit 5

Dysphagia:

- Definition
- Phases of normal swallow
- Etiology of swallowing disorders
- Assessment and Intervention

B 2.5: DIAGNOSTIC AUDIOLOGY

Unit 1

1. 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

Unit 2

3. 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
 - Introduction & classification of AEPs, Instrumentation, Test procedure, factors affecting Auditory Brainstem Responses, Interpretation of results & clinical application, Auditory Brainstem Response in pediatric response.
 - ECOG, early response
 - Middle & Long latency auditory evoked potentials – test procedure, factors affecting MLR & LLR, Interpretation of results & clinical application, Findings in the pediatric population.

Unit 4

5. Otoacoustic Emissions

Introduction, classification of OAEs, Instrumentation, measurement of OAE procedure, interpretation of results & clinical applications, findings in the pediatric population.
6. Tests to detect Pseudohypoacusis
 - Pure tone tests including tone in noise test, Stenger test
 - Speech tests including Lombard test, Stenger test, Lip-reading test, Doefler-Stewart test.

- Identification of functional hearing loss

Unit 5

7. Central Auditory Disorders

- (a) Definition, terminologies used, incidence & causes, indications for administration of CAD test, rationale for CAD tests.
- (b) Tests to detect Central Auditory Disorders
 - Monoaural low redundancy tests
 - Filtered speech tests
 - Time compressed speech tests
 - Speech-in-noise test
 - SSI with ICM
 - Other monoaural low redundancy tests
- (c) Dichotic speech tests
 - Dichotic digit test
 - Staggered spondaic word test
 - Dichotic CV test
 - SSI with CCM
 - Competing sentence test
 - Other dichotic speech tests
- (d) Binaural interaction tests
 - RASP
 - Binaural Fusion Test (BST)
 - MLD
 - Other binaural interaction tests
- (e) Temporal ordering tasks
 - Pitch pattern test
 - Duration pattern tests
 - Other temporal ordering tests
- (f) Variables influencing Central Auditory Assessment
 - Procedural variables
 - Subject variables
- (g) Test findings in subjects with central auditory disorders
 - Brainstem lesion
 - Cortical & hemispheric lesion
 - Interhemispheric dysfunction
 - CAPD in children
 - CAPD in elderly
- (h) Other special test – Minimal auditory capability test, SPIN, HINT, CST.

B 2.6 TECHNOLOGY & AMPLIFICATION DEVICES FOR PERSONS WITH HEARING IMPAIRMENT

PART A:

Unit 1

Operational characteristics, types and specifications. -No design aspects. Concepts and block diagrams only

- 1.
2. Basics of digital signal processing – Analog signal, digital signal, A to D and D to A conversion, Basic concept of Digital Signal Processing and its implementation, How does a DSP based system works? Application- DSP based hearing aids.

Unit 2

1. Microphones as transducers. Velocity microphones. uni-directional microphones Microphone impedance and sensitivity. Loudspeakers as transducers. Structure of a dynamic loudspeaker. Air suspension. Baffles and enclosures. Horn speakers. Multi-speaker systems. Loudspeaker Efficiency, Loudspeaker power and distortion.

Basics of electricity & electronics - Direct and alternating current, DC Power supplies, voltage stabilizers, Passive circuit elements, transistors. Linear and digital Integrated circuits, microprocessors. Micro computers and Computers. Filters, Linear and non-linear Amplifiers and Oscillators, Amplifier power and distortion

Recording and Reproduction of sound. Recording characteristics. Dynamic Range, Stereophonic recording. Magnetic tape recording and playback. Tape speed and frequency response, Bias and equalization, Tape noise, Digital Tape recording, CD ROM recording

2. 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

PART B:

Unit 3

Historical development of hearing aids Non-electrical hearing aids

Electric hearing aids

- a) Basic elements of hearing aids: Microphone, Amplifier, Receiver, Cords, Batteries
- c) Directional hearing aids, modular hearing aids
 - Routing of signals, head shadow / baffle / diffraction effects
 - Output limiting: Peak clipping, compression
 - Extended low frequency amplification, frequency transposition (Bone anchored hearing aid, Master Hearing aids)
- d) Signal processing in hearing aids
 - BILL, TILL, PILL
 - Programmable and digital hearing aids
 - Signal enhancing technology

Unit 4

Electroacoustic Characteristics & measurements for hearing aids

- a) Instrumentation & Analysis of Electroacoustic characteristics of all types of hearing aids.
- b) Measurement of standard & specification of hearing aids according to ISI, IEC and ANSI
- c) Interpretation of the analysis

Unit 5

Hearing Aid selection

- a) Pre-selection factors: Ear to be fitted, monoaural vs. binaural hearing aids, type of receiver, style of hearing aid.
- b) Prescriptive & comparative procedure
- c) Functional gain & insertion gain methods: Instrumentation, prescription formulae, Articulation Index, Speech-spectrum (banana), merit & demerits of each.
- d) Hearing aids for conductive hearing loss, congenital malformation, chronic middle ear disorders
- e) Hearing aids for infants/children/multiply handicapped
- f) Hearing aids for adults & geriatrics: recruiting ears, poor word recognition scores (WRS)
- g) Hearing aids for the sightless
- h) Procuring hearing aids under various schemes of the Government of India / State

B 2.7 PAEDIATRIC AUDIOLOGY

Unit 1

- a) Development of human auditory system
 - Basic embryology
 - Embryology of the auditory system
 - Relevance of the information with special reference to syndromes
- b) Development of auditory behaviour
 - Prenatal hearing
 - New born hearing
 - Auditory development from 0-2 years

Unit 2

- a) Early identification of hearing loss – need with specific reference to conductive and sensorineural hearing loss.
- b) Screening for hearing loss using high risk registers
- c) Behavioural screening tests: Stimuli, procedures, recording of response, interpretation of results and validation of results
- d) Concept of universal hearing screening

Unit 3

- a) Objective screening tests: Immittance, Evoked potentials, OAE,

- b) School Screening – Objective: Screening for hearing sensitivity, screening for middle ear effusion. Need, criteria, instrumentation.
- c) Individual and group screening / Mass media screening tests
- d) Importance of follow-up.

Unit 4

- a) Hearing testing in neonates and infants:
 - Behavioural Observation Audiometry (BOA)
 - Conditioning techniques including CORA, VRA and its modifications, TROCA, Play audiometry.
- b) Speech Audiometry in children
 - Tests & material used to obtain:
 - Speech Detection Threshold (SDT)
 - Speech Recognition Threshold (SRT)
 - Speech recognition tests including VASC, WIPI, NuChip, Glendonald Auditory Screening Procedure (GASP), Early Speech Perception Test (EST), Speech tests developed in India.
 - Factors affecting speech audiometry results in children
 - BC speech audiometry

Unit 5

- a. Unilateral hearing loss in children
- b. Hearing in children with multiple handicap and special population
- c. Auditory neuropathy in children
- d. Central Auditory Processing Disorders in children
 - Signs/symptoms
 - Screening tests
- e. Functional hearing loss in children
 - Signs/symptoms
 - Tests

B 2.1.2 INDIAN CONSTITUTION

Unit 1: Indian Constitution: Its Philosophy and Framing

- The constituent Assembly
- Preamble, Fundamental Rights and Fundamental Duties
- Directive Principles of State Policy
- Amendment and Review of the Constitution

Unit 2: The Union & State Legislature

- Union Parliament
- State Legislature
- Law-making process

- Committee System

Unit 3: The Union & State Executive

- The President of India
- The Prime minister and Council of Ministers
- The State Governor, Chief Minister and Council of Ministers
- Coalition Government

Unit 4: The Judiciary

- The Supreme Court of India
- Judicial Review
- Writs
- Judicial Activism and Public Interest Litigation

Unit 5: Issues

- Indian Federalism
- Human Rights and Environmental Protection
- Reservation and Social Justice
- Secularism

Third Year

B 3.1: FLUENCY AND ITS DISORDERS

Unit 1

Fluency: Definition, development of fluency, factors influencing the development
 Definitions of intonation, stress and rhythm- Development of intonation, rhythm, stress – their implications to therapy
 Measures of fluency and other prosodic aspects

Unit 2

Stuttering: definition, nature, incidence and prevalence
 Normal non fluency; primary stuttering; secondary stuttering
 Development of stuttering
 Cluttering and neurogenic stuttering

Unit 3

Theories of stuttering: organic vs. functional; cerebral dominance; diagnosogenic and learning theories; demand-capacity model

Unit 4

Assessment of stuttering;
 Associated problems
 Differential diagnosis of developmental stuttering, neurogenic stuttering, cluttering, normal non fluency, spasmodic dysphonia

Unit 5

Prevention
 Therapy; rationale; prolongation; shadowing; habit rehearsal technique, DAF, masking, shock therapy, desensitization, timeout, airflow and modified airflow

technique; sequence of therapy procedures
MIDVAS
Transfer and maintenance
Measurement of progress; naturalness rating
Relapse and recovery

B 3.2: NEUROGENIC LANGUAGE DISORDERS IN ADULTS

Unit 1

Neural bases of language: Neuroanatomical, neurophysiological and neurochemical correlates for language function

Pathophysiology of neurological lesions affecting speech, language and hearing; concepts of recovery, reorganization and relearning
Theoretical considerations in neurogenic language disorders: Competence Vs Performance; loss Vs Interference, Regression hypothesis, multilingualism, Uni-dimensional Vs multidimensional breakdown

Unit 2

Definitions of Aphasia
Etiology
Classification of aphasia based on anatomical, linguistic and psycholinguistic aspects
Clinical features: Linguistic, psycho-social, neuro-behavioural
Associated problems in aphasia: their definition, classification and clinical features

Unit 3

General and specific neurological examination procedures (higher functions, cranial nerves, motor and sensory systems, reflexes and fundus)
Neurological investigations: Electrophysiological (Electro Encephalo Gram, Evoked potentials) and imaging (Computerized Tomography, Magnetic Resonance Imaging)
Assessment of speech, language and cognitive behaviour of adults with a language-based disorder: Informal and formal test procedures(Western Aphasia Battery, Boston Diagnostic Aphasia Examination, Boston Naming Test, Minnesota Test for Differential Diagnosis of Aphasia, Porch Index of Communicative abilities, Functional Communication Profile, Token Test, Revised Token Test, Bilingual Aphasia Test and others; Indian tests

Unit 4

Other language disorders in adults: Introduction, Etiology, clinical profile, assessment and management

- Traumatic Brain Injury
- Right Hemisphere Damage Disorder
- Primary Progressive Aphasia
- Language disorders in Dementia

Differential diagnosis of Adult Neurogenic disorders

Unit 5

Intervention: Prognostic indicators, Spontaneous recovery; General principles of therapy; specific techniques (Melodic Intonation therapy, Visual Action therapy, Schuell's Auditory stimulation, Thematic language stimulation and the others

Team approach; Group therapy; Family support-preparing family, friends and colleagues on what to expect and how to deal with aphasic as a person; Counseling regarding role of family; Individual counselling and spouse and family counselling

B 3.3 REHABILITATIVE AUDIOLOGY

Unit 1

1. Speech reading
 - (a) Definitions
 - (b) Need
 - (c) Visibility of speech sounds – audio visual perception vs. visual perception
 - (d) Visual perception of speech by the hard of hearing
 - (e) Tests for speech reading ability, including Indian Tests
 - (f) Speech reading activities
2. Factors influencing speech reading
 - (a) Methods of training: analytical vs. synthetic; (including speech tracking)
 - (b) Individual and group training

Unit 2

1. Auditory training
 - (a) Definition and historical background
 - (b) Role of audition in speech and language development in normal children and its application in education of the hearing impaired.
 - (c) Factors in auditory training: motivation of the case, intelligence, age, knowledge of progress, etc.
 - (d) Auditory Verbal Therapy
 - (e) Methods of auditory training
 - (f) Auditory training activities
 - (g) Communicative strategies
 - (h) Individual vs. group auditory training

Unit 3

- Management of hearing impaired individuals with special needs
- (a) Management of multi handicapped hearing impaired children (MHHI)
 - (b) Management of children with central auditory processing problems
 - (c) Rehabilitation of hearing impaired – elderly population

Unit 4

- Assistive Listening Devices (ALDs)
- Classification based in auditory, visual & tactile stimulation
 - Classification based on alerting devices Vs devices for speech perception.
 - Selection of ALDs.

Unit 5

1. Implantable Devices
 - Middle Ear Implants and BAHA (Bone Anchored Hearing Aid)
 - Cochlear Implants
 - Brainstem Implants
- Components, Candidacy, Advantages and Complications for the same.

2. Utility of technology/devices in the management of tinnitus, hyperacusis.

B 3.4 NOISE MEASUREMENT AND HEARING CONSERVATION

Unit 1:

- a) Noise in the environment and effects of noise:
- Definition of noise
 - Sources – community, industrial, music, traffic and others
 - Types – steady & non-steady.
- b) Auditory effects of noise exposure
- Historical aspects
 - TTS and recovery patterns
 - PTS
 - Histopathological changes
 - Effect of noise on communication, Speech Interference Level (SIL), Articulation Index (AI)
 - Perceived Noise in dB (PN dB), Perceived Noise Level (PNL), Effective Perceived Noise Level (EPNL), Noise Criteria (NC) curves, Noise Reduction Rating (NRR), Signal to Noise Ratio (SNR)
- c) Non-auditory effects of noise exposure
- Physiological/Somatic & psychological responses, stress and health, sleep, audio-analgesia effects on CNS and other senses
 - Effects of noise on work efficiency and performance

Unit 2:

Audiometry in NIHL

Puretone audiometry:

- Base line and periodic monitoring tests, high frequency audiometry, brief tone audiometry, correction for presbycusis
- Instrumentation: Manual audiometer, automatic audiometer
- Testing environment
- High frequency audiometry

Speech audiometry:

- Speech discrimination tests with and without the presence of noise
- Filtered speech tests and time compressed speech tests
- Social Adequacy Index

Other audiological evaluations:

- Impedance audiometry
- ERA
- OAE
- Tests for susceptibility

Unit 3:

Noise & vibration measurement

- Instrumentation and procedure for indoor and outdoor measurement of ambient noise, traffic noise, aircraft noise, community noise and industrial

noise.

Unit 4:

Hearing conservation:

Need for hearing conservation program, steps in hearing conservation program

Ear protective devices: (EPDs)

- Types: Ear plugs, ear muffs, helmets, special hearing protectors, merits and demerits of each
- Properties of EPDs: Attenuation, comfort, durability, stability, temperature, tolerance
- Evaluation of attenuation characteristics of EPDs.
- Toughening

Unit 5:

Legislations related to noise:

- Damage Risk Criteria (DRC) – definition, historical aspects, use of TTS and PTS, information in establishing DRC, - Committee on Hearing Bioacoustics & Biomechanics (CHABA), Air Force Regulation (AFR 160-3), American Academy of Ophthalmology & Otolaryngology (AAOO), ASA-Z 24.5, Damage risk contours, Walsh – Healey Act, Occupational Safety & Health Act (OSHA), Environmental Protection Agency (EPA), Indian noise standards.
- Claims for hearing loss: Fletcher point eight formula, AMA method, AAOO formula, California variation in laws, factors in claim evaluation, variations in laws and regulations, date of injury, evaluation of hearing loss, number of tests.
- Indian studies/acts/regulations, American acts.

B 3.5 COMMUNITY ORIENTED PROFESSIONAL PRACTICES IN SPEECH, LANGUAGE AND HEARING

Unit 1

1. Epidemiology of speech, language and hearing disorders
2. Environmental, Social, Economic implications and preventive education
3. Levels of prevention: Primary, Secondary, Tertiary
4. Survey, prevalence, Incidence and its implication in planning
5. Health promotion, specific protection, early diagnosis and treatment of a high risk infant, Disability limitation, Educational and Vocational rehabilitation

Unit 2

1. Approaches to service delivery: Institution based, Camp based, Community based and Role of NGOs
2. Review of services in India
3. Integration of Disabled into the community and ICF 2001

Unit 3

1. Duties and responsibilities of SLP in various settings
2. Professional ethics for SLPs, Code of Ethics, Right to Education Act, Industrial

- Employment Act
3. Interacting with allied professional and community health workers

Unit 4

Planning services for the communication disordered population: Philosophy, planning, establishment of services for communication disorders- infrastructure, budget, staffing, equipment, furniture, policy making, record keeping, proposal writing.

1. Strategies for awareness, public education and information (Camps, Print and audiovisual media, Surveys. Radio broadcasts, street plays).
2. Empowering parents, persons with disabilities and the community; Skill transfer to DHLS, parents; grass-root level workers, teachers and health workers

Unit 5

1. Legislative support for rehabilitation- Rehabilitation Council of India Act (1992), Persons With Disability Act (1995), National Trust Act for the Welfare of Autism, CP, MR and Multiple Disabilities (1999), Environmental Act, Consumer Protection Act, Right To Information Act, UNCRPD Act.
2. The professional as a witness; documentation; handling legal issues

B 3.6: BASIC STATISTICS & SCIENTIFIC ENQUIRY IN AUDIOLOGY & SPEECH LANGUAGE PATHOLOGY

Part A: Basic Statistics

Unit 1

Introduction to statistics: Its importance in behavioural sciences; descriptive statistics and inferential statistics; usefulness of quantification in behavioural sciences; application to speech and hearing

Unit 2

Measures: scales of measurement; nominal, ordinal, interval and ratio scales
Data collection: classification of data- class intervals, continuous and discrete measurement, drawing frequency curve, drawing inference from a graph

Unit 3

Measurement of central tendency: Need, types- mean, median, mode; working out these measures with illustrations

Measures of variability: Need, types of range, deviation- average deviation, standard deviation, variance; interpretation

Unit 4

Normal distribution: general properties of normal distribution; theory of probability; illustration of normal distribution; area under normal probability curve

Variants from the normal distribution: skewness, kurtosis; their quantitative measurement; Introduction to non-parametric statistics

Unit 5

Correlation: Historical contribution; meaning of correlation; types of correlation-product-moment correlation, content correlation, rank correlation etc
Standard error sampling distribution; Type I and Type II errors, χ^2 , 't' and 'F'- tests; Methods of significance of differences between means and their interpretation and probability levels-small samples, large samples

Part B: Research Methods in Audiology and Speech Language Pathology

Unit 1

Scientific status of speech language pathology and audiology; speech language pathology and audiology as a behavioural science; need for scientific enquiry in speech language pathology and audiology; choosing a research problem, formulation of research question, statement of research question, formulation of hypothesis, types of hypotheses

Unit 2

Parameters for scientific research in speech language pathology and audiology: Identification of variables and the types; types of data and its nature; measurement procedures in speech language pathology and audiology; instrumental and behavioural measures and recording procedures

Unit 3

Sampling methods: types, methods of data collection
Application of the above with hypothetical illustrations

Unit 4

Introduction to research methods and designs: Ex post-facto, experimental, standard group comparisons, evaluation research etc
Application of these to clinical population and community research

Unit 5

Documentation of research: Reporting research-organization, analysis and presentation of data
Components of research article, report writing style
Ethics of research in behavioural sciences
Qualities of a researcher/scientific clinician

B 3.1.1 ENVIRONMENTAL STUDIES

Unit 1:

The multidisciplinary nature of environmental studies
Definition, scope and importance

Unit 2:

Natural Resources
Renewable and non-renewable resources
Natural resources and associated problems

Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams' benefits and problems.

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture , fertilizer-pesticide problems, water logging, salinity, case studies

Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, Case studies.

Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification

Role of an individual in conservation of natural resources
Equitable use of resources for sustainable lifestyles

Unit 3:

Eco Systems
Concept of an ecosystem
Structure and function of an ecosystem Producers, consumers and decomposers Energy flow in the ecosystem Ecological succession
Food chains, food webs and ecological pyramids
Introduction, types, characteristic features, structure and function of the following Ecosystem:
Forest ecosystem
Grassland ecosystem
Desert ecosystem
Aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries)

Unit 4:

Biodiversity and its conservation

Introduction – Definition, genetic, species and ecosystem

diversity Biogeographical classification of India

Value of biodiversity: consumptive use, productive use, social, ethical, esthetic and option values

Biodiversity at global, national and local

levels India as a mega diversity nation

Hot-spots of biodiversity

Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife

conflicts Endangered and endemic species of India

Conservation of biodiversity: In-situ and ex-situ conservation of biodiversity

Unit 5:

Environmental Pollution

Definition

Causes, effects and control measures of:-

- a. Air pollution
- b. Water pollution
- c. Soil pollution
- d. Marine pollution
- e. Noise pollution
- f. Thermal pollution
- g. Nuclear hazards

Solid waste management: causes, effects and control measures of urban and industrial wastes

Role of an individual in prevention of pollution Pollution case studies

Disaster management: floods, earthquakes, cyclone and landslides

Unit 6:

Social issues and the environment

From unsustainable to sustainable

development Urban problems related to energy

Water conservation, rain water harvesting, watershed management

Resettlement and rehabilitation of people, its problems and concerns, case studies Environment ethics, issues and possible solutions

Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies

Wasteland reclamation

Environment Protection

Act

Air (Prevention and Control of Pollution)

Act. Water (Prevention and control of pollution) Act Wild life protection Act

Forest conservation Act

Issues involved in enforcement of environment legislation

Public awareness

Unit 7:

Human population and the Environment

Population growth, variation among nations

Population explosion, family welfare programme

Environment and human health

Human rights

Value education

HIV/AIDS

Women and child welfare

Role of information technology in environment and human health

Case studies
