



SHRI  
DHARMASTHALA  
MANJUNATHESHWARA  
UNIVERSITY

ORDINANCE GOVERNING  
B.SC. IN ALLIED HEALTH SCIENCES  
**BACHELOR IN AUDIOLOGY AND SPEECH- LANGUAGE PATHOLOGY**  
CURRICULUM 2023-24

**SHRI DHARMASTHALA MANJUNATHESHWARA UNIVERSITY**

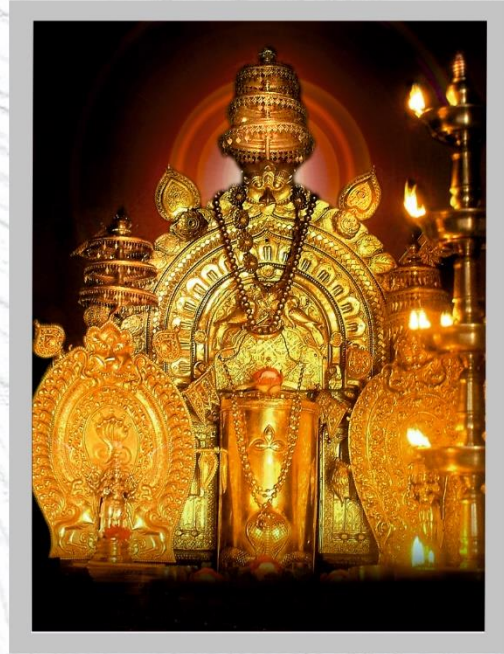
(A State Private University established under the Shri Dharmasthala Manjunatheshwara University Act No 19 of 2018 of Government of Karnataka and Notification No. ED 261 URC 2018 dated 19th December 2018)

Manjushree Nagar, Sattur, Dharwad - 580 009, Karnataka, India  
6<sup>th</sup> Floor, Manjushree Block SDM Medical College Campus

+91 836 2321127,2321126,2321125,2321124 [sdmuniversity.edu.in](http://sdmuniversity.edu.in)

[sdmuo@sdmuniversity.edu.in](mailto:sdmuo@sdmuniversity.edu.in) ; [registrar@sdmuniversity.edu.in](mailto:registrar@sdmuniversity.edu.in)

|| Om Shri Manjunathaya Namaha ||



Shree Kshethra Dharmasthala

**Edition Year : 2023-24**

**Shri Dharmasthala Manjunatheshwara University,**

Manjushree Nagar, Sattur, Dharwad - 580 009, Karnataka, India

Phone: 0836-2321127

email: [sdmuo@sdmuniversity.edu.in](mailto:sdmuo@sdmuniversity.edu.in)


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Shri Dharmasthala Manjunatheshwara University

6<sup>th</sup> Floor, Manjushree Block SDM Medical College Campus

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## THE LOGO

Poojya Dr D. Veerendra Heggade, Hon'ble Chancellor of the University, while searching for an appropriate Logo for the University, saw a photograph picked from Temple Architecture showing Wings of a Bird, sculpted in Indian style and wanted it to be incorporated in the logo for the University, as the Wings symbolize 'Spreading of Knowledge beyond Boundaries'. Further it was felt that the Central theme of the logo should be 'Rudra' (The Linga) with three wings on each side. In this way, the logo of the University was conceptualized.

Hence:

1. The central part represents **Rudra** who Demolishes Darkness.
2. The Three **horizontal lines on The Linga** stand for Samyak Darshan (Right Belief), Samyak Gyan (Right Knowledge) and Samyak Charitra (Right Conduct).
3. The **Wings** symbolize spreading of Knowledge across the boundaries.
4. Base line "**Truth Liberates**" highlights the Purpose of Education: to liberate oneself unconditionally. It shows that it is not discipline, nor knowledge nor the efforts to freedom that liberate but Truth is what liberates you from all your conditioning and ignorance.

The overall significance of Shri Dharmasthala Manjunatheshwara University's Logo is:

**Darkness of ignorance is destroyed by the flow of knowledge to bring Liberty to everyone, by realizing the truth. And, it should spread globally without the boundaries as hindrance.**



SHRI  
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UNIVERSITY

## VISION

Shri Dharmasthala Manjunatheshwara University will set the highest standards of teaching and learning by awakening the intelligence of the students and nurturing the creativity hidden in them by creating an environment where the ancient wisdom blends with modern science, to transform them into whole human beings to face the challenges.

## MISSION

- ▶ To ensure that the journey of education is inspiring, pleasant and enjoyable.
- ▶ Attract the best of teachers and students.
- ▶ Achieve high principles of trust, love and spirituality in the students.
- ▶ Create a collaborative, diverse and exclusive community.
- ▶ Transform the student of today to be a leader of tomorrow and a better human being.
- ▶ Produce passionate teachers.
- ▶ Evolve innovative teaching techniques.
- ▶ Create a peaceful environment.
- ▶ Prepare the student to face the social challenges.
- ▶ Create a University of which the Nation is proud of.
- ▶ Be an effective partner in Nation Building.
- ▶ Create an Eco-friendly University.
- ▶ Create a University based on the principles of beauty, love and justice.

||Om Shanti! Om Shanti! Om Shanti||



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UNIVERSITY

6<sup>th</sup> floor, Manjushree Building, SDM College of Medical  
Sciences & Hospital Campus, Sattur, Dharwad - 580009  
Tel. No : +91 836 2477511, 2321115, 2321117  
Fax: +91836 2463400  
Email: registrar@sdmuniversity.edu.in

SDMU/ACD/ALLIED/Notif-322/377/2023

Date: 27.06.2023

## NOTIFICATION

### Ordinance Governing Curricula of Bachelor in Audiology and Speech Language Pathology (B. ASLP)

Ref: 1. Minutes of the 7<sup>th</sup> Meeting of Academic Council held on 16<sup>th</sup> June 2023

In exercise of the powers conferred under Statutes 1.4 (Powers and functions - Para ix & x) of Shri Dharmasthala Manjunatheshwara University, the Academic Council is pleased to approve and notify the Ordinance governing the Curricula of **Bachelor in Audiology and Speech Language Pathology (B. ASLP)** with effect from the date of notification.

Dr. Chidendra M. Shettar

REGISTRAR  
REGISTRAR

Shri Dharmasthala Manjunatheshwara  
University, Dharwad

To: 1. The Principal, SDM College of Medical Sciences & Hospital  
2. Coordinator - Medical Allied Health Sciences, SDM College of Medical Sciences & Hospital,  
Dharwad

Copy for kind information to:

1. Hon'ble Vice Chancellor - Shri Dharmasthala Manjunatheshwara University
2. Pro Vice Chancellor (Academics) - Shri Dharmasthala Manjunatheshwara University
3. Controller of Examinations - Shri Dharmasthala Manjunatheshwara University
4. Coordinator - Medical Allied Sciences, SDM College of Medical Sciences & Hospital, Dharwad
5. Office of the Registrar
6. University Office for Records File & Website



**BACHELOR IN AUDIOLOGY AND SPEECH- LANGUAGE PATHOLOGY  
(B. ASLP)**

**REGULATIONS AND SYLLABUS**

**Effective from Academic Session 2023-24  
Four Years Duration  
(Including internship)**

**DEPARTMENT OF SPEECH AND HEARING**

**\*Adapted from Rehabilitation Council of India  
(A statutory body under Ministry of Social Justice and Empowerment, New Delhi)**

**Program Title:** Bachelor in Audiology and Speech-Language Pathology (B. ASLP)

**Duration:** The course shall be of 06+02 semesters (06 Semesters course work + 2 Semesters of internship). Commencement of the course as per the rules of SDM University

**Mode of study:** Full Time Program

**Validating Body:** SDM University



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## **1.0 Nomenclature**

As per UGC Notification of 2014, the nomenclature of the program shall be Bachelor in Audiology and Speech-Language Pathology. B. ASLP is the short form.

## **2.0 Objectives of the B. ASLP program**

The objectives of the B. ASLP program are

- To equip the students with knowledge and skills to function as audiologists and speech-language pathologists in different work settings
- To understand concepts in speech, language, communication, hearing and disability
- To screen, evaluate, diagnose and assess the severity of different disorders related to speech, language, swallowing and hearing
- To manage speech, language, swallowing and hearing disorders across life span
- To counsel persons with disorders of communication and their family members
- To rehabilitate persons with speech, language, swallowing and hearing disorders
- To prevent speech, language, swallowing and hearing disorders
- To liaise with professionals in allied fields and other stakeholders
- To implement public awareness and education program
- To undertake advocacy measures on behalf of and for persons with speech-language and hearing disorders

## **3.0 Duration of the program**

- The program shall be of 4 academic years, including 1 year of internship
- The course must be completed within six years from the date of admission.
- An academic year consists of two semesters, and each semester shall extend over a minimum period of sixteen weeks excluding examination days.
- The semesters will be spread out according to academic calendar of the university
- There shall be examinations at the end of each semester.
- There shall be a vacation of a minimum of 1 week after the examinations at the end of odd semesters and 2 weeks after the examinations at the end of even semesters.

#### 4.0 Eligibility for admission

- i. The Candidates applying for the B. ASLP program should have passed 10+2 or an equivalent examination from a recognized Board with a minimum of 50% aggregate marks. Relaxation in the qualifying marks shall be as per the rules and regulations of the University/ State/ Central government.
- ii. The applicant/candidate should have studied Physics, Chemistry, and any one of the subjects: Biology / Mathematics / Computer Science / Statistics / Electronics / Psychology.
- iii. At the time of entry/admission to the first-semester B. ASLP course, the candidate should be of age 17 years and there is no upper age limit for admission.

#### 5.0 Program Structure

Time structure of the program shall be as follows:

16 Weeks/ Semester	16 Weeks
6 Days/ Week	96 Days
7 hours / day	672 hours per semester

Semester 1	Theory	6 papers x 60 hours (60 hours for each paper)	360 hours
	Clinical		200 hours
Semester 2	Theory	4 papers x 60 hours	240 hours
	Clinical		320 hours
Semester 3	Theory	4 papers x 60 hours	240 hours
	Clinicals		320 hours
Semester 4	Theory	5 papers x 60 hours	300 hours
	Clinicals		320 hours
Semester 5	Theory	4 papers x 60 hours	240 hours
	Clinicals		320 hours
Semester 6	Theory	4 papers x 60 hours	240 hours
	Clinicals		320 hours
Theory		360 +300+ (240 x 4)	1620 hours
Clinicals		200+320 + (320 x 4)	1800 hours

	Sub total		3420 hours
Total	6 Semesters 630 x 6 Semesters		3780 hours
	Balance (Will be used for various academic purposes)		360 hours
Internship	20 weeks per semester		40 Weeks
	6 Days/ Week		240 Days
	7 Hours / Day		1680 Hours
Total	Theory	6 Semesters	1620 Hours
Total	Clinicals	6 Semesters + Internship	3300 Hours
<b>Grand Total</b>			<b>5100 Hours</b>

## 6.0 Attendance

- Minimum attendance shall be as stipulated by the SDM University. Attendance shall not be less than 80% in theory and 90% in Clinical/ Practical's in each semester to be eligible to appear for examination at the end of each semester. The 20% and 10% leverage is inclusive of medical, personal and miscellaneous leaves.
- Students who fail to have a minimum of 90% attendance in clinical/practicals in each semester will have to carry out compensation until the criteria is met.
- Candidates who cannot appear for the examination for want of attendance will be declared as failed and will have to repeat the particular semester to be eligible to appear for exams subsequently.
- Condonation of shortage of attendance in genuine cases shall be subject to approval from the Vice- Chancellor of SDM University.

## 7.0 Examination Pattern

7.1 The examination pattern and papers shall be as shown in the table below:

No.	Title of the paper	Practical IA	Theory IA	End Semester Exam	Total
<b>Semester 1</b>					
<b>Theory</b>					
B 1.1	Communication Sciences	--	25	75	100
B 1.2	Anatomy and Physiology of Speech and Hearing	--	25	75	100
B 1.3	Clinical Psychology	--	25	75	100
B 1.4	Linguistics and Phonetics	--	25	75	100
B 1.5	Electronics and Acoustics	--	25	75	100
B 1.6	Pediatrics & Genetics	--	25	75	100
				<b>Total</b>	<b>600</b>

<b>Semester 2</b>					
<b>Theory</b>					
<b>No.</b>	<b>Title of the paper</b>	<b>Practical</b>	<b>IA</b>	<b>End Semester Exam</b>	<b>Total</b>
B 2.1	Speech-Language Pathology	--	25	75	100
B 2.2	Audiology	--	25	75	100
B 2.3	Neurology	--	25	75	100
B 2.4	Otolaryngology	--	25	75	100
<b>Clinical Viva</b>					
		<b>Internal Viva</b>	<b>External Viva</b>		
B 2.5	Clinicals (Speech-language Pathology)	25	75		100
B 2.6	Clinicals (Audiology)	25	75		100
<b>Total</b>					<b>600</b>
<b>Semester 3</b>					
<b>No.</b>	<b>Title of the paper</b>	<b>Practical IA</b>	<b>Theory IA</b>	<b>End Semester Exam</b>	<b>Total</b>
B 3.1	Voice and its Disorders	25	25	50	100
B 3.2	Speech Sound Disorders	25	25	50	100
B 3.3	Diagnostic Audiology - Behavioral Tests	25	25	50	100
B 3.4	Amplification Devices	25	25	50	100
<b>Clinical Viva</b>					
		<b>Internal Viva</b>			
B 3.5	Clinicals in Speech-Language Pathology			100	100
B 3.6	Clinicals in Audiology			100	100
<b>Total</b>					<b>600</b>
<b>Semester 4</b>					
<b>Theory</b>					
<b>No.</b>	<b>Title of the paper</b>	<b>Practical IA</b>	<b>Theory IA</b>	<b>End Semester Exam</b>	<b>Total</b>
B 4.1	Motor Speech Disorders in Children	25	25	50	100
B 4.2	Child Language Disorders	25	25	50	100

B 4.3	Diagnostic Audiology - Physiological Tests	25	25	50	100
B 4.4	Implantable Hearing Devices	25	25	50	100
B 4.5	Research Methods and Statistics	-	25	75	100
<b>Viva</b>					
		<b>Internal Viva</b>	<b>External Viva</b>		
B 4.6	Clinicals in Speech-Language Pathology	25	75		100
B 4.7	Clinicals in Audiology	25	75		100
				<b>Total</b>	<b>700</b>
<b>Semester 5</b>					
<b>Theory</b>					
No.	Title of the paper	Practical IA	Theory IA	Theory II	Total
				Semester Exam	
B 5.1	Structural Anomalies & Speech Disorders	25	25	50	100
B 5.2	Fluency and its Disorders	25	25	50	100
B 5.3	Pediatric Audiology	25	25	50	100
B 5.4	Aural Rehabilitation in Children	25	25	50	100
<b>Clinical Viva</b>					
		<b>Internal Viva</b>			
B 5.5	Clinicals in Speech-Language Pathology	100			100
B 5.6	Clinicals in Audiology	100			100
				<b>Total</b>	<b>600</b>
<b>Semester 6</b>					
<b>Theory</b>					
No.	Title of the paper	Practical IA	Theory IA	End Semester Exam	Total
B 6.1	Motor Speech Disorders in Adults	25	25	50	100

B 6.2	Language Disorders in adults	25	25	50	100
B 6.3	Aural Rehabilitation in Adults	25	25	50	100
B 6.4	Audiology in Practice	25	25	50	100
<b>Clinical Viva</b>					
		<b>Internal Viva</b>	<b>External Viva</b>		
B 6.5	Clinicals in Speech-Language Pathology	25	75		100
B 6.6	Clinicals in Audiology	25	75		100
				<b>Total</b>	<b>600</b>
<b>Internship</b>					
<b>Semester 7</b>					
<b>Clinical Viva/ Practical Examination (Internal)</b>					
		<b>Viva/ Practical Examination</b>			<b>Total</b>
B 7.1	Clinicals in Speech-Language Pathology	50			50
B 7.2	Clinicals in Audiology	50			50
		<b>Total</b>	<b>100</b>		<b>100</b>
<b>Semester 8</b>					
<b>Clinical Viva/ Practical Examination (External)</b>					
B 8.1	Clinicals in Speech-Language Pathology	50			50
B 8.2	Clinicals in Audiology	50			50
		<b>Total</b>	<b>100</b>		<b>100</b>
		<b>Grand Total</b>	<b>200</b>		<b>200</b>

<b>Clinical/ Practical marks</b>	<b>IA Theory</b>	<b>IA Viva</b>	<b>External Viva</b>	<b>Theory Exam</b>	<b>Intern ship</b>	<b>Total Marks</b>
<b>400</b>	<b>675</b>	<b>550</b>	<b>1625</b>	<b>450</b>	<b>200</b>	<b>3900</b>

## 8.0 Assessment Criteria

### 8.1 Practical

Practical marks will be provided based on continuous case-based assessments of students by the core faculties of the department. The examiners shall also evaluate the record of practicals maintained by the students. Practical marks will be given only for core subjects and no other allied subjects. Students will be assessed out of 25 marks for each core subject from 3<sup>rd</sup> semester onwards.

<b>Component</b>	<b>Marks</b>
Participation	05
Report Submission	10
Assessment	10
<b>Total Internal Practical marks</b>	<b>25</b>

### 8.2 Internal Assessment (Theory)

The department's core faculty will carry out all internal assessments (Theory). An aggregate of three written tests and at least one group assignment shall be the basis for awarding internal assessment marks each semester.

<b>Component</b>	<b>Marks</b>
Sessional examination (Average marks obtained in three sessional exams. Normalized to 25)	25
<b>Total Internal Practical marks</b>	<b>25</b>

### 8.3. Internal Assessment (Viva)

The department's core faculty will carry out all internal assessments (Viva). Clinical viva and case-based assessment will be carried out at the end of each semester and will be the basis for awarding the marks. Internal Viva will be conducted for 100 marks in the odd semesters (3 and 5) and 25 marks in the even semesters (2, 4 and 6). The internal Viva in even semesters will be carried before the external viva.



<b>Component (Continuous assessment)</b>	<b>Marks (Odd Semesters)</b>	<b>Marks (Even Semester)</b>
Participation	25	05
Clinical Practicum	25	10
Clinical Competency	50	10
<b>Total Internal Viva marks</b>	<b>100</b>	<b>25</b>

#### **8.4. External Viva**

External Viva will be conducted by one internal examiner and one external examiner in even semesters. 25 marks will be awarded by the internal examiner and 75 marks will be awarded by the external examiner. The marks will be awarded based on the clinical competency of the student.

#### **8.5 Theory examination**

According to the academic calendar, theory examination will be conducted at the university level. The examination will be for 3 hours for a course carrying 75 marks and 2 hours for a course carrying 50 marks. Equal representation in each unit with two questions from each unit with “or” choices will be given in the theory examination.

**8.6** Course content shall be as in Annexure 1.

#### **9.0 Criteria for passing**

The student is required to obtain a minimum of 40% in each course. Students cannot appear for the university theory exam if they do not pass their practical exam. Students cannot appear for the university theory exam if they do not pass their internal assessment of both theory and viva. Students will have to pass the clinical viva of the given semester to proceed to the next semester.

Students should obtain an aggregate of 40% to be declared as ‘passed’ in each course.

## **10. Carry-over of papers**

- Each paper should be completed within 3 attempts including the first one.
- There is no limit to the number of theory papers that can be carried over to the next semester
- The candidate should have cleared all papers before starting internship
- It is mandatory to clear clinical viva at the end of each semester to be able to start the next semester. If students fail in clinical viva, they cannot proceed to the next semester/year.
- Students are eligible to appear for 8.1 and 8.2 examinations only after successfully completing all theory, practical, and clinical examinations of all semesters, including the sixth semester, and internship posting.
- All the semesters and internships should be successfully completed within 6 years from the date of admission.
- Students can start internships after the declaration of results of the 6th semester examinations. Students must pass the sixth semester clinical viva to start the internship.
- Students who fail in theory exams can repeat that specific paper(s) during the following semester. E.g.: If a student fails in a subject(s) during the 1<sup>st</sup> semester, he/she will be allowed to repeat the paper in 2<sup>nd</sup> semester along with the other papers of that semester. If the student fails a paper even on the second attempt, one last attempt is provided in the following semester. A maximum of 3 attempts will be provided for every paper. However, if a student fails the theory exam of the 5th and/or 6th semester, he/she has to reappear for the specific papers in the following semester exam cycle and must clear all the papers to become eligible for an internship.
- Students who are reappearing for the exams should pay the university exam fees. The marks obtained in the previous internal assessments will be considered without reassessment. There will be no provision for a makeup exam during the entire course.

### **11.0 Clinical internship**

All candidates shall complete a clinical internship of one academic year divided into two semesters (10 months) after the 6th semester. The rules and regulations of clinical internship shall be as in Annexure 2.

## **12.0 Award of Degree**

The University shall award the degree and issue a certificate only after the candidates successfully complete all the University examinations and clinical internships.

## **13.0 Others**

On all other issues not mentioned in these rules and regulations like the pattern of question paper, grading, award of grace marks, and declaration of rank, among others, the rules and regulations of the SDM University shall prevail.

## Annexure 2

### **Guidelines for implementation of Clinical Internship of B. ASLP program with effect from the academic session 2017-18**

#### **Objectives of the clinical internship are to:**

- Facilitate the transition from academic training to independent clinical responsibility
- Provide additional inputs to attain and maintain competence in the clinical management of persons with communication disorders,
- Initiate group and individual action focusing on prevention/early identification and intervention in individuals with speech, hearing and language impairments at the level of the individual, family and community, and
- Provide training to understand professional responsibilities and ethical practices including:
  - i) Rights and dignity of patients.
  - ii) Consultation and referral to other professionals.
  - iii) Conduct and professional obligations to peers/patients/families and the community at large.

#### **Guidelines**

- Internship is mandatory
- Duration: One academic year (10 months) split into two semesters (VII & VIII).
- Eligibility: Students can start an internship after the declaration of results of the 6<sup>th</sup> semester examinations. Students must pass the sixth semester clinical examination to start the internship. The candidates are NOT permitted to carry over the theory papers of any previous semester into the internship posting. The student should have passed all theory and practical/viva examinations of the previous six semesters to become eligible for the internship program.
- Students are eligible to appear for 8.1 and 8.2 examinations only after successful completion of all theory, practical, and clinical examinations of all semesters, including the sixth semester, as well as 10 months of internship posting. All the semesters and internship should be successfully completed in 6 years from the date of admission.

### **Structure and duration of posting**

- The respective parent institutions shall decide on the institutions where their students will be posted for internship. However, students can be posted for internship only at those institutions approved by the Rehabilitation Council of India.
- Students will intern at their parent institute for one semester and at an institute(s) outside the parent institute for one semester. Internships can be done at institutes like hospitals, special educational centers/schools, centers where clinical facilities for the management of ASD, cochlear implantation, AVT, etc. are available, centers that undertake empowering of mothers, centers for CP, and centers for LD, etc. Attempts must be made to provide clinical training to students in various setups.
- It shall be mandatory to provide additional clinical training to students in such areas as management of neurologically afflicted persons, prevention and early intervention programs, community-based rehabilitation, occupational health programs, structural abnormalities related to speech and hearing, etc.

### **Mode of supervision during internship:**

A Speech-language Pathologist and Audiologist should generally provide supervision. However, in institutes/centers where this is not feasible, supervision can be done by a specialist from an allied area like Otolaryngology, Neurology, Mental Health, and Pediatrics, among others.

### **Maintenance of records by students:**

Every student shall maintain records of the number of hours of clinical work in different areas and institutions. This should be certified by the head of the institution or his/her nominee where the student is undergoing an internship.

### **Leave:**

Candidates should have an attendance of at least 90% during the internship period. Internship shall be extended by the number of days the student falls short of 90% attendance. Compensatory work for the shortage of attendance must be completed before the final clinical exams of the 8th semester. The candidate should ensure that the internship posting should be completed within the maximum permissible duration for completion of the course.

### **Stipend:**

As per the norms of the parent institute.

**Grading and evaluation of students:**

All internees will be assessed based on their attendance, performance in the postings and presentation of log books. The institute will prescribe the mode of assessment and frequency of assessment. The student is required to repeat those particular postings in which his/her performance is below 50%.

**Certification:**

The parent institute will award a certificate after completing the internship and clinical examination successfully. Supervised clinical hours spent during the internship shall be included in the clinical competence certificate issued to students.

The University shall award the degree only after the successful completion of the clinical internship.

## **Annexure 1**

### **Course Content**

### **Semester I**

### **B 1.1 Communication Sciences**

Hour – 60

Marks -100

**Objectives:** After completing this course,

The student will be able to understand the basic concepts in speech, hearing, language and communication basic concepts of hearing sensitivity and acoustics.

### **Part A: Speech-Language Pathology**

#### **Unit 1: Speech, language and communication**

- a) Definitions of speech, language, communication, and their components
- b) Distinctions, similarities and functions of communication, speech and language
- c) Speech as an overlaid function
- d) Speech chain
- e) Normal development of speech & language
- f) Pre-requisites and factors affecting speech-language development
- g) Cultural and linguistic issues in communication; bi/multilingual issues

#### **Unit 2: Bases of speech and language**

- a) Overview of speech production – speech sub-systems
- b) Speech mechanism as a sound generator, vocal tract, periodic and aperiodic sounds
- c) Acoustic theory of speech production
- d) Social, cognitive, neurological, and genetic bases of speech and language

## **Part B: Audiology**

### **Unit 3: Sound intensity and concept of decibel**

- a) Acoustic energy and power, absolute and relative units – importance of reference sound intensity and intensity levels – absolute and relative measurements
- b) Bel and decibels, sound pressure and decibel sound pressure levels, relationship between intensity and pressure characteristics and application of decibels

### **Unit 4: Audibility & hearing**

- a. Hearing range – intensity and frequency
- b. Up-down and staircase procedure of estimating minimum audible levels  
Minimum audible pressure and field, Missing 6 dB and related issues
- c. Reference equivalent threshold sound pressure levels and hearing levels  
Sensation levels, Threshold of pain, most comfortable levels

### **Unit 5: Introduction to Audiology and Speech-language Pathology**

#### **Part A: Speech and language**

- a) Historical aspects of the field of speech-language pathology
- b) Development of speech and language pathology: Indian and global context
- c) Scope of practice in speech-language pathology
- d) Interdisciplinary nature of speech-language pathology

#### **Part B: Audiology**

- a) Audiology – historical aspects, development of instrumentation in audiology  
Development of audiology: Indian and global context
- b) Branches of audiology
- c) Scope of audiology



## Recommended Reading

- a) Bordon, G J., Harris, K S., & Raphael, L J. (2006). Speech science primer: Physiology, acoustics, & perception of speech. Lippincott-Williams & Wilkins.
- b) Subba Rao, T A. (1992). Manual for developing communication skills. NIMH. ISBN:81-86594-03-5
- c) Speaks, C. E. (1999). Introduction to Sound: Acoustics for the Hearing and Speech Sciences (3 edition). San Diego: Cengage Learning.
- d) Martin, F. N., & Clark, J. G. (2014). Introduction to Audiology (12 edition). Boston:Pearson.
- e) Gelfand, S. A. (2009). Hearing: An Introduction to Psychological and Physiological Acoustics (5 edition). London: CRC Press.
- f) Khara L. Pence, T., Laura M. & Justice (2011). Language Development: From Theory to Practice (2nd Ed.), Allyn & Bacon Communication Sciences and Disorders  
Webb, W. G., & Adler, R. K. (2008). Neurology for the speech-language pathologist (5th ed.). St. Louis, Mo: Mosby/Elsevier.

## **B 1.2 Anatomy and Physiology of Speech and Hearing**

Hours – 60

Marks - 100

**Objectives:** After completing this course, the student will be able to understand the

- Anatomy of the auditory system
- Anatomy of the speech mechanism
- Physiology of hearing mechanism
- Functioning of speech and swallowing mechanism

### **Unit 1: Introduction**

- a) General anatomical terms
- b) Anatomical positions and planes of reference
- c) Cells, tissues and muscles
- d) Muscle connection and joints tissue - vascular and neural

### **Unit 2: Embryology**

- a) Basic terminologies related to embryology
- b) Development of external ear
- c) Development of middle ear
- d) Development of Inner ear and the auditory system
- e) Five examples of embryonic anomalies affecting speech-language & hearing
- f) Development of respiratory structures
- g) Development of larynx
- h) Development of facial region and palate
- i) Development of tongue and teeth

### **Unit 3: Anatomy and physiology of speech production systems and swallowing**

- a) Mechanisms of breathing with emphasis on speech breathing
- b) Supportive frame work of larynx
- c) Anatomy of larynx
- d) Anatomy of esophagus
- e) Brief mechanisms of swallowing
- f) Mechanisms of phonation
- g) Anatomy of articulators and associated structures
- h) Contribution of articulatory structures to speech production
- i) Anatomy of resonatory mechanisms
- j) Contribution of resonatory mechanisms to speech production

#### **Unit 4: Anatomy and physiology of external and middle ear**

- a) Anatomy of the external ear
- b) Physiology of external ear including localization
- c) Head shadow effect, inter-aural intensity and time differences
- d) Brief anatomy of temporal bone
- e) Anatomy of tympanic membrane and associate structures
- f) Anatomy of middle ear and ossicles
- g) Anatomy of Eustachian tube and middle ear muscles
- h) Physiology of Eustachian tube
- i) Middle ear transformer action
- j) Physiology of middle ear muscles

#### **Unit 5: Anatomy and physiology of labyrinth**

- a) Anatomy of bony and membranous labyrinth
- b) Macro anatomy of cochlea
- c) Micro anatomy of cochlea
- d) Innervations and blood supply to cochlea
- e) Overview of theories of hearing
- f) Physiology of cochlea
- g) Electrical potentials of the cochlea
- h) Physiology of hearing through bone conduction
- i) Overview to physiology of balancing mechanisms
- j) Overview to anatomy of central auditory pathway
- k) Overview to central auditory mechanism

#### **Recommended Reading**

- a) Seikel, J. A., King, D. W., & Drumright, D. G. (2010). *Anatomy & Physiology for Speech, Language, and Hearing* (4th edition). Delmar, Ceenage Learning, Division of Thomson Learning. NY.
- b) Zemlin, W. R. (2010). *Speech and Hearing Science: Anatomy and Physiology:International Edition* (4 edition.). Boston: Pearson.
- c) Chaurasia, B.D (2004). *Human Anatomy, vol 3. Head Neck and Brain* 4 th Eds, CBSPublishers and Distributors, New Delhi. ISBN 81-239-1157-2.
- d) Kelley, M., Wu, D., & Fay, R. R. (Eds.). (2005). *Development of the Inner Ear* (2005edition.). New York: Springer.

## **B 1.3 Clinical Psychology**

Hour – 60

Marks -100

### **Objectives:**

After completing this course, the student will be able to understand the

- Scope of Clinical psychology and its significance for speech and hearing
- Concept of normality, abnormality and classification of abnormal behavior
- Cognitive, motor, emotional and social development
- Theories of learning and therapy techniques based on learning principles
- Neuropsychological assessment and rehabilitation
- Application of neuropsychology in the field of speech and hearing
- Basics of counseling

### **Unit 1: Introduction to psychology**

- a) Introduction to psychology: definition, history and schools of psychology
- b) Scope of psychology
- c) Meaning and definition of clinical psychology
- d) Historical development, modern clinical psychology
- e) Significance of clinical psychology in health sciences
- f) Role of clinical psychology in speech and hearing
- g) Concept of normality
- h) Concept of abnormality
- i) Models of mental disorders: biological, psychological social models

### **Unit 2: Assessment procedures in clinical psychology**

- a) Methods in clinical psychology: case history, clinical interviewing, clinical observation, definition and types of psychological testing
- b) Assessment of cognitive functions
- c) Adaptive functions,
- d) Personality Behavioural assessment
- e) Classification of abnormal behavior History, need & rationale of classification
- f) Current classificatory system: DSM, ICD

### **Unit 3: Developmental psychology**

- a) Child and developmental psychology: meaning, definition and scope
- b) Meaning of growth, development & maturation
- c) Principles of child development
- d) Motor development: general principals of motor development
- e) Stages in motor development: early motor development, motor development during later childhood and adolescence, decline with age
- f) Cognitive development: growth from early childhood to adolescence
- g) Piaget's theory of cognitive development
- h) Emotional development
- i) Social development

### **Unit 4: Principles of learning and behaviour modification**

- a) Learning: meaning, definition and characteristics
- b) Theories of learning: introduction
- c) Pavlov's classical conditioning: experiments and principles
- d) Skinner's operant conditioning: experiments and principles
- e) Therapeutic techniques based on learning principles
- f) Skill behavior techniques
- g) Problem behavior techniques

### **Unit 5: Neuropsychology and its relevance to study of speech**

- a) Neuropsychology: introduction and definition
- b) Neuropsychological assessment
- c) Neuropsychological rehabilitation
- d) Application of neuropsychology in the field of speech and hearing counselling: introduction and definition
- e) Types of counselling: directive and non- directive
- f) Characteristics of a good counselor

## Recommended Reading

- a) Morgon C.T., King R.A., Robinson N.M. Introduction to Psychology. Tata McGrawHill Publishing Co.
- b) Anastasi, A. (1999). Psychological testing, London: Freeman
- c) Baura, M (2004). Human Development and Psychology, Rehabilitation Council of India, New Delhi. ISBN: 81-7391-868-6
- d) Coleman J.C. Abnormal Psychology and Modern Life, Taraporevala Sons & Co. Gregory, R.J. (2000). Neuropsychological and geriatric assessment in Psychological Testing: History, Principles, and Applications (3rd ed.). New York: Allyn & Bacon. Hurlock, E.B. (1981). Child development. (VI Ed.). McGraw Hill International BookCo.
- e) Kline, P. (1993). The Handbook of Psychological Testing. Routledge
- f) Lezak, M., Loring, D.W., and Hannay, H.J. (2004). Neuropsychological Assessment. Fourth Edition. New York: Oxford University Press
- g) Siegal M.G. (Ed). (1987). Psychological Testing from Early Childhood Through Adolescence. International Universities Press

## B 1.4 Linguistics and Phonetics

Hour – 60

Marks -100

**Objectives:** After completing this course, the student will be able to understand

- Different branches and aspects of linguistics
- Characteristics and functions of language
- Different branches of phonetics, applied linguistics, and phonology morphology, syntax, semantics, and pragmatics
- Acquisition of language and factors affecting it bi/multilingualism and related issues

### Unit 1: Linguistics

- a) Introduction to linguistics and different branches of linguistics: applied linguistics, sociolinguistics, psycholinguistics, metalinguistics, neurolinguistics and clinical linguistics
- b) Language characteristics and functions, difference between animal communication systems and human language
- c) Morphology – concepts of morph, allomorph, morpheme, bound free and compound forms, roots etc.
- d) Processes of word formation, content and function words
- e) Endocentric and exocentric constructions, form classes, grammatical categories Inflection and derivation, paradigmatic and syntagmatic relationship
- f) Principles and practices of morphemic analysis
- g) Langue versus parole
- h) Competence vs. performance

### Unit 2: Phonetics and Phonology

- a) Introduction to phonetics
- b) Articulatory, acoustic, auditory and experimental phonetics – an introduction
- c) Articulatory classification of sounds – segmental and supra-segmental
- d) Classification description and recognition of vowels and consonants
- e) Pathological aspects of speech sound production
- f) Transcription systems with special emphasis on IPA. Transcription of samples of normal and disordered speech
- g) Introduction to phonology, classification of speech sounds on the basis of distinctive features and phonotactics
- h) Application of distinctive feature theory to speech pathology and speech therapy, phonotactics, phonotactic patterns of English and Indian languages

- i) Phonemic analysis – Principles and practices; their practical implications for speech pathologists
- j) Common phonological processes - assimilation, dissimilation, metathesis, haplology, epenthesis, spoonerism, vowel harmony, nasalization, neutralization.

### **Unit 3: Morphology, syntax, semantics and applied linguistics**

- a) Morphology – concepts of morph, allomorph, morpheme, roots, compound forms - endocentric and exocentric constructions, free and bound morphemes, inflection and derivation, principles and practices of morphemic analysis
- b) Syntax – different methods of syntactic analysis
- c) IC analysis, phrase structure, grammar, transformational generative grammar Introduction to the major types of transformations
- d) Sentence types, notions about competence versus performance; Deep structure versus surface structure, Acceptability versus grammaticality; language versus parole etc.
- e) A brief introduction to semantics – semantic feature theory, pragmatics
- f) Processes of word formation, content and function words, form classes, grammatical categories
- g) Syntax – concepts of phrases and clauses, sentence and its types
- h) Different methods of syntactic analysis – Immediate constituent analysis, Phrase structure, grammar, transformational generative grammar– deep structure versus surface structure, acceptability versus grammaticality; Introduction to the major types of transformations
- i) Usefulness of morphemic and syntactic analysis in planning speech and language therapy
- j) A brief introduction to semantics, semantic relations, semantic feature theory
- k) A brief introduction to pragmatics and discourse.

### **Unit 4: Language acquisition**

- a) Issues in first language acquisition Pre-linguistic stages, linguistic stages
- b) Acquisition of phonology, morphology, syntax, semantics, and pragmatics
- c) Language and cognition
- d) A brief introduction to theories and models of language acquisition
- e) Biological maturation theory, linguistic theory, behavioral theory, information processing theory, social interaction theory
- f) An integrated approach to theories communicative competence and its development
- g) Applied linguistics with special reference to communication disorders
- h) Usefulness of morphemic and syntactic analysis in planning speech and language therapy



## **Unit 5: Bi/multilingualism**

- a) Introduction to the language families of the world and India
- b) Issues related to second language acquisition & factors influencing it Inter-language theory, language transfer and linguistic interference
- c) Differences between first and second language acquisition/learning
- d) Bilingualism/Multilingualism
- e) Metaphonology
- f) Writing systems – types of writing History of writing systems
- g) Indian writing systems

## **Recommended Reading**

- a) Ball & Martin (1995). Phonetics for speech pathology. Delhi: AITBS Publishes, India.
- b) Ball, Rahilly&Tench (1996). The phonetic transcription of disordered speech. San Diego: Singular Publishing Group Inc.
- c) Clark and Yallop (1999). An introduction to phonetics and phonology. Oxford: Blackwell Publishes Inc.
- d) Karanth, P (2003). Cross-Linguistic study of Acquired Reading Disorders. Sage Publications, New Delhi. ISBN : 0-306-48319-X
- e) Ladefoged, P. (1982). A course in phonetics. New York: Harcourt Brace Jovanovich Inc.
- f) Shriberg & Kent (1982). Clinical phonetics. New York: John Wiley & Sons.

## B 1.5 Electronics and Acoustics

Hours - 60  
100

Marks -

**Objectives:** After completing this course, the student will be able to understand

- The concept and types of power supply for biomedical instruments
- Basic aspects of digital signal processing theoretical
- Basis of acoustics required for audiologists functioning of computers and computing systems

### Unit 1: Electronic components and power supply

- a) Resistors, capacitors, inductors Transformers and potentiometers, Semiconductor diodes and transistors
- b) Light emitting devices, seven segment displays, Liquid crystal displays
- c) Principles of operations and working of Field Effect Transistors, Uni-junction transistors and thyristors
- d) Introduction to linear and digital integrated circuits, Block diagram of a DC power supply
- e) Linear regulated power supplies, line regulation and load regulation, specifications of a DC power supply unit, Switched Mode Power Supply
- f) AC power supply, stabilizers, Uninterrupted Power Supply, and inverters Basic electronic concepts such as Polarity, Grounding

### Unit 2: Introduction to acoustics

- a) Vibrations and their characteristics
- b) Sound - generation and propagation
- c) Characteristics of sound
- d) Amplitude, frequency and phase of complex tones (FFT and spectrum, relationship between time waveform, FFT and impulse response)
- e) Reflection and absorption, acoustic impedance, reverberation
- f) Impedance and admittance
- g) Electro-mechano-acoustic transformers

### **Unit 3: Acoustical treatment, transducers and basics of computers**

- a) Introduction to audiometric rooms : Absorption coefficient, Sabine's formula
- b) Materials for construction of audiometric rooms
- c) Lighting, grounding and other miscellaneous issues related to audiometric rooms
- d) Evaluation of efficiency of sound proofing in the audiometric rooms
- e) Amplifiers
- f) Microphones, loudspeakers - types and function
- g) Fundamentals of digital electronics, binary number system, Hex code, bit, byte, logic gates, counters, flip-flops etc.
- h) Introduction to computers
- i) Operating systems, hard ware, software, memory devices and other peripherals, care and preventive maintenance of computers

### **Unit 4: Signal processing**

- a) Digital signal processing –introduction and need Analog to digital converters, sampling and quantization
- b) Fundamentals of digital filtering
- c) Infinite impulse response and finite impulse response filters
- d) Time domain methods of speech processing
- e) Frequency domain methods of speech processing
- f) Linear predictive analysis of speech signals
- g) Digital coding of speech signals
- h) Automatic speech recognition Speech synthesis

### **Unit 5: Instrumentation in speech and hearing**

- a) Introduction to electronic instrumentation in speech and hearing Electrodes, filters and preamplifiers
- b) Principle of operations, block diagram, calibration, maintenance and troubleshooting of audiometers, immittance meters, oto-acoustic emissions, hearing aids, evoked potential system, speech and voice analyses systems, artificial larynx, electroglottograph

## **Recommended Reading**

- a) Haughton, P., & Haughton, P. M. (2002). Acoustics for Audiologists (1st edition.). San Diego, Calif: Emerald Group Publishing Limited.
- b) Moser, P. (2015). Electronics and Instrumentation for Audiologists. Psychology Press.
- c) Moser, P. J. (2013). Electronics and Instrumentation for Audiologists. Psychology Press.
- d) Rout, N and Rajendran, S. (2014). Hearing aid trouble shooting and Maintenance, Published by National Institute for Empowerment of Persons with Multiple Disabilities, Chennai. Freely downloadable from <http://niepmd.tn.nic.in/publication.php>. ISBN 978-81-928032-1-0.
- e) Speaks, C. E. (1999). Introduction To Sound: Acoustics for the Hearing and Speech Sciences (3 edition.). San Diego: Cengage Learning.
- f) Villchur, E. (1999). Acoustics for Audiologists (1 edition.). San Diego, Calif: Delmar Cengage Learning.

## **B 1.6 Pediatrics and Genetics**

**Hours: 60**

**Marks: 100**

**Objectives:** After studying the course, a student will have:

- A basic idea about the role of genetics in Speech-Language and Hearing
- Knowledge about the various concepts related to growth and development in pediatrics

### **Unit 1: Basic Concepts and Terminologies in Genetics**

- a) Principles of genetics – Genes, human chromosome, cytogenetics, mitosis and meiosis, numerical aberrations, structural aberrations, the sex chromosome anomalies.
- b) Introduction to pedigree construction, traits, environment – genetic interactions influencing fetus.

### **Unit 2: Genetic Assessment**

- a) Introduction to laboratory techniques
- b) Basic and advanced methods in genetics: cloning, molecular genetics, epigenetics.
- c) Study of DNA.

### **Unit 3: Genetics in Communication Disorders**

- a) Genetic basis of Speech- Language and Hearing impairment
- b) An overview of various genetic conditions leading to communication disorders
- c) Genetic disorders – genetic counseling, Mendelian disorders, chromosomal disorders, non mendelian modes of inheritance, management of genetic disorders, gene therapy, human genome mapping project (HGMP).

### **Unit 4: Basics Concepts in Pediatrics**

- a) Growth and development–basic concepts, growth from birth to puberty, growth during adolescent period.
- b) Anatomy and Physiology of speech and hearing systems from infancy to childhood.

## **Unit 5: Pediatric disorders related to speech and hearing**

- a) Nutritional disorders in children – protein energy malnutrition, water soluble vitamins, fat soluble vitamins, trace elements
- b) Perinatal pediatric disorders leading to speech and hearing impairment.

### **Recommended Reading**

- a) Parthasarathy, A., Menon, P. S. N., & Nair, M. K. C. (2019). IAP Textbook of Pediatrics. Jaypee Brothers Medical Publishers.
- b) Verma, P. S., & Agarwal, V. K. (2009). Genetics, (Multicolour Edition). S. Chand Publishing.
- c) Rudolph, C. D. (2003). Rudolph's pediatrics. Norwalk, CT: Appleton & Lange.
- d) Ringo, J. (2004). Fundamental genetics. Cambridge University Press.
- e) Kumar, R. (2008). Textbook of human embryology. IK International Pvt Ltd.
- f) Kliegman, R. M., Behrman, R. E., Jenson, H. B., & Stanton, B. M. (2007). Nelson textbook of pediatrics e-book. Elsevier Health Sciences.

**Semester II**  
**B 2.1 Speech-Language Pathology**

Hour – 60

Marks -100

**Objectives:** After completing this course, the student will be able to understand

- The different speech and language disorders
- Basic concepts and tools required for diagnosing speech and language disorders
- Basics of assessment procedures for speech and language disorders
- Basic principles and intervention procedures for speech and language disorders clinical requirements to practice,
- Different laws, social-cultural and ethical issues
- Identification and prevention of speech and language disorders
- Basic principles of providing counselling and guidance to clients and caregivers

**Unit 1: Basic concepts and methods of diagnostics**

- a) Introduction to Speech Language Disorders
- b) Definition and descriptions of delay, deviancy and disorders; impairment, disability and handicap
- c) Incidence and prevalence of speech and language disorders
- d) Causes of speech and language disorders
- e) Basic principles in assessment, evaluation and appraisal
- f) Tools for diagnosis- case history, interview, self-reports, questionnaire & observations
- g) Diagnostic models – SLPM, Wepman, Bloom and Lahey
- h) Types of diagnoses – Clinical diagnosis, direct diagnosis, differential diagnosis, diagnosis by treatment, diagnosis by exclusion, team diagnosis, instrumental diagnosis, provocative diagnosis, tentative diagnosis advantage/disadvantages
- i) Characteristics of a diagnostic clinician
- j) Organization and basic requirements for clinical set up and team approach
- k) DSM, ICD classification and ICF

**Unit 2: Basic concepts and methods of therapeutics**

- a) Basic concepts and terminologies in speech therapeutics
- b) General principles of speech and language therapy
- c) Speech therapy set-up

- d) Individual and group therapy
- e) Procedures and types of for speech-language therapy
- f) Approaches to speech and language therapy – formal, informal and eclectic approaches
- g) Planning for speech and language therapy – goals, steps, procedures and activities
- h) Importance of reinforcement principles and strategies in speech and language therapy, types and schedules of rewards and punishment
- i) Individual and group therapy
- j) AAC and other nonverbal methods of therapy

### **Unit 3: Overview of basic assessment and management of speech disorders**

- a) Causes of speech disorders
- b) Overview of assessment procedures for voice disorders; articulation and phonological disorders; and fluency disorders
- c) Overview of management procedures for voice disorders; articulation and phonological disorders; and fluency disorders
- d) Early identification and prevention of speech disorders
- e) Basic concepts in assessment and management of swallowing disorders

### **Unit 4: Overview of basic assessment and management of language disorders**

- a) Types, characteristics and classification of language disorders
- b) Causes of language disorders
- c) Overview of assessment procedures for child language disorders; adult language disorders; and neurogenic language disorders
- d) Overview of management procedures for child language disorders; adult language disorders; and neurogenic language disorders
- e) Early identification and prevention of language disorders
- f) Issues related to bi- /multilingualism



## **Unit 5: Other issues in practice as a speech - language pathologist**

- a) Professional code of conduct – social, cultural and other ethical issues
- b) Scope of practice –different set ups and prerequisites
- c) Documentation of diagnostic, therapeutic and referral reports
- d) Counseling, guidance, facilitation of parent participation and transfer of skills
- e) Evaluation of therapy outcome and follow up
- f) Evidence based practice
- g) Community based rehabilitation
- h) Role of itinerant speech therapist, Anganwadis, resource teachers etc.
- i) PWD act, National Trust, Consumer protection Act, noise pollution Act and other public laws, RCI, ISHA and other organizations controlling the field
- j) Facilities and concessions available for speech and hearing disabled

### **Recommended Reading**

- a) Owens. Jr, Kimberly, A. Metz, F.E. (2014). 5th Ed. Introduction to Communication Disorders: A life span based Perspective. Pearson Communication Science and Disorders Series.
- b) Hegde, M. N., & Davis, D. (2005). Clinical methods and practicum in speech-language pathology (4th ed.). Australia; Clifton Park, NY: Thomson Delmar Learning.
- c) Shipley, K. G., & Roseberry-McKibbin, C. (2006). Interviewing and counselling in communicative disorders : Principles and procedures (3rd ed.). Austin, Tex: Pro-Ed. Brookshire, R. H. (2003). Introduction to neurogenic communication disorders (6th ed.). St. Louis, Mo: Mosby.
- d) Hulit, L.M., Marle. R., Kathleen, R. H., & Fowey (2010). Born to Talk. Pearson Communication Science and Disorders Series 5th Ed.
- e) Roth, F. P., & Worthington, C. K. (2005). Treatment resource manual for speech language pathology (3rd ed.). Australia; Clifton Park, NY: Thomson Delmar Learning.
- f) Shipley, K. G., & McAfee, J. G. (2004). Assessment in speech-language pathology: A resource manual (3rd ed.). Australia; Clifton Park, NY: Delmar Learning.
- g) Ysseldyke, J. E., & Algozzine, R. (2006). Teaching students with communication disorders : A practical guide for every teacher. Thousand Oaks, Calif.: Corwin Press.

## B 2.2 Audiology

Hour – 60

Marks -100

**Objectives:** After completing this course, the student will be able to

- Understand and carryout experiments to measure differential sensitivity loudness and pitch
- Take case history, administer the tuning fork tests and interpret the results administer pure tone audiometry including masking on clinical population and appreciate the theoretical back ground of it
- Carryout different tests involved in speech audiometry appreciate the theoretical back ground
- Carryout subjective calibration and daily listening checks of the audiometer
- Get adequate theoretical information necessary to understand concepts involved in objective calibration

### Unit 1: Differential sensitivity

- a) Concept of differential sensitivity, just noticeable difference, Weber's fraction, Intensity discrimination, Frequency discrimination
- b) Duration discrimination and temporal resolution, Applications of jnd's
- c) Magnitude estimation and production
- d) Loudness – equal loudness level contours and its application Loudness scales - sone, phone, Steven's power law
- e) Pitch- scales of pitch

### Unit 2: Case history and tuning fork tests

- a) Need for case history, Basics of history taking
- b) Essential factors to be included in case history for adults
- c) Essential factors to be included in case history for children, Interpretation of case history
- d) Audiological evaluation – rationale and purpose
- e) Principles, procedure, interpretation, advantages and disadvantages of Rinne and Schwabach tuning fork test
- f) Principles, procedure, interpretation, advantages and disadvantages of Weber and Bing tuning fork test
- g) Audiometric version of Weber and Bing test

### **Unit 3: Pure tone audiometry**

- a) Classification of audiometers, Parts of an audiometer, characteristics specifications of transducers used (earphones, bone vibrators, loud speakers), Audiogram- concept and symbols used
- b) Clinical method of threshold estimation.
- c) Factors affecting air conduction threshold, Bone conduction thresholds- measurements
- d) Factors effecting Permissible noise levels in the audiometric room

### **Unit 4: Speech audiometry**

- a) Importance and purpose
- b) Different types of stimuli used in speech audiometry, Concept of phonetically and phonemically balanced Speech detection thresholds – procedure and application
- c) Speech reception thresholds – procedures and application
- d) Word recognition scores –procedure and applications
- e) PIPB function – procedure and applications
- f) Factors affecting speech audiometry
- g) BC speech audiometry – procedure and its application
- h) Test materials available in various languages

### **Unit 5: Clinical masking and instrumental calibration**

- a) Definition and different terminologies
- b) Purpose and rationale of clinical masking
- c) Different types of stimulus employed in clinical masking
- d) Interaural attenuation and factors affecting interaural attenuation
- e) When to mask and how much to mask – importance of adequate noise levels
- f) Different procedures for masking
- g) Masking for speech audiometry
- h) Calibration definition and purpose
- i) Daily listening checks and subjective calibration, Objective calibration of air conduction transducers, Objective calibration of bone conduction transducers, Frequency calibration

## Recommended Reading

- a) Durrant, J. D., & Feth, L. L. (2012). *Hearing Sciences: A Foundational Approach* (1 edition.). Boston: Pearson.
- b) Emanuel, D. C., & Letowski, T. (2008). *Hearing Science* (1 edition.). Philadelphia: Lippincott Williams and Wilkins.
- c) Lippincott Williams and Wilkins.
- d) Gelfand, S. A. (2009). *Hearing: An Introduction to Psychological and Physiological Acoustics* (5 edition.). London: CRC Press  
Kaplan, H., Gladstone, V. S., & Lloyd, L. L. (1993). *Audiometric Interpretation: A Manual of Basic Audiometry* (2 edition.). Boston: Pearson.
- e) Katz, J. (2014). *Handbook of Clinical Audiology* (7th International edition edition.). Lippincott Williams and Wilkins.
- f) Martin, F. N., & Clark, J. G. (2014). *Introduction to Audiology*. Boston: Pearson.  
Silman, S., & Silverman, C. A. (1997). *Auditory Diagnosis: Principles and Applications* (Reissue edition.). San Diego: Singular Publishing Group

## B 2.3 Neurology

Hour – 60

Marks -100

**Objectives:** After completing this course, the student will be able to understand

- Basic concepts, anatomy and physiology of nervous system related to speech and hearing
- Neural organization –different structures and functions of various systems neurosensory and neuromotor controls in speech, language and hearing mechanisms cerebral plasticity and dominance and its relevance for speech, language and hearing disorders
- Various neural diseases, lesions, nutritional and metabolic conditions affecting speech, language and hearing
- Basic principles and assessment procedures used in speech, language and hearing disorders associated with neurological conditions
- Basic principles and management procedures used in speech, language and hearing disorders associated with neurological conditions

### Unit 1: Anatomy and physiology of the nervous system

- a) General introduction to basic neurological concepts
- b) Organization of the neural system
- c) Central, peripheral and autonomic neural system
- d) Neural structures - applied anatomy and physiology
- e) Cranial nerves and those important for speech, language, hearing and balance
- f) Cerebral blood supply, nourishment and protection of the brain
- g) General principles of neural organization
- h) Transmission of information in neural system – nerve fibers, synaptic transmission, action potential, chemical transmission, excitatory and inhibitory potential & neuromuscular transmission
- i) Cerebral plasticity and development of neural plasticity and cerebral dominance

### Unit 2: Neural organization of speech and hearing processes

- a) Neurosensory organization of speech and hearing
- b) Central auditory nervous system
- c) Anatomy of oral sensation and oral sensory receptors
- d) Neuromotor control of speech
- e) The pyramidal, extra-pyramidal system, basal ganglia and cerebellar system
- f) Lower and upper motor neuron
- g) Alpha and gamma motor neurons
- h) Sensory and motor examination, oral, peripheral and other reflexes
- i) Swallowing mechanism and neural control
- j) Screening and bedside neurological examination

### **Unit 3: Neural disorders associated with speech and hearing disorders - I**

- a) Neural infections – meningitis, encephalitis
- b) Developmental anomalies – spinal cord defects, syringomelia and bulbia, Arnold chiari malformations
- c) Hydrocephalus – source and circulation of CSF, types and etiopathogenesis  
UMN lesions – spastic dysarthria
- d) LMN lesions – flaccid dysarthria  
Mixed lesions
- e) Extra pyramidal lesions – dyskinetic dysarthria
- f) Cerebellum and cerebellar pathway lesions – ataxic dysarthria  
Other diverse lesions and dysarthrias

### **Unit 4: Neural disorders associated with speech and hearing disorders – II**

- a) Cerebrovascular diseases – ischemic brain damage – hypoxic ischemic encephalopathy, cerebral infarction – intracranial hemorrhage – intracranial, subarachnoid
- b) Trauma to the CNS – subdural hematoma, epidural hematoma, parenchymal brain damages
- c) Demyelinating diseases – multiple sclerosis, perivenous encephalomyelitis, Dementia Degenerative, metabolic and nutritional disorders – Alzheimer's disease, Parkinsonism
- d) Metabolic, hereditary, acquired, neuronal storage disorders  
Wilson's disease, Phenylketonuria
- e) Nutritional – Wernicke's encephalopathy, pellagra  
Alcoholic cerebellar degeneration
- f) Clinical-pathological methods and Neuro-imaging
- g) Tumors of the CNS – gliomas, embryonal tumors of meninges, metastasis, malignant tumors

### **Unit 5: Speech-language and swallowing disorders**

- a) Central language mechanism and its disorders
- b) Developmental motor speech disorders – cerebral palsy, muscular dystrophy
- c) Neurologic disorders with primitive reflexes, diagnosis and management
- d) Clinical neurological syndromes associated with speech and language disorders
- e) Childhood language disorders associated with neurologic disorders
- f) Swallowing associated with neurogenic disorders and assessing mastication and deglutition
- g) Agnosia and other conditions associated with speech and hearing disorders
- h) Cognitive disorders associated with neurologic disorders

- i) General management principles and options for childhood neurogenic speech, language and hearing disorders
- j) General management principles and options for adult neurogenic speech, language and hearing disorders

### **Recommended Reading**

- a) Adams, R.D. & Sidman, R.L. (1968). Introduction to neuropathology. New Jersey: McGraw-Hill.
- b) Bhatnagar, S.C. (2012). Neuroscience for the Study of Communicative Disorders. Lippincott, Williams & Wilkins
- c) Garden, E. (1968). Fundamental of neurology, V Edn., Philadelphia: Sarenders Co. Webb, W. G., & Adler, R. K. (2008). Neurology for the speech-language pathologist (5th ed.). St. Louis, Mo: Mosby/Elsevier.
- d) Duffy, J. R. (2013). Motor Speech Disorders: Substrates, Differential Diagnosis, and Management (3rd Ed.). University of Michigan, Elsevier Mosby.

## B 2.4 Otolaryngology

Hour – 60

Marks -100

**Objectives:** After completing this course, the student will be able to understand the

- Causes, signs, symptoms, pathophysiology and management of diseases of external, middle and inner ear leading to hearing loss, and
- Causes, signs, symptoms, pathophysiology and management of diseases of laryngeal and articulatory systems

### Unit 1: External and middle ear and their disorders

- a) Clinical anatomy of the ear
- b) Congenital anomalies
- c) Diseases of the external ear
- d) Tumors of the external ear
- e) Perforation and ruptures of tympanic membrane
- f) Eustachian tube dysfunction
- g) Otitis media with effusion, Cholesteatoma, chronic suppurative otitis media and Otosclerosis
- h) Trauma to temporal bone
- i) Facial nerve and its disorder

### Unit 2: Inner ear and its disorders

- a) Congenital anomalies
- b) Meniere's Disorder, Ototoxicity, Presbycusis
- c) Disorders of vestibular system, Vestibular Schwannoma
- d) Tinnitus and medical line of treatment
- e) Pre-surgical medical and radiological evaluations for implantable hearing devices
- f) Overview of surgical technique for restoration and preservation of hearing
- g) Post-surgical care and complication of surgery for cochlear implants
- h) Overview of surgical technique, post-surgical care and complication of surgeries for implantable bone conducted hearing aids and middle ear implant

### Unit 3: Oral cavity and its disorders

- a) Anatomy of the oral cavity
- b) Common disorders of the oral cavity and Tumors of the oral cavity
- c) Cleft lip and palate – medical aspects
- d) Clinical anatomy and physiology of pharynx
- e) Inflammatory conditions of the pharynx, tonsils and adenoids Tumors of the pharynx



#### **Unit 4: Larynx and its disorders**

- a) Clinical anatomy of larynx
- b) Difference between adult and infant larynx
- c) Clinical examination of larynx
- d) Stroboscopy - technique, procedure, interpretation and precautions
- e) Congenital laryngeal pathologies
- f) Inflammatory conditions of the larynx
- g) Vocal nodule and other disorders of the vocal folds
- h) Benign and malignant tumours of the larynx
- i) Laryngectomy – overview of surgical procedure
- j) Phono surgery and other voice restoration surgeries

#### **Unit 5: Esophagus and its disorders**

- a) Clinical anatomy and physiology of esophagus
- b) Clinical examination of esophagus
- c) Congenital anomalies of esophagus
- d) Esophageal fistula
- e) Inflammatory conditions of esophagus, Benign conditions of esophagus, Malignant conditions of the esophagus
- f) Airway management procedures

#### **Recommended Reading**

- a) Chan, Y. and Goddard, J.C. (2015). K J Lee's Essential otolaryngology: head and neck surgery. (11th edition). New Delhi: Atlantic Publisher and Distributers  
Dhingra, P. L. (2013). Diseases of Ear, Nose and Throat (Sixth edition). Elsevier.  
O'Neill, J.P. and Shah, J.P. (2016). Self-assessment in otolaryngology. Amsterdam: Elsevier
- b) Postic, W.P., Cotton, R.T., Handler, S.D. (1997). Ear trauma. Surgical Pediatric Otolaryngology. New York: Thieme Medical Publisher Inc.
- c) Wackym, A. and Snow, J.B. (2015). Ballenger's otorhinolaryngology head and neck surgery. (18th edition). United States: McGraw-Hill Medica

## B 2.5 Practicals (Speech-language Pathology)

Marks -100

### Practicals

1. Demonstrate normal aspects of speech and analyze perceptually variations in voice, articulation and fluency in different recorded speech samples of typical individuals at different age groups (children, adults and older adults) and sex.
2. Demonstrate normal aspects of language and analyze perceptually variations in language in different recorded samples of typical individuals at different age groups (children, adults and older adults) and sex.
3. Demonstrate stress, rhythm and intonation and variations in rate of speech and analyse perceptually variations in prosody in different recorded samples of typical individuals at different age groups (children, adults and older adults) and sex.
4. Use IPA to transcribe spoken words.
5. Record a standard passage, count number of syllables and words, identify syllable structure, syntactic structures in the passage.
6. Oral mechanism examination on 5 normal children and 5 normal adults.
7. Prepare a chart and show the developmental stages of speech and language behavior. Administer standardized tests for assessment of delayed speech and language development such as REEL, SECS, LAT, 3DLAT, ALD each on any 2 children.
8. Study the available normative data (Indian/Western) of speech such as respiratory, phonatory, resonatory and articulatory parameters.
9. Measure the following in 5 normal subjects: (a) Habitual frequency (b) Frequency range (c) Intensity (d) Intensity range (e) Phonation duration (f) rate of speech (g) Alternate Motion Rates and Sequential Motion Rates (h) s/z ratio.
10. Study the available normative data (Indian/Western) of language such as phonology, semantics, syntax, morphology and pragmatic measures.
11. Perceptual analysis of speech and language parameters in normal (2 children and 2 adults and persons with speech disorders (3 adults + 3 children).
12. Prepare a model diagnostic report of a patient with speech and language disorder. Prepare a diagnostic and therapy kit.
13. Make a list of speech language stimulation techniques and other therapy techniques for various speech disorders.
14. Familiarize with the sources for referral and parent counseling procedures.
15. Prepare a report on the available audiovisual material and printed material/pamphlets relating to speech-language pathology, public education of communication and hearing disorders, etc.
16. Prepare a report on the available clinical facilities and clinical activities of the institute.

## **Clinical Practicum**

1. Observe the evaluation process and counselling of at least 5 different speech and language disorders in children.
2. Observe the evaluation process and counselling of at least 5 different speech and language disorders in adults.
3. Take case history of a minimum of 10 individuals (5 normal & 5 clients with complaints of speech-language problems).
4. Observation of diagnostic procedures.
5. Observe various therapeutic methods carried out with children and adults with speech and language disorders.

## B 2.6 Practicals (Audiology)

Marks -100

### Practicals

Calculate/derive the answers for following

Calculate the relative intensities with different reference intensities. Calculate decibels when sound intensities are doubled, increased by 4 times

Add decibels when two sounds with different intensities are produced simultaneously

Collect pictures of audiometers that existed between 1920 and 1990.

### Perform the following experiments

1. Calculate reference equivalent sound pressure levels (RETSPL) for head phones and bone vibrator for any two frequencies using 30 participants.
2. Measure most comfortable level on 10 participants with normal hearing sensitivity. Measure uncomfortable levels on 10 participants with normal hearing sensitivity. Calculate the sensation levels of MCL and UCLs in above 10 participants.
3. Measure difference limen of intensity, frequency and duration on 10 normal hearing adults and plot it in graphical form and interpret the results.
4. Measure equal loudness level contours at minimum level, 40 dB SPL, 70 dB SPL (1 kHz) in 5 normal hearing adults.
5. Measure sone and mel in 5 normal hearing adults using scaling techniques.
6. Take case history on 5 adults and 5 children with hearing problem and correlate the information from case history to results of pure tone audiometry.
7. Administer different tuning fork tests on 5 simulated conductive and 5 sensori neural hearing loss individuals.
8. Carry out pure tone and speech audiometry on 10 normal hearing individuals.
9. Carry out clinical masking on 10 normal hearing individuals with simulated conductive hearing loss and carry out clinical masking on 5 individuals with conductive hearing loss and 5 individuals with sensori-neural hearing loss.
10. Carryout daily listening checks and subjective calibrations 20 times and observe objective calibration once
11. Perform otoscopy and draw the tympanic membrane of 10 healthy normal individuals Measure difference limen of intensity, frequency and duration on 10 normal hearing adults and plot it in graphical form and interpret the results
12. Measure equal loudness level contours at minimum level, 40 dB SPL, 70 dB SPL (1 kHz) in 5 normal hearing adults
13. Measure sone and mel in 5 normal hearing adults using scaling techniques
14. Take case history on 5 adults and 5 children with hearing problem and correlate the information from case history to results of pure tone audiometry

15. Administer different tuning fork tests on 5 simulated conductive and 5 sensori neural hearing loss individuals
16. Carry out pure tone and speech audiometry on 10 normal hearing individuals
17. Carry out clinical masking on 10 normal hearing individuals with simulated conductive hearing loss and carry out clinical masking on 5 individuals with conductive hearing loss and 5 individuals with sensori-neural hearing loss
18. Carryout daily listening checks and subjective calibration 20 times and observe objective calibration once

### **Clinical Practicum**

1. Observe case history being taken on 5 adults and 5 children with hearing problem and correlate the information from case history to results of pure tone audiometry. Administer different tuning fork tests on 5 conductive and 5 sensori neural hearing loss individuals.
2. Observe the pure tone audiometry being carried out on 30 clients.
3. Plot the audiogram, calculate the pure tone average and write the provisional diagnosis of observed clients.
4. Perform otoscopy (under supervision) on at least 1 client with following conditions: Tympanic membrane perforation, SOM, CSOM

## Semester III

### B 3.1 Voice and its Disorders

Hour – 60

Marks -100

**Objectives:** After completing this course, the student will be able to

- Describe characteristics of normal voice and identify voice disorders explain etiology related to voice problems, and its pathophysiology assess voice disorders
- Provide counseling and therapy to individuals with voice disorders

#### Unit 1: Basic concepts in voice and its production

- a) Definition and functions of voice – biological and non-biological
- b) Parameters of voice
- c) Structures and function of respiratory system for the purpose of phonation
- d) Laryngeal anatomy – Structural support of larynx, muscles, vocal fold microstructure, blood supply, and innervations
- e) Vocal tract resonance and voice quality
- f) Development of voice: Birth to senescence; structural and voice related changes
- g) Aerodynamic myo-elastic theory of voice production
- h) Voice mechanics – Physiologic, acoustic and aerodynamic correlates of voice
- i) Pitch and loudness changing mechanism, voice registers and voice quality
- j) Description of normal and abnormal voice: Parametric, pathologic/perceptual, social

#### Unit 2: Characteristics and pathophysiology of voice disorders

- a) Pathologies of the laryngeal mechanism: classification of voice disorders, incidence, and prevalence
- b) Etiology of voice disorders: voice misuse and abuse, medical related etiologies, primary disorder etiologies and personality related etiologies
- c) Pathologies of vocal fold cover (infective and trauma related secondary conditions) and muscular dysfunction
- d) Non-organic voice disorders: functional disorders, psychosomatic- functional aphonia and physiological- voice abuse, puberphonia)
- e) Congenital voice disorders
- f) Neurological voice disorders
- g) Voice problems in systemic illnesses and endocrine disorders
- h) Voice problems in transgenders
- i) Voice problems in the elderly
- j) Voice problems in professional voice users: teachers and singers

### **Unit 3: Assessment of voice**

- a) Referral sources, medical examination and team approach
- b) Protocol for voice assessment: components and philosophies (ICF, ICD)
- c) Clinical voice laboratory: principles of instrumental measurements – electrical error, electrical safety, hygiene safety; recording of data; storage; patented soft wares, free wares
- d) Perceptual evaluation of voice: GRBAS, CAPE -V
- e) Visualization procedures- indirect laryngoscopy, video laryngoscopy & stroboscopy
- f) Acoustic analysis of voice: F0 related measures, intensity related measures, quality related measures, phonetogram, DSI
- g) Electroglottography and inverse filtering procedures
- h) Aerodynamic analysis of voice: static & dynamic measures
- i) Self-evaluation of voice : PROM, VHI, V-DOP
- j) Reporting of voice findings, normative comparisons, differential diagnosis

### **Unit 4: Management of voice**

- a) Voice therapy orientation: basic principles, goal setting and approaches
- b) Vocal hygiene and preventive counselling
- c) Symptomatic voice therapy – voice facilitation techniques
- d) Psychological approaches to voice therapy – psychoanalysis, rational emotive therapy and cognitive behavior therapy
- e) Physiological approach – breathing and postural techniques
- f) Holistic voice therapy approaches -1: accent therapy, confidential voice therapy,
- g) Holistic voice therapy approaches - 2: vocal function exercises, resonant voice therapy, Lee Silverman voice therapy
- h) Medical and surgical procedures in the treatment of benign vocal fold lesions: pharmaceutical effects on voice, phono surgery : re-innervation techniques, laryngeal framework surgeries, micro laryngeal excision
- i) Professional voice care

## **Unit 5: Intervention strategies for voice disorders**

- a) Vocal trauma related disorders
- b) Functional voice disorders – inappropriate vocal components
- c) Functional aphonia
- d) Puberphonia/mutational falsetto
- e) Muscle tension dysphonia
- f) Sulcus vocalis
- g) Vocal fold palsy
- h) Spasmodic dysphonia
- i) GERD/LPR
- j) Benign vocal fold lesions requiring surgical intervention
- k) Post-operative care for benign vocal fold lesions disorders
- l) Documenting voice therapy outcome



## Practicals

- a) Record phonation and speaking samples (counting numbers) from five children, adult men, adult women, geriatric men and geriatric women. Note recording parameters and differences in material.
- b) Make inferences on age and sex differences across the samples obtained in the previous experiment using perceptual voice profiling. Make a note of differences in pitch, loudness, quality and voice control. Explain how voice reflects one's personality and other social needs.
- c) Perform an acoustic voice analysis on phonation sample and generate a voice report based on acoustic findings. Compare findings between men & women.
- d) Perform MPT and s/z ratio. Infer differences across age and sex.
- e) Perform spirometry or any other appropriate aerodynamic procedure. Infer differences across age and sex.
- f) Perform acoustic analysis on five abnormal voice samples.
- g) Observe and document findings from five laryngeal examinations (pre-recorded or live) such as VLS, stroboscopy or any other relevant.
- h) Administer a PROM on five individuals. Prepare a vocal hygiene checklist.
- i) Demonstrate therapy techniques such as vocal function exercise, resonant voice therapy, digital manipulation, push pull, relaxation exercises.

## Recommended Reading

- a) Stemple, J. C., Glaze, L. E., & Gerdeman, B. K. (2014). *Clinical voice pathology: Theory & Management* (5th Ed.). San Diego: Plural publishers.
- b) Aronson, A.E. & Bless, D. M. (2009). *Clinical Voice Disorders*.(4th Ed.). New York: Thieme, Inc.
- c) Boone, D. R., McFarlane, S. C, Von Berg, S. L. & Zraick, R, I. (2013): *The Voice and Voice Therapy*. (9th Ed.). Englewood Cliffs, Prentice-Hall, Inc. New Jersey.
- d) *Professional Voice: Assessment and Management*. Proceedings of the national workshop on "Professional Voice: Assessment and management", 9-10 Dec 2010. All India Institute of Speech & Hearing, Mysore. 2010.
- e) Andrews, M. L. (2006). *Manual of Voice treatment: Pediatrics to geriatrics* (3rd Ed.). Thomson Delmar Learning.
- f) Colton, R. H, Casper, J. K. & Leonard, R. (2006). *Understanding voice problems*. Baltimore: Williams & Wilkins.
- g) Sapienza, C. M., & Ruddy, B H. (2013). *Voice Disorders*.(2nd Ed.). San Diego: Plural Publisher.
- h) *Voice: Assessment and Management*. Proceedings of the national workshop on "Voice: Assessment and management", 14-15 Feb 2008. All India Institute of Speech & Hearing, Mysore. 2008

## B 3.2 Speech Sound Disorders

Hour – 60

Marks -100

**Objectives:** After completing this course, the student will be able to

- Describe normal speech sound development and characterization of individuals with speech sound disorders.
- Perform phonological analysis and assessment of speech sound disorders.
- Plan intervention for individuals with speech sound disorders.

### Unit 1: Speech sound acquisition and development

- a) Fundamentals of articulatory phonetics - phonetic description of vowels & consonants.
- b) Phonology & phonological theories – generative phonology, natural phonology. Phonology & phonological theories – non-linear phonology, optimality theory. Methods to study speech sound acquisition – diary studies, cross sectional studies and longitudinal studies.
- c) Speech sound acquisition
- d) Birth to one year (development of infant speech perception, early speech production).
- e) One to two years (consonant inventories, influence of phonological knowledge on vocabulary acquisition).
- f) Two to five years (growth of phonetic, phonemic, phonotactic inventory – consonants, clusters, phonological patterns).
- g) Above five years (speech sound mastery and development of literacy – phonological awareness).
- h) Factors influencing speech sound acquisition
- i) Acoustics of speech sounds
- j) Speech intelligibility, factors affecting speech intelligibility, assessment of speech intelligibility
- k) Co articulation: types and effects
- l) Phonological development in bilingual children.
- m) Phonological development in Indian languages.

## **Unit 2: Assessment of speech sound disorders - I**

- a) Current concepts in terminology and classification of speech sound disorders
- b) Organically-based speech sound disorders, childhood apraxia of speech.
- c) Speech sound disorders of unknown origin, classification by symptomatology.
- d) Factors related to speech sound disorders
- e) Structure and function of speech & hearing and oro-sensory mechanisms.
- f) Cognitive – linguistic, psychosocial and social factors.
- g) Metalinguistic factors related to speech sound disorders.
- h) Introduction to assessment procedures: aims of assessment, screening and comprehensive assessment.
- i) Speech sound sampling procedures - issues related to single word and connected speech samples; imitation and spontaneous speech samples, contextual testing, recording of speech samples.
- j) Review of tests in English and other Indian languages - Single word articulation tests, deep articulation of articulation, and computerized tests of phonology.
- k) Influence of language and dialectal variations in assessment.
- l) Transcription of speech sample - transcription methods –IPA and extension of IPA; broad and narrow transcription.

## **Unit 3: Assessment of speech sound disorders - II**

- a) Introduction to independent and relational analysis.
- b) Independent analyses – phonetic inventory, phonemic inventory and phonotactic inventory (utility of independent analysis for analysis of speech of young children and children with severe speech sound disorders).
- c) Relational analyses – SODA, pattern analysis, (distinctive features, phonological process analysis).
- d) Phonological processes analyses - language specific issues, identification and classification of errors.
- e) Assessment of oral peripheral mechanism.
- f) Speech sound discrimination assessment, phonological contrast testing, stimulability testing.
- g) Determining the need for intervention – speech intelligibility and speech severity assessment.
- h) Factors influencing target selection – stimulability, frequency of occurrence, developmental appropriateness, contextual testing, and phonological process analysis.
- i) Case study – Documenting the assessment findings and determining the need for intervention.

#### **Unit 4: Management – I**

- a) Basic considerations in therapy – target selection, basic framework for therapy, goal- attack strategies, organizing therapy sessions, individual vs. group therapy.
- b) Treatment continuum – establishment, generalization and maintenance; measuring clinical change.
- c) Facilitation of generalization.
- d) Maintenance and termination from therapy.
- e) Motor-based treatment approaches – Principles of motor learning.
- f) Discrimination/ear training and sound contrast training.
- g) Establishing production of target sound – imitation, phonetic placement, successive approximation, context utilization.
- h) Traditional approach, contextual/sensory-motor approaches.
- i) General guidelines for motor-based treatment approaches.
- j) Use of technology in articulation correction.

#### **Unit 5: Management – II**

- a) Core vocabulary approach.
- b) Introduction to linguistically-based treatment approaches- Distinctive feature therapy, Minimal pair contrasts therapy, Metaphon therapy, Cycles approach, Broad-based language approaches.
- c) General guidelines for linguistically-based approaches.
- d) Phonological awareness and phonological disorders.
- e) Phonological awareness intervention for preschool children.
- f) Adapting intervention approaches to individuals from culturally and linguistically diverse backgrounds.
- g) Role of family in intervention for speech sound disorders.

#### **Practicals**

- a) List the vowels and consonants in your primary language and provide phonetic and acoustic descriptions for the speech sounds.
- b) Identify the vowels and consonants of your language on the IPA chart and practice the IPA symbols by transcribing 25 words.
- c) Make a list of minimal pairs (pairs of words which differ by only one phoneme) in English.
- d) Make a list of minimal pairs in any language other than English.
- e) Identify the stages of speech sound acquisition by observations from videos of children from birth to 5 years of age.
- f) Record the speech of a two year old typically developing child, transcribe and analyze the speech sample.
- g) Record the speech of one typically developing child from 3-5 years of age (include single word and connected speech samples), transcribe the sample, and perform phonological assessment.

- h) Analyze transcribed speech samples of typically developing children – practice independent and relational analysis.
- i) Practice instructions for phonetic placement of selected sounds.
- j) Develop a home plan with activities for any one section of phonological awareness in English and in one Indian language.

### **Recommended Reading**

- a) Bernthal, J.E., Bankson, N.W., & Flipsen, P. (2013). Articulation and phonological disorders.(7th Ed.). Boston, MA: Pearson.
- b) Dodd, B. (2013). Differential diagnosis and treatment of children with speech disorder.(2nd Ed). NJ: Wiley.
- c) Rout, N (Ed)., Gayathri, P., Keshree, N and Chowdhury, K (2015). Phonics and Phonological Processing to Develop Literacy and Articulation; A Novel Protocol.
- d) A publication by NIEPMED, Chennai. Freely downloadable from <http://niepmd.tn.nic.in/publication.php>. ISBN 978-81-928032-9-5
- e) Vasanta, D. (2014). Clinical applications of phonetics and phonology. ISHA Monograph.Vol 14, No. 1.Indian Speech & Hearing Association.
- f) Velleman, S. L (2003). Resource guide for Childhood Apraxia of Speech.Delmar/Thomson Learning.
- g) Williams, A., McLeod, S., & McCauley, R. (2010). Interventions for speech sound disorders in children. Baltimore: Brookes.

### **B 3.3 Diagnostic Audiology: Behavioural Tests**

**Hours – 60**

**Marks - 100**

**Objectives:** After completing this course, the student will be able to

- Choose individualized test battery for assessing cochlear pathology, retro cochlear pathology, functional hearing loss, CAPD, vestibular dysfunctions, tinnitus and Hyperacusis
- Independently run the tests and interpret the results to identify the above conditions and also use the information for differential diagnosis
- Make adjustments in the test parameters to improve sensitivity and specificity of tests.
- Make appropriate diagnosis based on the test results and suggest referrals.

#### **Unit 1: Introduction to diagnostic audiology**

- a) Characteristics of a diagnostic test, difference between screening and diagnostic test, functions of a diagnostic test in Audiology
- b) Need for test battery approach in auditory diagnosis and integration of results of audiological tests, cross-check principle
- c) Concept of sensitivity, specificity, true positive, true negative, false positive, false negative, hit rate
- d) Definition of behavioural and physiological tests and their characteristics in diagnostic audiology
- e) Theories and physiological bases of recruitment
- f) Theories and physiological bases of adaptation
- g) Clinical indications for cochlear pathology, retro-cochlear pathology, central auditory processing disorders, functional hearing loss, vestibular disorders

#### **Unit 2: Tests to identify cochlear and retro cochlear pathology**

- a) ABLB, MLB and SISI tests
- b) Behavioural tests of adaptation
- c) Bekesy audiometry
- d) Brief tone audiometry , PIPB function
- e) Glycerol test
- f) Test to identify dead regions of cochlea

### **Unit 3: Tests to diagnose functional hearing loss**

- a) Behavioural and clinical indicators of functional hearing loss
- b) Pure tone tests including tone in noise test, Stenger test, BADGE, puretone DAF  
Speech tests including Lombard test, Stenger test, lip-reading test, Doerfler-Stewart test, Low level PB word test, Yes-No test, DAF test
- c) Identification of functional hearing loss in children: Swinging story test, Pulse tone methods

### **Unit 4: Assessment of central auditory processing**

- a) Definition, different behavioral processes
- b) Behavioral and clinical indicators of central auditory processing disorders
- c) Bottleneck and subtlety principles and their implications in tests to detect central auditory processing disorders
- d) Monaural low redundancy tests - filtered speech tests, time compressed speech test, speech-in-noise test, SSI with ICM, other monaural low redundancy tests.
- e) Dichotic speech tests – Dichotic digit test, Staggered spondaic word test, Dichotic CV test, SSI with CCM, Competing sentence test, other dichotic speech tests.
- f) Binaural interaction tests – RASP, BFT, MLD, other binaural interaction tests
- g) Tests of Temporal processing – pitch pattern test, duration pattern tests, other temporal ordering tests, gap detection test, TMTF
- h) Variables influencing the assessment of central auditory processing: Procedural and subject variables
- i) Test findings of important tests in subjects with central auditory disorders: brainstem lesion, cortical, CAPD in children.

### **Unit 5: Assessment of persons with vestibular disorder, tinnitus, hyperacusis**

- a) Introduction to structure and function of vestibular system, Vestibular ocular reflex and vestibulo spinal reflex, Overview on other systems involved in balance
- b) Signs and Symptoms of vestibular disorders
- c) Team in the assessment and management of vestibular disorders
- d) Behavioral tests to assess vestibular functioning: Fukuda stepping test, tandem gait test, finger nose pointing, Romberg test, Sharpened Romberg test, Dix-Hallpike test, Log-roll test
- e) Overview of tinnitus and hyperacusis and tests for assessment
- f) Pitch matching, loudness matching, residual inhibition, Feldman masking curves Johnson Hyperacusis Dynamic Range Quotient

## Practicals

- a) Administer ABLB, MLB and prepare ladder gram (ABLB to be administered by blocking one ear with impression material)
- b) Administer classical SISI on 3 individuals and note down the scores Administer tone decay tests (classical and its modifications) and note down the results (at least 3 individuals)
- c) Administer Bekesy audiometry Administer Brief tone audiometry
- d) Plot PIPB function using standardized lists in any 5 individuals
  
- e) Administer the tests of functional hearing loss (both tone based and speech based) by asking subject to malingering and having a yardstick of loudness.
- f) Administer CAPD test battery to assess different processes on 3 individuals and note down the scores
- g) Administer Fukuda stepping test, Tandem gait test, Finger nose pointing, Romberg test, Sharpened Romberg test, Dix-Hallpike test, Log-roll test on 5 of the individuals each and note down the observations.
- h) Estimate the pitch and loudness of tinnitus in 2 persons with tinnitus (under supervision). Assess the residual inhibition in them.
- i) Plot Feldman masking curves for a hypothetical case
- j) Administer Johnson Hyperacusis Dynamic Range Quotient on any 2 of the individuals and note down the scores.

## Recommended Reading

- a) Gelfand, S. A. (2009). *Essentials of Audiology*. Thieme.
- b) Hall, J. W., & Mueller, H. G. (1996). *Audiologists' Desk Reference: Diagnostic audiology principles, procedures, and protocols*. Cengage Learning.
- c) Jerger, J. (1993). *Clinical Audiology: The Jerger Perspective*. Singular Publishing Group.
- d) Katz, J., Medwetsky, L., Burkard, R. F., & Hood, L. J. (Eds.). (2007). *Handbook of Clinical Audiology* (6th revised North American edition). Philadelphia: Lippincott Williams and Wilkins.
- e) Martin, F. N., & Clark, J. G. (2014). *Introduction to Audiology* (12 edition). Boston: Pearson.
- f) Roeser, R. J., Valente, M., & Hosford-Dunn, H. (2007). *Audiology: Diagnosis*. Thieme.
- g) Stach, B. A. (2010). *Clinical audiology: an introduction* (2nd ed). Clifton Park, NY: Delmar Cengage Learning.



## B 3.4 Amplification Devices

Hours – 60

Marks - 100

**Objectives:** After completing this course, students will be able to

- Assess the candidacy for hearing aids and counsel accordingly
- Evaluate the listening needs and select the appropriate hearing aid independently
- Program digital hearing aids as per the listening needs of the client independently
- Assess the benefit from the hearing aid using subjective and objective methods
- Make all types of ear molds counsel the parents/care givers at all stages

### Unit 1: Types of hearing aids

- a) Historical development of hearing aids: development of concept of amplification, development of different types of amplification devices
- b) Review of basic elements of hearing aids: Microphone, Amplifier, Receiver/vibrator, Cords, Batteries.
- c) Classification and Types of hearing aids (Body level, ear level, in the ear, ITC, invisible in the canal, CIC Binaural, pseudo binaural, monaural, Programmable, trimmer digital and digital hearing aids, Directional hearing aids, modular hearing aids)
- d) RIC hearing aids , Implantable hearing aids, Master hearing aids, CROS hearing aids
- e) Group amplification – hard wired, induction loop, FM, infrared
- f) Assistive listening devices – types and selection (Telephones, Television, typing technology)

### Unit 2: Technological aspects in hearing aids

- a) Routing of signals, head shadow/baffle/diffraction effects
- b) Output limiting and issues related to them: peak clipping, compression
- c) Concept and use of compression in hearing aids: BILL, TILL, PILL, Wide Dynamic Range Compression, Syllabic Compression, Dual Compression
- d) Signal processing in hearing aids – BILL, TILL, PILL
- e) Signal enhancing technology
- f) Noise reduction algorithms
- g) Extended low frequency amplification, frequency lowering technology (transposition, compression)
- h) Recent advances in hearing aids

### **Unit 3: Electro-acoustic measurements for hearing aids**

- a) Purpose and Parameters to be considered: OSPL90, SSPL90, HFA SSPL90, Gain, Full on Gain, HFA Full on Gain, Reference test Gain, Basic Frequency Response, Total Harmonic distortion, Intermodulation Distortion, input Output functions, instrumentation, procedure, variables affecting EAM
- b) Electro-acoustic measurements, BIS, IEC and ANSI standards
- c) Environmental tests.
- d) Care, maintenance and troubleshooting of hearing aids
- e) Counselling and orienting the hearing aid user (Client and significant others)

### **Unit 4: Selection of hearing aids**

- a) Pre-selection factors; Prescriptive and comparative procedures; Functional gain and insertion gain methods; Use of impedance, OAEs and AEPs audiometry; Hearing aids for conductive hearing loss; Hearing aids for children; Hearing aids for elderly; Selection of non-linear programmable and digital hearing aids
- b) Hearing aid programming
- c) Methods for assessing hearing aid benefit
- d) Real ear insertion measurements for verification of hearing aid benefit: REIG, REUR, REAR, REOR, RESR, REIG, REAG, RECD
- e) Acoustic feedback in hearing aids

### **Unit 5: Mechano-acoustic couplers (Ear molds)**

- a) Different types of molds
- b) Procedure for hard molds and soft mold UV curing methods
- c) Special modifications in the ear molds: Vents (diagonal and parallel), deep canal molds, short canal, horns, Libby horn, reverse horn, acoustic modifier
- d) Effects of mechano-acoustic couplers on the hearing aid output

### **Practicals**

- a) Listen to the output of different types and classes of hearing aids (monaural, binaural, analog, digital hearing aids), in different settings
- b) Troubleshoot hearing aids: Check the continuity of the receiver cord using multi meter, measure the voltage of different sized batteries using multi meter, Check voltage of batteries different types and sizes
- c) Carry out electroacoustic measurements for the body level and ear level hearing aids Program the hearing aid for different configuration and degrees of hearing loss (at least 5 different audiograms) using different prescriptive formulae

- d) Program the hearing aid for different listening situations (at least 3 different situations)
- e) Vary the compression settings in a digital hearing aid and note down the differences in the output
- f) Perform real ear insertion measurements using different hearing aids (body level and ear level, hearing aids of different gains)
- g) Compare speech perception through conventional BTE and RIC hearing aids using a rating scale
- h) Observe assistive listening devices such as telephone amplifier, vibro-tactile alarms, note down the candidacy and their utility.
- i) Administer a questionnaire to assess hearing aid benefit on 2 persons using hearing aids.
- j) Carry out a role play activity of counselling a hearing aid user Ear Molds
- k) Take impression for the ear mold using different techniques, different methods and using different materials
- l) Make hard mold for any 2 ears
- m) Make soft mold for any 2 ears
- n) Make vent in hard molds you made

### **Recommended Reading**

- a) Dillon. (2012). Hearing Aids (2 edition). Thieme Medical and Scientific Publisher.
- Hall, J. W., & Mueller, H. G. (1998). Audiologists' Desk Reference: Audiologic management, rehabilitation, and terminology. Singular Publishing Group.
- b) Kates, J. M. (2008). Digital Hearing Aids (1 edition). San Diego: Plural Publishing Inc.
- c) Metz, M. J. (2014). Sandlin's Textbook of Hearing Aid Amplification: Technical and Clinical Considerations. Plural Publishing.
- d) Mueller, H. G., Hawkins, D. B., & Northern, J. L. (1992). Probe Microphone Measurements: Hearing Aid Selection and Assessment. Singular Publishing Group.
- Mueller, H. G., Ricketts, T. A., & Bentler, R. A. (2007). Modern Hearing Aids: Pre-fitting Testing and Selection Considerations: 1 (1 edition). San Diego, CA: Plural Publishing Inc.
- e) Sandlin, R. E. (Ed.). (1989). Handbook of Hearing Aid Amplification: Clinical Considerations and Fitting Practices v. 2. Boston: Singular Publishing Group.
- Sandlin, R. E. (Ed.). (1993). Understanding Digitally Programmable Hearing AIDS. Boston: Allyn & Bacon.
- f) Tate, M. (2013). Principles of Hearing Aid Audiology. Springer.
- g) Taylor, B., & Mueller, H. G. (2011). Fitting and Dispensing Hearing Aids (1 edition). San Diego: Plural Publishing Inc.
- h) Valente, M. (2002). Hearing Aids: Standards, Options, and Limitations. Thieme.

## **B 3.5 Clinicals in Speech Language Pathology**

**Marks - 100**

### **General considerations:**

Exposure is primarily aimed to be linked to the theory courses covered in the semester.

After completion of clinical postings in Speech –language diagnostics, the student will know (concepts), know how (ability to apply), show (demonstrate in a clinical diary/log book based on clinical reports/recordings, etc), and do (perform on patients/ client contacts) the following:

### **Know:**

Procedures to obtain a speech language sample for speech & language assessment from children of different age groups such as, pre schoolers, kindergarten, primary school and older age groups.

Methods to examine the structures of the oral cavity/organs of speech.

The tools to assess language abilities in children (with hearing impairment, specific language impairment & mixed receptive language disorder).

Development of speech sounds in vernacular and linguistic nuances of the language.

### **Know-how:**

To evaluate speech and language components using informal assessment methods. To administer at least two standard tests for childhood language disorders.

To administer at least two standard tests of articulation/ speech sounds.

To assess speech intelligibility.

### **Show:**

Analysis of language components – Form, content & use – minimum of 2 samples. Analysis of speech sounds at different linguistic levels including phonological processes – minimum of 2 samples.

Transcription of speech language samples – minimum of 2 samples.

Analyse differences in dialects of the local language.

### **Do:**

Case history - minimum of 5 individuals with speech & language disorders.

Oral peripheral examination - minimum of 5 individuals.

Language evaluation report – minimum of 5.

Speech sound evaluation report – minimum of 5.

### **Evaluation:**

Internal evaluation shall be based on attendance, clinical diary, log book and learning conference.

External evaluation: Spot test, OSCE, Record, Viva-voce, case work

## B 3.6 Clinicals in Audiology

Marks - 100

### General consideration

Exposure is primarily aimed to be linked to the theory courses covered in the semester, however, not just limited to these areas.

After completion of clinical postings in auditory diagnostics and auditory rehabilitation, the student will Know (concept), know how (ability to apply), show (demonstrate in a clinical diary/log book), and do (perform on patients/client contacts) the following

### Know:

Methods to calibrate audiometer.

Materials commonly employed in speech audiometry.

Calculation pure tone average, % of hearing loss, minimum and maximum masking levels.

Different types of hearing loss and its common causes

### Know-how:

To obtain detailed case history from clients or parents/guardians. To carry out commonly used tuning fork tests.

To administer pure tone audiometry including appropriate masking techniques on adults using at least techniques

To administer tests to find out speech reception threshold, speech identification scores, most comfortable and uncomfortable levels on adults.

### Show:

Plotting of audiograms with different degree and type with appropriate symbols – 2 audiograms per degree and type

Detailed case history taken and its analysis

Calculation degree, type and percentage of hearing loss on 5 sample conditions

### Do:

Case history on at least 5 adults and 3 children with hearing disorders

Tuning fork test on at least 2 individuals with conductive and 2 individuals with sensori-neural hearing loss

Pure tone audiometry with appropriate masking on 5 individuals with conductive, 5 individuals SN hearing loss and 3 individuals with unilateral/asymmetric hearing loss – 5

### Evaluation:

Internal evaluation shall be based on attendance, clinical diary, log book and learning conference.

External evaluation: Spot test, OSCE, Record, Viva-voce, case work

**Semester IV**  
**B 4.1 Motor Speech Disorders in Children**

Hours – 60

Marks - 100

**Objectives:** After completing this course, the student will be able to

- Describe the characteristics of motor speech disorders in children such as cerebral palsy, childhood apraxia of speech and other childhood dysarthrias
- Assess the speech and non-speech aspects associated with the above conditions plan and execute therapy strategies for children with motor speech disorders

**Unit1: Neuro-developmental processes in speech production and motor speech disorders**

- a) Review of neuro-anatomy (cerebral cortex, sub-cortical structures, brainstem, cerebellum, spinal cord & cranial nerves, pyramidal and extra-pyramidal systems)
- b) Sensory-motor integration (spatial temporal planning, motor planning and feedback)
- c) Anatomic development of speech production systems
- d) Development of neural pathways of speech motor control (brain maturation, reflexes, sensory and motor)
- e) Dysarthria in children – cerebral palsy – disorders of tone (spastic, flaccid): definition, etiology, characteristics and associated problems
- f) Dysarthria in children – cerebral palsy – disorders of movement (hyperkinetic, hypokinetic) and disorder of balance (ataxia): definition, etiology, characteristics and associated problems
- g) Dysarthria in children – lower motor neuron and other syndromes with motor speech disorders
- h) Childhood apraxia of speech and nonverbal oral apraxia: definition, characteristics and classification

## **Unit 2: Assessment of motor speech disorders in children**

- a) Case history and developmental neurological evaluation – primitive postural and oro- pharyngeal reflexes, cranial nerve examination
- b) Assessment of oral sensory and motor capacity – Oral peripheral mechanism examination, neuro- muscular status
- c) Assessment of speech sub-systems – quantitative and qualitative
- d) Assessment of speech intelligibility and comprehensibility
- e) Assessment of associated problem
- f) Speech assessment with specific reference to childhood apraxia of speech – Phonetic and phonemic inventory, phonotactics and syllable sequencing, variability of errors, speech intelligibility, fluency and prosody
- g) Test materials – checklist for childhood apraxia of speech, screening test for developmental apraxia of speech
- h) Protocols for non-verbal and verbal praxis specific to Indian languages
- i) Differential diagnosis- dysarthria and other developmental disorders
- j) Differential diagnosis - childhood apraxia of speech and other developmental disorders

## **Unit 3: Management of childhood dysarthria**

- a) Team approach in rehabilitation of motor speech disorders in children
- b) Neuro-developmental therapy
- c) Non speech oral-motor exercises: its application for children with dysarthria
- d) Management of drooling
- e) Behavioral management of respiratory, phonatory, resonatory and articulatory subsystems
- f) Prosthetic appliances in treatment of childhood dysarthria
- g) AAC in management of motor speech disorders- role of devices, AAC team, candidacy and pre-requisites, symbol selection, techniques, assessment for AAC, effective use of AAC
- h) Case studies: Planning intervention for children with dysarthria

#### **Unit 4: Management of childhood apraxia of speech**

- a) Principles of motor learning
- b) Integral stimulation – dynamic temporal cueing
- c) Multisensory and tactile cueing techniques (motor kinesthetic speech training, sensory motor approach, PROMPTS, Touch cue method & speech facilitation)
- d) Gestural cueing techniques (signed target phoneme therapy, adapted cueing techniques, cued speech, visual phonics, & Jordon's gestures)
- e) Miscellaneous techniques (melodic intonation therapy, multiple phonemic approach, & instrumental feedback)
- f) Cognitive/conceptual/ linguistic /phonological remedial approaches - phonotactics Other approaches: Vowel and diphthong remediation techniques (Northampton (Yale) vowel chart and Alcorn symbols), Nancy Kauffman's speech praxis treatment kit
- g) Use of AAC in childhood apraxia of speech
- h) Evidence-based practice in intervention for childhood apraxia of speech, Case studies: Planning intervention for childhood apraxia of speech

#### **Unit 5: Feeding and swallowing disorders in children**

- a) Embryology- periods and structures of development
- b) Anatomical structures of swallowing- upper aero digestive system, anatomic difference between adults and children
- c) Physiology of swallowing- swallow phases, neural control of swallowing, reflexes related to swallowing, suckling and sucking, airway and swallowing
- d) Terms involved in dysphagia and development of feeding skills
- e) Causes of dysphagia in children
- f) Signs and symptoms of dysphagia in children
- g) Assessment – inferences from neural developmental assessment, cranial nerve examination, assessment scales, nutritive and non-nutritive assessment, instrumental assessment (VFS, cervical auscultation), gastrointestinal evaluation
- h) Management: positioning, oral- motor treatment, team approach, non oral feeding, transitional feeding, modifications in feeding
- i) Role of speech-language pathologist in neonatal intensive care with reference to feeding and swallowing



## Practicals

- a) With the help of models, charts and software, identify the motor control centers in the brain.
- b) Perform oro-motor examination in five children and adults and compare Identify oro-motor reflexes (rooting, suckling, & phase bite) in 5 infants.
- c) Demonstrate normal posture and breathing patterns required for varied speech tasks. Alter the postures and breathing patterns and notice changes in speech patterns.
- d) Assess DDK rate in five typically developing children.
- e) Rate intelligibility of speech in five typically developing children. Discuss factors that influenced speech intelligibility and their ratings.
- f) Observe and record (a) physical status, (b) oral sensory motor abilities and vegetative skills, (c) respiration, (d) phonation, (e) resonance, (f) articulation and (g) language abilities in five typically developing children. Compare these with observations made from children with motor speech disorders.
- g) Perform oro-motor exercises – isotonic and isometric. Discuss strategies to modify exercises for children.
- h) Identify from video the AAC system such as low technology vs high technology systems and different symbol system, that is, Bliss symbols, IICP symbols and different signing systems – Makaton.
- i) Observe feeding and swallowing skills in different age groups of children: 2 newborns; 2 infants, 2 toddlers, and 2 older children. Identify the differences in feeding methods, food consistencies, texture, quantity, feeding habits, feeding appliances used by these children.

## Recommended Reading

- a) Arvedson, J.C., and Brodsky, L. (2002) (2nd Ed.). Pediatric swallowing and feeding. San Diego, Singular publishing.
- b) Caruso, F. J. and Strand, E. A. (1999). Clinical Management of Motor Speech Disorders in Children. New York: Thieme.
- c) Hardy, J. (1983). Cerebral Palsy. Remediation of Communication Disorder Series by
- d) F.N. Martin. Englewood Cliffs, Prentice Hall Inc.
- e) Love, R.J. (2000) (2nd Ed). Childhood Motor Speech Disorders. Allyn & Bacon.  
Love, R.J. and Webb, W.G. (1993). (2nd ed.) Neurology for the Speech-Language Pathologist. Reed Publishing (USA)
- f) Rosenthal. S., Shipp and Lotze (1995). Dysphagia and the child with developmental disabilities. Singular Publishing Group.
- g) Velleman, S. L (2003). Resource guide for Childhood Apraxia of Speech. Delmar/Thomson Learning.

## B 4.2 Child Language Disorders

Hours – 60

Marks - 100

**Objectives:** After completing this course, the student will be able to

- Explain the process of acquisition of language and factors that influence its development in children.
- Identify and assess language delay and deviance in children.
- Select appropriate strategies for intervention.
- Counsel and provide guidance to parents/caregivers of children with language disorders.

### Unit 1: Bases of language acquisition, development and disorders

- a) Theories of language acquisition 1: Biological, Psycholinguistic/syntactic theory
- b) Theories of language acquisition 2: Cognitive, social interaction/pragmatic, information processing, behavioral
- c) Pre-cursors for normal development of language
- d) Development of components of language from birth to two years (pre-linguistic/pre- symbolic to symbolic)
- e) Development of components of language during preschool period
- f) Development of components of language during early school age and beyond
- g) Basic concepts and terminologies of language development in bilingual children – simultaneous versus sequential language acquisition, additive and subtractive bilingualism, process of second language acquisition, variables influencing second language acquisition
- h) Development of language in culturally diverse environments and exceptional circumstances – neglect and abuse, twins, low-socio economic background
- i) Over view of language disorders – definition and classification based on ICD, DSM
- j) Application of ICF in language disorders

## **Unit 2: Language disorders – definition, classification, causes, and characteristics**

- a) Intellectual disability: definition, classification, causes and characteristics
- b) Autism spectrum disorders: definition, classification, causes and characteristics
- c) Attention deficit hyperactive disorder: definition, classification, causes and characteristics
- d) Language impairment - mixed receptive and expressive language disorder, specific language impairment: definition, classification, causes and characteristics
- e) Learning disability: definition, classification, causes and characteristics
- f) Acquired childhood aphasia: definition, classification, causes and characteristics
- g) Sensory impairments and language disorders: types, causes and characteristics
- h) Syndromic conditions leading to language difficulties: William syndrome, fragile x syndrome, Down syndrome
- i) Other developmental disabilities: deaf-blind, cerebral palsy and multiple disabilities

## **Unit 3: Assessment of language in children**

- a) Preliminary components of assessment: Case history, screening, evaluation of environmental, linguistic & cultural variables.
- b) Methods to assess children with language disorder: Formal versus informal assessment; types of assessment materials: assessment scales, observational checklists, developmental scales; standardization, reliability, validity, sensitivity and specificity of test materials
- c) Informal assessment - pre-linguistic behavior, play, mother-child interaction Language sampling: planning and collecting representative sample; strategies to collecting language sample, audio-video recording, transcription
- d) Analysis of language sample: Specific to various components of language such as phonology, morphology, syntax, semantics and pragmatics.
- e) Test materials for assessing language skills: Assessment of Language Development (ALD), 3D-Language Assessment Test, Linguistic Profile Test, Com-DEALL checklist, other Indian and global tests
- f) Test materials used for children with developmental delay, intellectual disability: Madras Developmental Program Scale, Bayley's Scale for infant and toddler development
- g) Test materials used for children with autism spectrum disorder: Modified-Checklist for Assessment of Autism in Toddlers, Childhood Autism Rating Scale, Indian Scale for Assessment of Autism
- h) Other test materials used for children with ADHD, ACA, LD (NIMH battery for assessment of Learning Disability)
- i) Documenting assessment results: diagnostic report, summary report and referral report specific to disorder
- j) Differential diagnosis of language disorders in children

#### **Unit 4: Management of language disorders in children - I**

- a) General principles and strategies of intervention in children with language impairment – purpose of intervention, basic approaches to language intervention (developmental or normative approach, functional approach)
- b) Types of service delivery models - Individuals versus group; direct versus tele-rehabilitation; structure of therapy session, setting the environment, furniture, seating arrangements
- c) Reinforcement in language therapy, types and schedules of reinforcement
- d) Choice of language for intervention, incorporating principles of multiculturalism into treatment activities
- e) Choosing and framing goals and Objectives: SMART Objectives
- f) Specific treatment techniques
- g) Incidental teaching, self-talk, parallel talk, expansion, extension, recasting, joint routines, joint book reading, whole language, modifying linguistic input, communicative temptations drill, modelling, focused stimulation, vertical structuring, milieu teaching, and model
- h) Caregivers and family in intervention: Structured and informal approaches

#### **Unit 5: Management of language disorders in children - II**

- a) Team approach to intervention
- b) Augmentative and alternative communication – types (aided and unaided) and application in child language disorders
- c) Specific approaches to management of children with Autism: PECS, Lovaas, TEACCH, Com-DEALL, ABA, Facilitated Communication
- d) Approaches to management of children with LD
- e) Strategies to facilitate language skills in children with disorders such as intellectual disability: Redundancy, chunking, chaining
- f) Use of technology in language intervention
- g) Home plan and counselling for children with language disorders
- h) Documentation specific to the disorder: pre-therapy; lesson plan; SOAP notes
- i) Documentation specific to the disorder: summary report, referral report
- j) Decision making in therapy: transition to next objective, termination of therapy

## Practicals

- a) Record mother-child interaction of one typically developing child in the age range of 0-1, 1-2, 2-4, 4-6 and 6-8 years of age. Compare linguistically the outputs from the mother and the child across the age groups. Make inferences on socio cultural influences in these interactions.
- b) Make a list of loan words in two familiar languages based on interaction with 10 typically developing children in the age range of 2-4, 4-6, 6-8 and 8-10 years. Discuss the influence of bi- or multilingualism on vocabulary.
- c) Record a conversation and narration sample from 3 children who are in preschool kindergarten, and primary school. Perform a language transcription and analyze for form, content and use.
- d) Administer 3D LAT, ALD, LPT, ComDEALL checklist on 2 typically developing children.
- e) Draft a diagnostic report and referral letter for a child with language disorder. Demonstrate general language stimulation techniques and discuss the clinical application.
- f) Demonstrate specific language stimulation techniques with appropriate materials and discuss its clinical applications.
- g) Draft Subjective Objective Assessment Plan (SOAP) for a pre-recorded sample of a 45 minute session of intervention for a child with language disorder.
- h) Draft a lesson plan for a child with language disorder.
- i) Draft a discharge summary report for a child with language disorder

## Recommended Reading

- a) Roseberry-McKibbin, C. (2007). Language Disorders in Children: A multicultural and case perspective. Boston: Pearson Education, Inc.
- b) Paul, R. (2013). Language disorders from infancy through adolescence (4th ed.). St.Louis, MO: Mosby. Dwight, D.M. (2006). Here's how to do therapy: Hand-on core skills in speech language pathology. San Diego, CA: Plural Publishing
- c) Hegde, M.N. (2005). Treatment protocols for language disorders in children – Vol. 1
- d) 2. San Diego: Plural Publishing
- e) Owens, R.E. (2008). Language development: An introduction (7th ed.). Boston: Pearsons
- f) Reed, V.A. (2004). An Introduction to children with language disorders (3rd Ed.) New York: Allyn & Bacon
- g) Rout, N and Kamraj, P (2014). Developing Communication - An Activity Book, A publication by NIEPMED, Chennai. Freely downloadable from <http://niepmd.tn.nic.in/publication.php>. ISBN 978-81-928032-41

### **B 4.3 Diagnostic Audiology: Physiological Tests**

Hours – 60

Marks - 100

**Objectives:** After completing this course, the students will be able to justify the

- Need for using the different physiological tests in the audiological assessment
- Independently run the tests and interpret the results to detect the middle ear, cochlear and retro cochlear pathologies and also differentially diagnose design tailor-made test protocols in Immittance, AEPs and OAEs as per the clinical need.
- Make appropriate diagnosis based on the test results and suggest referrals.

#### **Unit 1: Immittance evaluation**

- a) Clinical significance of physiological tests in audiology
- b) Immittance evaluation: Principle of immittance evaluation, Concept of impedance and admittance, their components,
- c) Tympanometry: definition, measurement procedure, response parameters, their measurement and normative, classification of tympanogram, clinical significance of tympanometry
- d) Eustachian tube functioning tests of tympanometry: basics of pressure equalization function of ET, Valsalva, Toynbee, William's pressure swallow, inflation-deflation test.
- e) Overview on multicomponent and multi-frequency tympanometry
- f) Overview on wide band reflectance and wide band tympanometry
- g) Reflexometry: definition, acoustic reflex pathway, measurement procedure, clinical applications of acoustic reflexes, special tests

#### **Unit 2: Auditory evoked potentials (AEPs): Auditory brainstem response (ABR)**

- a) Introduction and classification of AEPs,
- b) Instrumentation and Principles of AEP recording techniques
- c) Auditory brainstem response generators
- d) Protocol and procedure of recording auditory brainstem response
- e) Factors affecting auditory brainstem responses
- f) Clinical applications of ABR, ABR in the paediatric population
- g) Role of ABR in infant hearing screening

### **Unit 3: Overview of other AEPs**

- a) ECoChG
- b) Auditory Middle Latency Responses (AMLR) and their clinical applications
- c) Auditory Long Latency Responses (Obligatory responses) and their clinical applications
- d) Other long latency potentials such as P300, MMN, P600, N400, T-complex, CNV and their clinical applications
- e) ASSR: Instrumentation, recording and clinical applications
- f) Brainstem responses to speech and other complex signals

### **Unit 4: Otoacoustic emissions**

- a) Introduction to otoacoustic emissions origin and classification of OAEs
- b) Instrumentation
- c) Procedure of OAE measurement: SOAE, TEOAEs, and DPOAEs
- d) Interpretation of results: SOAE, TEOAEs, and DPOAEs
- e) Clinical applications of OAEs: SOAE, TEOAEs, and DPOAEs, Contralateral suppression of OAEs and its clinical implications

### **Unit 5: Physiological tests for assessment of vestibular system**

- a) Electronystagmography: procedure, interpretation, clinical applications  
Videonystagmography, videooculograph
- b) Vestibular Evoked Myogenic Potentials
- c) Overview of Rotatory chair test, video Head Impulse Test, Overview of Dynamic Posturography

### **Practicals**

- a) Measure admittance in the calibration cavities of various volumes and note down the observations
- b) Calculate Equivalent ear canal volume by measuring static admittance in an uncompensated tympanogram (10 ears)
- c) Do tympanogram in the manual mode and measure peak pressure, peak admittance and ear canal volume manually using cursor (10 ears).
- d) Measure gradient of the tympanogram (10 ears)
- e) Administer Valsalva and Toynbee and William's pressure swallow test(5 ears)
- f) Record acoustic reflex thresholds in the ipsi and contra modes, (10 ears)
- g) Plot Jerger box pattern for various hypothetical conditions that affect acoustic reflexes and interpret the pattern and the corresponding condition.
- h) Carry out Acoustic reflex decay test and quantify the decay manually using cursor (5 individuals).

- i) Trace threshold of ABR (in 5 dBnHL steps near the threshold) for clicks and tone bursts of different frequencies (2 persons) and draw latency intensity function.
- j) Record ABR using single versus dual channels and, note down the differences
- k) Record ABR at different repetition rates in 10/sec step beginning with 10.1/11.1 per second. Latency-repetition rate function needs to be drawn. Record with each of three transducers (HP, insert phones and bone vibrator) and polarities and draw a comparative table of the same. Students should also record with different transducers without changing in the protocol in the instrument and calculate the correction factor required.
- l) Record ASSR for stimuli of different frequencies and estimate the thresholds
- m) Record TEOAEs and note down the amplitude, SNR, noise floor and reproducibility at octave and mid-octave frequencies. Note down the stimulus stability and the overall SNR (10 ears).
- n) Record DPOAEs and note down the amplitude, SNR, noise floor and reproducibility at octave and mid-octave frequencies (10 ears)

### **Recommended Reading**

- a) Hall, J. W., & Mueller, H. G. (1996). *Audiologists' Desk Reference: Diagnostic audiology principles, procedures, and protocols*. Cengage Learning.
- b) Hood, L. J. (1998). *Clinical Applications of the Auditory Brainstem Response*. Singular Publishing Group.
- c) Hunter, L., & Shahnaz, N. (2013). *Acoustic Immittance Measures: Basic and Advanced Practice* (1 edition). San Diego, CA: Plural Publishing.
- d) Jacobson, G. P., & Shepard, N. T. (2007). *Balance Function Assessment and Management* (1 edition). San Diego, CA: Plural Publishing Inc.
- e) Jacobson, J. T. (1985). *The Auditory brainstem response*. College-Hill Press.
- f) Katz, J., Medwetsky, L., Burkard, R. F., & Hood, L. J. (Eds.). (2007). *Handbook of Clinical Audiology* (6th revised North American ed edition). Philadelphia: Lippincott Williams and Wilkins.
- g) McCaslin, D. L. (2012). *Electronystamography/Videonystamography* (1 edition). San Diego: Plural Publishing.
- h) San Diego: Plural Publishing.
- i) Musiek, F. E., Baran, J. A., & Pinheiro, M. L. (1993). *Neuroaudiology: Case Studies* (1 edition). San Diego, Calif: Singular.
- j) Robinette, M. S., & Glatcke, T. J. (Eds.). (2007). *Otoacoustic Emissions: Clinical Applications* (3rd edition). New York: Thieme.



## **B 4.4 Implantable Hearing Devices**

Hours – 60

Marks - 100

**Objectives:** After completing this course, the students will be able to

- Assess candidacy for bone anchored hearing devices, middle ear implants, cochlear implants, and ABI
- Select the appropriate device depending on the audiological and non-audiological findings
- Handle post-implantation audiological management
- Assess the benefit derived from implantation, and counsel the parents/care givers during different stages of implantation

### **Unit 1: Implantable hearing devices – basics**

- a) Need for implantable hearing devices
- b) History of implantable hearing devices (bone anchored hearing devices, middle ear implants, cochlear implants, auditory brainstem implants and midbrain implants)
- c) Candidacy for implantable hearing devices
- d) Team involved in implantable hearing devices
- e) Pre-implant counseling, Informed consent

### **Unit 2: Bone anchored hearing devices and middle ear implants**

- a) Types, components
- b) Surgical approaches, risks, complications
- c) Audiological evaluations for candidacy, contraindications
- d) Assessment of benefits

### **Unit 3: Cochlear implant and brain stem implants – basics**

- a) Terminology, types, components and features
- b) Bilateral, bimodal and hybrid cochlear implants
- c) Factors related to selection of the device, funding sources
- d) Surgical approaches, risks, complications
- e) Audiological and non-audiological candidacy criteria, contraindications

## **Unit 4: Cochlear implants and brainstem implants**

- a) Signal coding strategies, classification, types
- b) Intraoperative monitoring by audiologists
- c) Objective measures: ESRT, ECAP, prom stim, EABR, aided cortical potentials
- d) Post implant Mapping: schedule, pre-requisites, switch-on, mapping parameters, impedance, compliance, role of objective and subjective measures in mapping, post mapping audiological evaluation
- e) Assessment of benefits
- f) Optimization of hearing aid on contralateral ear

## **Unit 5: Implantable hearing devices - Counselling and troubleshooting; Rehabilitation**

- a) Post implant Counselling on care and maintenance and trouble shooting of the device
- b) Overview of post implant rehabilitation including AVT
- c) Factors affecting outcome of implantable devices in adults and children

## **Practicals**

- a) Watch videos of BAHA, middle ear implant, cochlear implant
- b) Create hypothetical cases (at least 5 different cases) who are candidates for cochlear implantation. Make protocol for recording an EABR
- c) List down the technological differences across different models of cochlear implants from different companies, their cost
- d) Observation of mapping Watching of videos on AVT
- e) Watch video on cochlear implant surgery

## Recommended Reading

- a) Clark, G., Cowan, R. S. C., & Dowell, R. C. (1997). Cochlear Implantation for Infants and Children: Advances. Singular Publishing Group.
- b) Cooper, H., & Craddock, L. (2006). Cochlear Implants: A Practical Guide. Wiley.
- c) Dutt, S. N. (2002). The Birmingham Bone Anchored Hearing Aid Programme: Some Audiological and Quality of Life Outcomes. Den Haag: Print Partners Ipskamp.
- d) Eisenberg, L. S. (2009). Clinical Management of Children with Cochlear Implants. Plural Publishing.
- e) Gifford, R. H. (2013). Cochlear Implant Patient Assessment: Evaluation of Candidacy, Performance, and Outcomes. Plural Publishing.
- f) Hagr, A. (2007). BAHA: Bone-Anchored Hearing Aid. International Journal of Health Sciences, 1(2), 265–276.
- g) Kim C. S., Chang S. O., & Lim D. (Eds.). (1999). Updates in Cochlear Implantation: The 2nd Congress of Asia Pacific Symposium on Cochlear Implant and Related Sciences, Seoul, April 1999 (Vol. 57). Seoul: KARGER.
- h) Kompis, M., & Caversaccio, M.-D. (2011). Implantable Bone Conduction Hearing Aids. Karger Medical and Scientific Publishers.
- i) Mankekar, G. (2014). Implantable Hearing Devices other than Cochlear Implants. Springer India.
- j) Møller A.R. (2006). Cochlear and Brainstem Implants (Vol. 64).
- k) Niparko, J. K. (2009). Cochlear Implants: Principles & Practices. Lippincott Williams & Wilkins.
- l) Ruckenstein, M.J. (Ed.). (2012). Cochlear Implants and Other Implantable Hearing Devices. Plural.
- m) Suzuki J.L. (1988). Middle Ear Implant: Implantable Hearing Aids (Vol. 4). KARGER.
- n) Thoutenhoofd, E. (2005). Paediatric cochlear implantation: evaluating outcomes. Whurr.
- o) Valente, M. (2002). Strategies for selecting and verifying hearing aid fittings. 2nd Edn. Thieme.

## **B 4.5 Research Methods and Statistics**

Hours – 60

Marks - 100

**Objectives:** After completing this course, the student will be able to understand the

- Basic concept of research in the field of audiology and speech-language pathology design and execution of research
- Ethical guidelines for conducting research

### **Part A: Research Methods**

#### **Unit I: Introduction to research methods**

- a) Meaning and purpose of research: meaning
- b) Need for research in audiology and speech-language pathology
- c) Funds/grants for research
- d) Steps in research: identification, selection
- e) Formulation of research questions: aims, objectives, statement of problem, hypothesis
- f) Types of variables; types of sampling procedures (random and non-random)
- g) Types/ methods of data collection and their advantages and disadvantages
- h) Reliability and validity (internal and external validity)

#### **Unit II: Research design in audiology and speech-language pathology**

- a) Types of research: survey, ex-post facto research, normative research, standard-group comparison
- b) Experimental and quasi experimental research: group design & single subject design Internal and external validity of research
- c) Between groups vs. repeated measures design
- d) Documentation of research: scientific report writing, different formats or styles (APA, AMA and MLA),
- e) Ethics of research

## **Part B: Statistics**

### **Unit III: Introduction to statistics and data collection**

- a) Application of statistics in the field of Audiology and speech-language pathology.
- b) Scales of measurement: nominal, ordinal, interval, ratio
- c) Classification of data: class intervals, continuous and discrete measurement
- d) Normal distribution: general properties of normal distribution, theory of probability, area under normal probability curve
- e) Variants from the normal distribution: skewness and kurtosis
- f) Measure of central tendency: mean, median, mode
- g) Measures of variability: range, deviation (average and standard deviation), variance

### **Unit IV: Statistics and research designs**

- a) Choosing statistics for different research designs
- b) Correlational techniques: Pearson's Product Moment Correlation Coefficient; Spearman's Rank order correlation coefficient
- c) Statistical inference: concept of standard error and its use; the significance of statistical measures; testing the significance of difference between two means z-test, t-test; analysis of variance, post hoc tests,
- d) Non-parametric tests: Chi-square test, Wilcoxon test, Mann-Whitney U test, Reliability and validity of test scores: reliability and validity, Item analysis Analysis of qualitative data
- e) Software for statistical analysis

### **Unit V: Epidemiology**

- a) Basic epidemiologic concepts and principles Epidemiologic data sources and measurements
- b) Epidemiologic methods – questionnaire survey, screening, personal survey, testing
- c) Media - their advantages and disadvantages
- d) Incidence and prevalence of hearing, speech, language disorders as per different census (NSSO, WHO)

## Recommended Reading

- a) Dane F. C. (2011). Sampling and Measurement. In Evaluating research: Methodology for people who need to read research. New Delhi: SAGE publication.
- Field, A. (n.d.). Discovering Statistics Using IBM SPSS (4th ed.). SAGE Publications.
- b) Hegde M. N. (2010). A course book on Scientific and professional writing for speechlanguage pathology (4thEdition), Singapore: Delmar publication.
- c) Hegde, M. N. (2003). Clinical research in communicative disorders: Principles and strategies. (3rd Edition), Austin: Pro-ed
- d) Hesse-Biber, S. N. &Leavy, P. (2011). The Ethics of social research. In The Practiceof qualitative research. (2nd Edition), New Delhi: SAGE publication.
- e) Jekel, F. J., Katz, L.D., & Elmore, G.J (2001). Basic Epidemiologic Concepts and Principles in epidemiology, Biostatistics, and Preventive Medicine (2nd Edition). Pennsylvian: Saunders
- f) Meline, T. (2010). A research primer for communication sciences and disorders. Singapore: Pearson publication.

## **B 4.6 Clinicals in Speech-language Pathology**

Marks – 100

### **General considerations:**

Exposure is primarily aimed to be linked to the theory courses covered in the semester.

After completion of clinical postings in Speech –language diagnostics, the student will know (concepts), know how (ability to apply), show (demonstrate in a clinical diary/log book based on clinical reports/recordings, etc), and do (perform on patients/ client contacts) the following:

### **Know:**

Speech & language stimulation techniques.

Different samples /procedures required to analyse voice production mechanism. (acoustic/ aerodynamic methods / visual examination of larynx/ self evaluation) Different samples /procedures required to analyse speech production mechanism in children with motor speech disorders.

### **Know-how:**

To administer at least two more (in addition to earlier semester) standard tests for childhood language disorders.

To administer at least two more (in addition to earlier semester) standard tests of articulation/ speech sounds.

To set goals for therapy (including AAC) based on assessment/test results for children with language and speech sound disorders.

To record a voice sample for acoustic and perceptual analysis.

To assess parameters of voice and breathing for speech.

Assessment protocol for children with motor speech disorders including reflex profile and swallow skills.

Counselling for children with speech-language disorders.

**Show:**

Acoustic analysis of voice – minimum of 2 individuals with voice disorders. Simple aerodynamic analysis - minimum of 2 individuals with voice disorders. Self-evaluation of voice – minimum of 2 individuals with voice disorders.

Informal assessment of swallowing – minimum of 2 children.

Assessment of reflexes and pre linguistic skills - minimum of 2 children.

Pre –therapy assessment and lesson plan for children with language and speech sound disorders - minimum of 2 children each.

**Do:**

Case history - minimum of 2 individuals with voice disorders. Case history - minimum of 2 children with motor speech disorders Oral peripheral examination- minimum of 5 children

Apply speech language stimulation/therapy techniques on 5 children with language disorders (with hearing impairment, specific language impairment & mixed receptive language disorder)/speech sound disorders – minimum of 5 sessions of therapy for each child.

Exit interview and counselling - minimum of 2 individuals with speech language disorders.

**Evaluation:**

Internal evaluation shall be based on attendance, clinical diary, log book and learning conference.

External evaluation: Spot test, OSCE, Record, Viva-voce, case work



## B4.6 Clinicals in Audiology

Marks – 100

### General considerations:

Exposure is primarily aimed to be linked to the theory courses covered in the semester, however, not just limited to these areas.

After completion of clinical postings in auditory diagnostics and auditory rehabilitation, the student will Know (concept), know how (ability to apply), show (demonstrate in a clinical diary/log book), and do (perform on patients/client contacts) the following

### Know:

Indications to administer special tests  
Procedures to assess the listening needs

National and international standards regarding electroacoustic characteristics of hearing aids

### Know-how:

To administer at least 1 test for adaptation, recruitment and functional hearing loss.  
Counsel hearing aid user regarding the use and maintenance hearing aids

To troubleshoot common problems with the hearing aids

To select test battery for detection of central auditory processing disorders.

Select different types of ear moulds depending on type of hearing aid, client, degree, type and configuration of hearing loss

### Show:

Electroacoustic measurement as per BIS standard on at least 2 hearing aids

How to process 2 hard and 2 soft moulds

How to preselect hearing aid depending on listening needs and audiological findings

on at least 5 clinical situations (case files)

How select test battery depending on case history and basic audiological information

– 3 situations

**Do:**

Tone decay test – 2 individuals with sensori-neural hearing loss  
Strenger test – 2 individuals with unilateral/asymmetrical hearing loss.  
Dichotic CV /digit, Gap detection test – 2 individuals with learning difficulty or problem in hearing in noise

Hearing aid fitment for at least 5 individuals with mild to moderate and 3 individuals with mod-severe to profound

Hearing aid selection with real ear measurement system on 3 individuals with hearing impairment

**Evaluation:**

Internal evaluation shall be based on attendance, clinical diary, log book and learning conference.

External evaluation: Spot test, OSCE, Record, Viva-voce, case work

## Semester V

### B 5.1 Structural Anomalies and Speech Disorders

Hours - 60

Marks - 100

**Objectives:** After completing the course, the student will be able to

- Understand the characteristics of disorders with structural anomalies including speech evaluate and diagnose the speech characteristics seen in these disorders
- Learn about the techniques for the management of speech disorders in these conditions

#### Unit 1: Speech characteristics of persons with cleft lip and palate

- a) Types, characteristics and classification of cleft lip and palate
- b) Causes of cleft lip and palate: genetic, syndrome and others
- c) Velopharyngeal inadequacy: types, causes and classification
- d) Associated problems in persons with cleft lip and palate: speech, language, feeding, dental and occlusion, hearing, psychological

#### Unit 2: Assessment and management of cleft lip and palate speech

- a) Team of professionals in the management of persons with cleft lip and palate: their roles in diagnosis and management.
- b) Assessment of persons with cleft lip and palate for speech language functions:  
Subjective assessment of speech characteristics and speech intelligibility: proforma, tests, scales and others.
- c) Objective assessment of phonatory, resonatory and articulatory features
- d) Diagnosis and differential diagnosis of speech related functions
- e) Subjective assessment of language and communication functions
- f) Reporting test results using Universal Parameters
- g) Management of persons with cleft lip and palate
- h) Surgical and prosthetic management
- i) Techniques and strategies to correct speech sound disorders
- j) Techniques and strategies to improve feeding
- k) Counselling and guidance

### **Unit 3: Structural anomalies of tongue and mandible - Characteristics, assessment and management**

- a) Types, classification and characteristics of structural anomalies of tongue and mandible
- b) Causes for structural anomalies of tongue and mandible
- c) Team of professionals in the management of persons with structural anomalies of tongue and mandible and their roles
- d) Associated problems in persons with structural anomalies of tongue and mandible:
  - Speech
  - Feeding
  - Dental and occlusion Psychological and others
- e) Management of persons with structural anomalies of tongue and mandible
- f) Surgical and prosthetic management
- g) Techniques and strategies to improve speech intelligibility
- h) Techniques and strategies to improve feeding
- i) Counselling and guidance for persons with glossectomy and mandibulectomy

### **Unit 4: Characteristics & assessment of laryngectomy**

- a) Causes, symptoms and classifications of laryngeal cancers
- b) Team of professionals in the management of persons with laryngeal cancer
- c) Surgery for laryngeal cancers: types and outcome
- d) Associated problems in laryngectomy individuals
- e) Assessment of speech and communication skills of laryngectomy individuals:
  - Pre and post-operative considerations

### **Unit 5: Management of speech and communication in laryngectomies**

- a) Esophageal speech: candidacy, types of air intake procedures, speech characteristics and its modification through techniques and strategies, complications and contraindications.
- b) Tracheo-esophageal speech: candidacy, types of TEP, fitting of prosthesis, speech characteristics and its modification through techniques and strategies, complications and contraindications.
- c) Artificial larynx: types, factors for selection, output characteristics, techniques for efficient use of artificial larynx, complications and contraindications.
- d) Other remedial procedures: Pharyngeal speech, buccal speech, ASAI speech, gastric speech.

## Practicals

- a) Identify the different types of cleft lip and palate by looking at illustrations and images
- b) Listen to 10 speech samples of children with cleft lip and palate and rate their nasality/ speech (articulation and cleft type errors) based on universal reporting parameters.
- c) Identify the type of closure of velopharyngeal port for 5 normal individuals and 5 individuals with cleft lip and palate using videos of nasoendoscopy/ videofluoroscopy. Perform oral peripheral mechanism examination on 10 individuals and document the structure and functions of the articulators.
- d) Analyse the different types of occlusion in 10 individuals.
- e) Identify the type of glossectomy by looking at pictures/illustrations.
- f) Identify the different types of prosthesis in the management of head and neck cancer. Analyse the speech profile of 5 individuals with laryngectomy.
- g) Identify parts of an artificial larynx and explore its use.
- h) Prepare a checklist / pamphlet illustrating care of the stoma and T- tubes in vernacular.

## Recommended Reading

- a) Berkowitz. S. (2001). Cleft Lip and Palate: Perspectives in Management. Vol II. San Diego, London, Singular Publishing Group Inc.
- b) Falzone. P., Jones. M. A., & Karnell. M. P. (2010). Cleft Palate Speech. IV Ed., Mosby Inc.
- c) Ginette, P. (2014). Speech Therapy in Cleft Palate and Velopharyngeal Dysfunction. Guildford, J & R Press Ltd.
- d) Karlind, M. & Leslie, G. (2009). Cleft Lip and Palate: Interdisciplinary Issues and Treatment. Texas, Pro Ed.
- e) Kummer, A.W. (2014). Cleft Palate and Craniofacial Anomalies: The Effects on Speech and Resonance. Delmar, Cengage Learning.
- f) Peterson-Falzone, S. J., Cardomone, J. T., & Karnell, M. P. (2006). The Clinician Guide to Treating Cleft Palate Speech. Mosby, Elsevier.
- g) Salmon . J & Shriley (1999). Alaryngeal speech rehabilitation for clinicians and by clinicians. ProEd
- h) Yvonne, E (Ed) (1983). Laryngectomy: Diagnosis to rehabilitation. London: Croom Helm Ltd

## B 5.2 Fluency and its Disorders

Hours – 60

Marks - 100

**Objectives:** After completion of the course, the student will be able to understand

- The characteristics of fluency and its disorders
- evaluate and diagnose fluency disorders
- learn about the techniques for the management of fluency disorders

### Unit 1: Fluency

- a) Scope and definition of fluency
- b) Factors influencing fluency
- c) Definition and characteristics of features of suprasegmentals in speech: rate of speech, intonation, rhythm, stress and pause, Suprasegmental features in typical speech
- d) Suprasegmental features in the speech of persons with fluency disorders
- e) Developmental aspects of suprasegmentals of speech
- f) Normal non-fluency

### Unit 2: Stuttering and other fluency disorders

- a) Stuttering: Definition and causes for stuttering
- b) Characteristics of stuttering: core and peripheral characteristics, primary and secondary stuttering, effect of adaptation and situation
- c) Development of stuttering
- d) Normal non fluency: characteristics and differential diagnosis
- e) Theories of stuttering: organic, functional, neurogenic, diagenosogenic and learning
- f) Cluttering: Definition, causes and characteristics
- g) Neurogenic stuttering: Definition, causes and characteristics

### Unit 3: Assessment and differential diagnosis

- a) Assessment of fluency disorders: stuttering, cluttering, neurogenic stuttering and normal non fluency:
- b) Subjective methods: protocols and tests
- c) Objective methods
- d) Qualitative and quantitative assessment
- e) Differential diagnosis of fluency disorders

#### **Unit 4: Management of stuttering**

- a) Approaches to management
- b) Changing scenario in management of stuttering
- c) Different techniques and strategies used in management with their rationale
- d) Relapse and recovery from stuttering
- e) Issues of speech naturalness in stuttering

#### **Unit 5: Management of fluency-related entities**

- a) Management of cluttering: rationale, techniques and strategies
- b) Management of neurogenic stuttering: rationale, techniques and strategies
- c) Management of normal non-fluency: rationale, techniques and strategies
- d) Relapse and recovery in cluttering and neurogenic stuttering
- e) Changes in normal non-fluency
- f) Prevention and early identification of stuttering, and cluttering

#### **Practicals**

- a) Assess the rate of speech in 5 normal adults.
- b) Record and analyse the supra segmental features in typically developing children between 2 and 5 years.
- c) Record audio visual sample of 5 typically developing children and 5 adults for fluency analysis.
- d) Listen/see samples of normal non fluency and stuttering in children and document the differences.
- e) Identify the types of dysfluencies in the recorded samples of adults with stuttering. Instruct and demonstrate the following techniques: Airflow, prolongation, easy onset shadowing techniques.
- f) Record 5 speech samples with various delays in auditory feedback and analyse the differences.
- g) Administer SPI on 5 typically developing children. Administer SSI on 5 adults with normal fluency.
- h) Administer self-rating scale on 10 adults with normal fluency.

## Recommended Reading

- a) Assessment and management of fluency disorders. Proceedings of the national workshop on "Assessment and management of fluency disorders", 25-26 Oct 2007. All India Institute of Speech & Hearing, Mysore. 2007.
- b) Bloodstein, O., & Ratner, N. B. (2008). A Handbook on Stuttering (6th Ed.). Clifton Park, NY, Thomson Demer Learning.
- c) Guitar, B. (2014). Stuttering-An Integrated Approach to its Nature and Treatment. 4th Ed. Baltimore, Lippincott Williams & Wilkins.
- d) Hegde, M. N. (2007). Treatment Protocols for Stuttering. CA Plural Publishing.
- e) Packman, A., & Attanasio, J.S. (2004). Theoretical Issues in Stuttering. NY, Psychology Press.
- f) Rentschler, G. J. (2012). Here`s How to Do: Stuttering Therapy. San Diego, Plural Publishing.
- g) Wall, M. J., & Myers F. L. (1995). Clinical Management of Childhood Stuttering. Texas, PRO-ED, Inc.
- h) Ward, D. (2006). Stuttering and Cluttering: Frameworks for Understanding & Treatment. NY, Psychology Press.
- i) Yairi, E., & Seery, C. H. (2015). Stuttering - Foundations and Clinical Applications. 2nd Ed. USA, Pearson Education, Inc.



## B 5.3 Pediatric Audiology

Hours - 60

Marks -

100

**Objectives:** After completing this course, the student will be able to

- Describe auditory development list etiologies and relate them to different types of auditory disorders that may arise
- Explain different hearing screening/identification procedures and their application
- Elaborate on different aspects of paediatric behavioral and physiological / electrophysiological evaluation

### Unit 1: Auditory development

- a) Review of Embryology of the ear
- b) Development of auditory system from periphery to cortex
- c) Neuroplasticity
- d) Prenatal hearing
- e) Normal auditory development from 0-2 years, Infant speech perception
- f) Incidence and prevalence of auditory disorders in children

### Unit 2: Auditory disorders

- a) Congenital and acquired hearing loss in children
- b) Permanent minimal and mild bilateral hearing loss
- c) Impact on auditory skills, speech-language, educational and socio-emotional abilities
- d) Moderate to profound sensorineural hearing loss
- e) Unilateral hearing loss
- f) Auditory Neuropathy Spectrum Disorders
- g) Central auditory processing disorders
- h) Pseudohypacusis
- i) Auditory disorders in special population and multiple handicap

### **Unit 3: Early identification of hearing loss**

- a) Principles of early hearing detection and intervention programs
- b) Principles and history of hearing screening
- c) Joint Committee on Infant Hearing position statement ( 2000, 2007,2013)
- d) High risk register/ checklists for screening
- e) Sensitivity and specificity of screening tests
- f) Hearing screening in infants and toddlers: Indian and Global context
- g) Hearing screening in preschool children: Indian and Global context
- h) Hearing screening in school-age children ( including screening for CAPD):  
Indian and Global context

### **Unit 4: Paediatric assessment I**

- a) Behavioral observation audiometry : Conditioned orientation reflex audiometry, Visual reinforcement audiometry, TROCA, play audiometry
- b) Pure tone audiometry in children: Test stimuli, response requirement and reinforcement
- c) Speech audiometry (SRT, SDT); Speech recognition and speech perception tests developed in India
- d) Bone conduction speech audiometry
- e) Immittance evaluation in paediatric population
- f) Central auditory processing disorders assessment

### **Unit 5: Paediatric assessment II**

- a) Recording and interpretation of OAE in paediatric population
- b) Factors affecting OAE in paediatric population
- c) Recording and interpretation of click evoked and tone burst evoked ABR in paediatric population
- d) Factors affecting ABR in paediatric population
- e) Recording ASSR in paediatric population
- f) Recording AMLR, ALLR in paediatric population
- g) Assessment of hearing loss in special population
- h) Diagnostic test battery for different age groups
- i) Diagnosis and differential diagnosis

## Practicals

- a) Observe a child with normal hearing (0-2 years) in natural settings. Write a report on his/her responses to sound.
- b) Observe a child with hearing impairment (0-2 years) in natural settings. Write a report on his/her responses to sound with and without his amplification device
- c) Administer HRR on at least 3 newborns and interpret responses
- d) Based on the case history, reflect on the possible etiology, type and degree of hearing loss the child may have.
- e) Compare ABR wave forms in children of varying ages from birth to 24 months.
- f) Observe live or video of BOA/VRA of a child with normal hearing and hearing loss and write a report on the instrumentation, instructions, stimuli used, procedure and interpretation.
- g) Observe OAE in a child with normal hearing and a child with hearing loss. Write a report on the instrumentation, protocol used and interpretation
- h) Observe ABR in a child with normal hearing and a child with hearing loss. Write down a report on the instrumentation, protocol used and interpretation
- i) Observe immittance evaluation in a child with normal hearing and a child with hearing loss. Write a report on the instrumentation, protocol used and interpretation
- j) Using role play demonstrate how the results of audiological assessment are explained to caregiver in children with the following conditions
- k) Child referred in screening and has high risk factors in his history
- l) Child with chronic middle ear disease
- m) Child with CAPD
- n) Child with severe bilateral hearing impairment

## Recommended Reading

- a) Finitzo, T., Siningher, Y., Brookhouser, P., & Village, E. G. (2007). Year 2007 position statement: Principles and guidelines for early hearing detection and intervention programs. *Paediatrics*, 120(4), 898–921.  
<http://doi.org/10.1542/peds.2007-2333>
- b) Madell, J.R., & Flexer, C. (2008). *Paediatric Audiology: Diagnosis, Technology, and Management*. New York NY: Thieme Medical Publishers.
- c) Northern, J.L. and Downs, M.P. (2014). *Hearing in Children*. 6th Ed. San Diego: Plural Publishing.
- d) Seewald, R., and Thorpe, A.M. (2011). *Comprehensive Handbook of Paediatric Audiology*, San Diego: Plural Publishing. ( core text book )  
[www.jcih.org](http://www.jcih.org)

## B 5.4 Aural Rehabilitation in Children

Hours – 60

Marks - 100

**Objectives:** After completing this course the student will be able to

- Describe the different communication options available for young children with hearing impairment
- Explain the impact of hearing impairment on auditory development and spoken language communication
- Describe factors that effect of acoustic accessibility and strategies to manage them at home and in classroom
- Design activities for auditory learning at different levels
- Enumerate how the needs of individuals with hearing impairment using sign language and spoken language as form of communication in India are being met

### **Unit 1: Auditory development, spoken communication and acoustic accessibility**

- a) Sensitivity period for auditory development
- b) Impact of hearing impairment on auditory development, spoken language acquisition, parent child communication
- c) Factors affecting auditory development
- d) Hearing loss implications for speech perception: acoustics of speech
- e) Optimizing hearing potential through hearing aids
- f) Optimizing hearing potential through cochlear implants
- g) Barriers to acoustic accessibility: distance, signal to noise ratio, reverberation
- h) Managing the listening environment for infants, toddlers schools
- i) Signal to noise ratio enhancing technologies, personal FM, loop systems, desktop group systems, bluetooth connectivity

### **Unit 2: Communication options**

- a) Detecting and confirming hearing loss
- b) Parent support counselling, individual family service plan
- c) Choosing communication options
- d) Auditory oral approach
- e) Auditory verbal therapy
- f) Manual/sign language: Indian and Global context
- g) Cued speech and total communication
- h) Listening devices hearing aid/cochlear implant
- i) Early intervention programs

### **Unit 3: Optimal listening and learning environments infancy and early childhood**

- a) Involvement of family
- b) Factors impacting family involvement, supporting families through information and education
- c) Creating optimum listening and learning environment
- d) Intervention: Assessment, auditory learning, listening and language facilitation techniques in infancy and early childhood
- e) Issues with children with mild hearing loss, unilateral hearing loss, Children with hearing loss, ANSD or APD: Children are intervened late , Children with hearing loss and other special needs
- f) Listening and spoken language in school age: benefits of inclusion
- g) Intervention at school age: Functional hearing assessment, communication assessment and intervention to integrate with academic targets

### **Unit 4: Auditory - speech reading training and literacy**

- a) Candidacy for auditory training and speech reading
- b) Auditory training/learning four design principles skill, stimuli, activity, and difficulty level
- c) Early training Objectives
- d) Analytic and Synthetic training
- e) Objectives Formal and informal training
- f) Auditory training for infants and very young children , Outcomes of training
- g) Speech and language and literacy characteristics
- h) Speech language and literacy evaluation assessment
- i) Speech language therapy

### **Unit 5: Indian perspectives**

- a) Prevalence of hearing impairment in children
- b) Education of the deaf in India, historical perspectives
- c) Available resources for education of the hearing impaired
- d) Early intervention programs and centers
- e) Schools for the hearing impaired; day schools, residential schools, Beyond school: college and vocational training
- f) Training manpower resources for service delivery, Indian sign language
- g) Training sign language interpreters, Cued speech in India
- h) Assessment and therapy tools developed for individuals with hearing impairment in India.

## Practicals

- a) Watch documentaries such as “Sound and Fury” (2001). Write a reflection of why parents made communication choices for their children
- b) Follow on links to the above film that shows the status of the children with hearing impairment after a few years.
- c) Learn at least 50 signs across different categories of Indian sign language. Make a video of you signing 10 sentences. Have a class mate interpret them.
- d) Interview a parent of a child with hearing impairment on how they adapted their child to wear the hearing aids and /or implant. What were the first responses to sound they observed and how language and speech develop?
- e) Complete a functional auditory evaluation on one child with hearing loss. Do a speech and language evaluation and also write a report on the child strengths and weakness.
- f) Design and demonstrate auditory learning activities at the four levels awareness, discrimination, identification and comprehension. Ensure that the activities encompass different skill level and difficulty levels.
- g) Develop a short audio/film/pamphlet for parents in your local language on one of the following: teaching parent to trouble shooting the hearing aid/cochlear implant, establishing consistent use of listening device, activities to facilitate language across different age groups
- h) Visit a school for the deaf. Document your observation about the acoustic environment in the class, strategies used by the teacher to promote listening and spoken language

## Recommended Reading

- a) Fitzpatrick, E.M., and Doucet S.P. (2013) (Eds). Paediatric Audiologic Rehabilitation. Thieme, New York
- b) Hosford-Dumm, H., Roser, R., & Valente, M. (2007). Audiology Practice Management (2nd edition edition). New York: Thieme.
- c) Mardell, J., & Flexer, C. (2013). Paediatric Audiology: Diagnosis, Technology, and Management (2nd ed.). New York, NY: Thieme.
- d) Rout, N and Rajendran, S. (2015). Hearing aid Counselling and Auditory training Manual, A publication of NIPMED, Chennai. Freely downloadable from <http://niepmd.tn.nic.in/publication.php>. ISBN 978-81-928032-5-8.
- e) Schwartz, S., (2007) Choices in Deafness : a Parent’s guide to Communication Options , 3rd edition Woodbine house Bethesda
- f) Status of Disability in India Hearing Impairment (2012) Rehabilitation Council of India, New Delhi
- g) Tye-Murray, N., ( 2014) Foundations of Aural Rehabilitation: Children , adults and their family members 4th edition Plural Publishing San Die

## B5.5 Clinicals in Speech Language Pathology

Marks - 100

### General considerations:

Exposure is primarily aimed to be linked to the theory courses covered in the semester. After completion of clinical postings in Speech –language diagnostics, the student will know (concepts), know how (ability to apply), show (demonstrate in a clinical diary/log book based on clinical reports/recordings, etc.), and do (perform on patients/ client contacts) the following:

### Know:

Procedures to assess speech fluency and its parameters using standardized tests for children and adults.

Differential diagnosis of motor speech disorders in children.

Procedures to assess individuals with cleft lip and palate, and other oro-facial structural abnormalities.

Procedures to assess laryngectomy and provide management options.

### Know-how:

To administer at least two more (in addition to earlier semesters) standard tests for childhood language disorders.

To record a speech sample for analysis of fluency skills (including blocks & its frequency, rate of speech, prosody, etc.).

To assess posture and breathing for speech in children with motor speech disorders. To consult with inter-disciplinary medical/rehabilitation team and counsel the individual/family regarding management options and prognosis.

### Show:

Rating of cleft, speech intelligibility and nasality – minimum of 2 individuals with cleft lip and palate.

Language assessment - minimum of 2 individuals with cleft lip and palate.

Transcription of speech sample and assessment of percentage dis/dysfluency – minimum of 2 individuals with stuttering.

Assessment of rate of speech on various speech tasks – at least on 2 children & adults.

### Do:

Voice assessment report - minimum of 2 individuals with voice disorders.

Fluency assessment report - minimum of 2 individuals with fluency disorders.

Oral peripheral examination on minimum of 2 individuals with cleft lip and palate. Apply speech language stimulation/therapy techniques on 5 children with language disorders/speech sound disorders/ motor speech disorders – minimum 5 sessions of therapy for each child.

**Evaluation:**

Internal evaluation shall be based on attendance, clinical diary, log book and learning conference.

External evaluation: Spot test, OSCE, Record, Viva-voce, case work



## B 5.6 Clinicals in Audiology

Marks - 100

### General considerations:

Exposure is primarily aimed to be linked to the theory courses covered in the semester, however, not just limited to these areas.

After completion of clinical postings in auditory diagnostics and auditory rehabilitation, the student will Know (concept), know how (ability to apply), show (demonstrate in a clinical diary/log book), and do (perform on patients/client contacts) the following:

### Know:

- Different protocols in tympanometry and reflexometry.
- Different protocols used in auditory brainstem responses
- Protocols for screening and diagnostic otoacoustic emissions
- Tests to assess vestibular system
- Different indications for selecting implantable hearing devices
- Various speech stimulation and auditory training techniques

### Know-how:

- To administer auditory brainstem responses for the purpose of threshold estimation and site of lesion testing
- To administer high frequency tympanometry and calculate resonance frequency.
- To administer high risk register
- To modify the given environment to suit the needs of hearing impairment

### Show:

- Analysis of ABR waveforms – threshold estimation 5 and site of lesion 5
- Analysis of immittance audiometry and relating to other tests – 5 individuals with conductive and 5 individuals with sensori-neural hearing loss
- How to formulate select appropriate auditory training technique based on audiological evaluation

### Do:

- Threshold estimation on 5 infants (< 2 years) TEOAE and DPOAE on 5 infants (<2 years) BOA on 5 infants (<2 years)
- VRA on 2 infants (6 month – 3 year)
- Conditioned play audiometry – 3 children (3-6 years)
- Hearing aid fitment on 1 infant (< 3 years) 2 children (3-6 years)
- Listening age of 3 children with hearing impairment
- Appropriate auditory training on 5 children with hearing loss

**Evaluation:**

Internal evaluation shall be based on attendance, clinical diary, log book and learning conference.

External evaluation: Spot test, OSCE, Record, Viva-voce, case work

## Semester VI

### B 6.1 Motor Speech Disorders in Adults

Hours – 60

Marks - 100

**Objectives:** After completing the course, the student will be able to

- Understand the characteristics of acquired motor speech disorders in adults
- Evaluate and diagnose speech characteristics in acquired motor speech disorders
- Learn about the techniques for the management of speech and related errors in acquired motor speech disorders

#### Unit 1: Causes & Characteristics of dysarthria

- a) Definition, etiology and classification of acquired dysarthria
- b) General, speech and feeding related characteristics of acquired dysarthria with and without genetic underpinnings
- c) Vascular lesions: dysarthria following stroke/CVA, cranial and peripheral nerve palsies
- d) Infectious condition of the nervous system: dysarthria following meningitis, encephalitis, polyneuritis, poliomyelitis, neurosyphilis.
- e) Traumatic lesions: Dysarthria following TBI.
- f) Toxic conditions of the nervous system: Dysarthria following exogenic and endogenic toxic conditions of the nervous system.
- g) Anoxia of the nervous system: Dysarthria following anoxic conditions
- h) Metabolic disorders affecting nervous system: Dysarthria following metabolic conditions that affect the nervous system, Wilson's disease etc.
- i) Idiopathic causes: Dysarthria following idiopathic causes
- j) Neoplastic lesions of nervous system: Dysarthria following neoplastic lesions in the nervous system
- k) Demyelinating and degenerative conditions: Huntington's Chorea, Parkinson's, Multiple Sclerosis, Motor Neuron Diseases

## **Unit 2: Assessment and diagnosis of dysarthria**

- a) Subjective assessment of dysarthria:
- b) Assessment of respiratory, phonatory, resonatory, articulatory errors
- c) Assessment of prosodic features
- d) Assessment of speech intelligibility
- e) Scales, protocols and tests used for subjective assessment of dysarthria
- f) Instrumental analysis of speech in dysarthria: Acoustic, kinematic and physiological
- g) Advantages and disadvantages of subjective and instrumental procedures in the assessment of dysarthria in adults
- h) Differential diagnosis of acquired motor speech disorders in adults: Dysarthria and verbal apraxia
- i) Dysarthria and functional articulation disorders
- j) Dysarthria and aphasia
- k) Apraxia of speech and aphasia
- l) Dysarthria from other allied disorders such as agnosia, alexia, agraphia etc.
- m) Apraxia from other allied disorders such as agnosia, alexia, agraphia etc.
- n) Assessment of feeding, swallowing and related issues in persons with dysarthria

## **Unit 3: Management of dysarthria**

- a) Management of acquired dysarthria
- b) General principles in the management of dysarthria
- c) Influence of medical, prosthetic and surgical procedures on the speech in persons with acquired dysarthria.
- d) Facilitative approach: vegetative, sensorimotor and reflex based.
- e) Systems approach: correction of respiratory, phonatory, resonatory, articulatory and prosodic errors.
- f) Strategies to improve speech intelligibility and speech enhancement techniques
- g) Strategies to improve feeding, swallowing behavior in persons with acquired dysarthria

#### **Unit 4: Assessment and management of apraxia in adults**

- a) Definition, etiology and classification of acquired apraxia Characteristics of nonverbal apraxia's in adults
- b) Characteristics of verbal apraxia's in adults
- c) Subjective assessment strategies: standard tests and scales, protocols and behavioral profiles
- d) Instrumental analysis of the speech of apraxia in adults: Acoustic, Kinematic and Physiological
- e) Management Approaches for verbal & nonverbal apraxia: principles and strategies

#### **Unit 5: Management related issues in motor speech disorders**

- a) Team involved in the management of persons with acquired dysarthria and apraxia
- b) Issues related to maintenance and generalization of speech in dysarthria and apraxia
- c) Counselling and guidance for persons with acquired dysarthria and apraxia
- d) Augmentative and alternative strategies for persons with acquired dysarthria and apraxia

#### **Practicals**

- a) Identify the cranial nerves and mention its origin and insertion from a picture/ model. Demonstrate methods to assess the cranial nerves.
- b) Assess the respiratory system using speech and non-speech tasks in 10 healthy adults.
- c) Assess the phonatory system using subjective and acoustic analysis in 10 healthy adults.
- d) Looking at a video identify the clinical signs and symptoms of different neurological conditions resulting in Dysarthria.
- e) Record the speech sample of 5 normal adults and compare with the audio sample of individuals with Dysarthria.
- f) Administer Duffy's intelligibility rating scale on 5 healthy adults. Administer Frenchay's Dysarthria Assessment on 5 healthy adults. Demonstrate activities to improve the functions of speech subsystem. Identify the signs of UMN and LMN based on a video.
- g) Prepare a low tech AAC for functional communication for an individual with apraxia.

## Recommended Reading

- a) Brookshire, R. H. (2007). Introduction to Neurogenic Communication Disorders. University of Virginia, Mosby.
- b) Duffy, J. R. (2013). Motor Speech Disorders: Substrates, Differential Diagnosis, and Management (3rd Ed.). University of Michigan, Elsevier Mosby.
- c) Dworkin, P. J. (1991). Motor Speech Disorders: A Treatment Guide. St. Louis: Mosby.
- d) Ferrand, C. T., & Bloom, R. L. (1997). Introduction to Organic and Neurogenic Disorders of Communication: Current Scope of Practice. US, Allyn & Bacon.  
Goldenberg, G. (2013). Apraxia: The Cognitive Side of Motor Control. Oxford University Press, UK.
- e) Lebrun, Y. (1997). From the Brain to the Mouth: Acquired Dysarthria and Dysfluency in Adults. Netherlands, Kluwer Academic Publishers.
- f) Murdoch, B. E. (2010). Acquired Speech and Language Disorders: A Neuroanatomical and Functional Neurological Approach (2nd Ed.). New Delhi, India: John Wiley & Sons.
- g) Papathanasiou, I. (2000) (Eds.). Acquired Neurogenic Communication Disorders – A Clinical Perspective, Chapters 5, 6 & 7. London, Whurr Publishers.
- h) Yorkston, K. M., Beukelman, D. R., Strand, E. A., & Hakel, M. (2010). Management of Motor Speech Disorders in Children and Adults (3rd Ed.). Austin, Texas;Pro-EdInc.

## B 6.2 Language Disorders in Adults

Hours – 60

Marks - 100

**Objectives:** After completing the course, the student will be able to

- Understand the characteristics of language disorders in adults
- Evaluate and diagnose speech characteristics in adults with language disorders
- Learn about the techniques for the management of speech and related errors in language disorders seen in adults

### Unit 1: Neural bases of language

- a) Correlates of language functions
- b) Neuroanatomical
- c) Neurophysiological
- d) Neurobiological
- e) Cognitive
- f) Neurolinguistic models of language processing
- g) Connectionist models
- h) Hierarchical models
- i) Global models
- j) Process models
- k) Computational models
- l) Language process in bi/multilingualism
- m) Language processing in right hemisphere

### Unit 2: Language disorders in adults

- a) Definition, causes and characteristics of speech, language and cognition in Aphasia: cortical and subcortical
- b) Primary progressive aphasia
- c) Traumatic brain injury
- d) Right hemisphere damage
- e) Schizophasia
- f) Dementia
- g) Differential diagnosis of various language disorders seen in adults.

### **Unit 3: Assessment and diagnosis of language disorders**

- a) Assessment of the following in aphasia, primary progressive aphasia, traumatic brain injury, right hemisphere damage, schizophasia and dementia
- b) Linguistic behaviour including speech: scales, tests, protocols.
- c) Assessment of cognitive, social, behavioural characteristics
- d) Medical Investigation: Neuroimaging

### **Unit 4: Management of language disorders**

- a) Medical, linguistic and programmed intervention for persons with Aphasia: cortical and subcortical
- b) Primary progressive aphasia
- c) Traumatic brain injury
- d) Right hemisphere damage
- e) Schizophasia
- f) Dementia

### **Unit 5: Rehabilitation issues relating to adult language disorders**

- a) Team involved in the rehabilitation of persons with adult language disorders
- b) Factors influencing the assessment and intervention for language in the context of bilingual and multilingual influences.
- c) Factors influencing the assessment and management of language in persons who are preliterate, illiterate and literate.
- d) Assessment of quality of life
- e) Recovery patterns and prognosis in adults with language disorders
- f) Age related influence in adults with language disorders
- g) Counselling and guidance for adults with language disorders
- h) Generalization and maintenance issues in adults with language disorders
- i) Augmentative and alternative strategies for adults with language disorders



## Practicals

- a) Identify different lobes of in the brain by looking at a model/ image and label the language areas.
- b) Administer a standardized test battery on 3 normal individuals to assess language and cognition.
- c) Administer bilingual aphasia test on 3 healthy normal adults.
- d) List the language characteristics in different types of aphasia from a video.
- e) Analyse the speech, linguistic and non-linguistic features seen in Right hemisphere damaged individual from a video.
- f) In a given brain model mark the subcortical structures involved in language processing/ production.
- g) Demonstrate various facilitatory and compensatory therapy techniques in the management of aphasia.
- h) Formulate activities to assess linguistic abilities in dementia and aphasia. Counsel by a role play for a given profile of an individual with adult language disorder.
- i) Prepare a counselling checklist /guideline that can be used with the family members of an individual with aphasia and traumatic brain injury.

## Recommended Reading

- a) Chapey, R. (2008). Language Intervention strategies in aphasia and related neurogenic communication disorders. Philadelphia: Lippincott Williams and Wilkins Davis, G. A. (2014). Aphasia and related Communication Disorders. Pearson Education Inc.
- b) Edwards, S. (2005). Fluent Aphasia. Cambridge University Press.
- c) Laine, M. & Martin, N. (2006). Anomia: Theoretical and Clinical Aspects. Psychology Press.
- d) Lapointe, L. L. (2005). Aphasia and related neurogenic language disorders. (3rdEdn.). Thieme.
- e) Lapointe, L. L., Murdoch, B. E., & Stierwalt, J. A. G. (2010). Brain based Communication Disorders. Plural Publishing Inc.
- f) Stemmer, B., & Whitaker, H. A. (Eds.). (2008). Handbook of Neuroscience of Language. Elsevier.
- g) Whitworth, A., Webster, J., & Howard, D. (2005). A cognitive neuropsychological approach to assessment and intervention in aphasia: A clinician's guide. Psychology Press

## B 6.3 Aural Rehabilitation in Adults

Hours - 60  
100

Marks -

**Objectives:** After completing this course, the student will be

- Able to describe the impact on the quality of life of adults with hearing impairment
- Explain the principles benefits and limitations of auditory training and speech reading recognize factors that impair communication and suggest facilitative and repair strategies identify components of aural rehabilitation program for adults (planning to outcome assessment) identify strategies used with the older adult to implement a successful aural rehabilitation program administer different tools for assessment of hearing handicap, attitudes and beliefs that can impact aural rehabilitation

### Unit 1: Aural rehabilitation

- a) Definition
- b) Scope of aural rehabilitation in adults
- c) Prevalence of hearing loss in children (global and Indian data )
- d) Prevalence of hearing loss in adults (global and Indian data)
- e) Relationship between audiometric data, hearing difficulties and amplification considerations
- f) Limitations of audiometric data
- g) Quality of life and impact on income, education, employment; Assessing communication handicap : interviews, questionnaires
- h) Vocational rehabilitation

### Unit 2: Listening training and speech reading for adults

- a) Listening to speech with a hearing loss
- b) Candidacy for auditory training
- c) Listening training to improve speech perception
- d) Listening training to improve music perception
- e) Benefits of auditory training
- f) Speech reading for communication
- g) Characteristics of good lip readers versus good speech readers
- h) Factors affecting speech reading
- i) Assessing vision only auditory only processing
- j) Traditional methods of speech reading training.

### **Unit 3: Communication strategies**

- a) Factors that influence the reception of spoken message
- b) Facilitative communication strategies
- c) Repair strategies
- d) Repairing a communication breakdown
- e) Conversational styles
- f) Communication strategies training formal instruction, guided learning, real world practice

### **Unit 4: Aural rehabilitation for adults**

- a) Principles of aural rehabilitation in adults
- b) Psychological impact of hearing loss
- c) Support through counselling
- d) Orienting towards hearing aid use
- e) Needs assessment for non-hearing and assistive technology for adults
- f) Categories of assistive technology
- g) Aural rehabilitation programs: Individual vs group Components of aural rehabilitation program
- h) Process of aural rehabilitation
- i) Communication under adverse listening conditions

### **Unit 5: Aural rehabilitation for older adults**

- a) Influence of aging on the older adults: quality of life and psychological perspectives
- b) Influence of aging on the older adults: quality of life and social perspectives
- c) hearing aid use by the older adult
- d) Aural rehabilitation Auditory barriers to communication
- e) Non auditory barriers to communication
- f) Barriers to aural rehabilitation
- g) Factors influencing for different populations of older adult: independent and semi- independent older adult
- h) Aural rehabilitation for different populations of older adult: dependent older adult Aural rehabilitation in an old age home
- i) Hearing aid orientation

## Practicals

- a) All scales and tools available in Hull R. H; Introduction to aural rehabilitation
- b) Listen to the speech recorded using hearing loss simulators (available on internet) and experience the sounds as heard by persons with different degrees of hearing loss. Write your observations on the same
- c) Simulate hearing loss by plugging ears and administer sentence tests of word recognition. Write a report on the performance
- d) Administer any three self-report questionnaires to three adults who have hearing loss and write a report of the relationship of their hearing loss to performance on the scale
- e) Administer any three self-report questionnaires to three older adults who have hearing loss and write a report of the relationship of their hearing loss to performance on the scale
- f) Administer any three self-report questionnaires to three adults who wear hearing aids and write a report of the relationship of their hearing loss to performance on the scale.
- g) Administer the hearing belief questionnaire (Saunders, 2013) on an adult. Identify the positive and negative attitude and behavior that may impact the success of aural rehabilitation
- h) Design a session of aural rehab program (Objectives, activities, outcomes assessment) for adults recently fitted with cochlear implant, group of 4 older adults. Design an individualised program for an executive using a hearing aid for the first time, and an adult moving from an analog to a digital hearing aid
- i) Develop a pamphlet in your local language that would address any topic in aural rehabilitation

## Recommended Reading

- a) Hull, R. H., (2014) ed. Introduction to Aural Rehabilitation 2nd edition Plural Publishing, San Diego Chapters 1, 2, 11 to 20
- b) Schow, R.L. & Nerbonne, M.A., (2012). Introduction to Audiologic Rehabilitation (6th edition), Allyn & Bacon, Boston.
- c) Tye-Murray, N., (2014). Foundations of Aural Rehabilitation: Children , adults and their family members 4th edition Plural Publishing San Diego Chapters 5-1

## B 6.4 Audiology in Practice

Hours - 60  
100

Marks -

**Objectives:** After completing the course, the student will be able to

- List and describe the highlights of legislations relating to hearing impairment and other disabilities incorporate ethical practices in professional service delivery.
- Provide information on welfare measures, policies of government when needed
- Describe different strategies to create awareness of hearing impairment and programs to address them
- Explain the different clinical practice settings in audiology with reference to their requirement, protocols and role and responsibility of audiologist
- Describe methods to measure the impact of noise on humans and strategies to address excessive noise exposure in industries and the community.
- Describe terminology, technology and methods used in tele-practice, and their application in audiological service delivery

### Unit 1: Scope, legislation and ethics in audiology

- a) Scope of practice in audiology (National – ISHA & International body - AAA) Professional ethics (ISHA)
- b) Legislations and conventions relating to disability: need and historical aspects
- c) Classification of hearing impairment and disability certification, Rehabilitation Council of India Act (1992) and its amendments
- d) Person with Disability Act (1995), National Trust Act (1999), Right to Education (2012), Biwako Millennium framework (2003) and Salamanca Statement 1994, UNCRPD
- e) Concept of barrier free access and universal design relating to individuals with hearing impairment

### Unit 2: Hearing health and strategies for prevention of hearing impairment

- a) Epidemiology of hearing disorders ICD and ICF
- b) Levels of prevention: Primary, secondary and tertiary
- c) National programs and efforts national institutes, Welfare measures by Government,
- d) Camps (planning, purpose, organizing and providing remedial measures) Public education and information (media, radio broadcasts, street plays) Hearing health and prevention programs (hearing help line, dangerous decibels, online hearing tests etc.)

### **Unit 3: Audiological practice in different settings**

- a) Audiological Private practice ENT clinics
- b) Paediatric / neonatology clinic/departments
- c) Neurology departments Factories and Industry
- d) Hearing aid dispensing centre/hearing aid industry, Rehabilitation centres such as DRC/CRCs , Schools for the hearing impaired
- e) Cochlear implant clinics
- f) Multiple handicap habilitation centre and others

### **Unit 4: Noise and hearing conservation in industry and community**

- a) Introduction to noise, types
- b) Sources of noise in the industry and community
- c) Effects of noise in the auditory system (outer, middle and inner ear)
- d) Temporary threshold shift, permanent threshold shift, factors increasing the risk of NIHL
- e) Non auditory effects of noise (physiological, psychological, stress, sleep, job productivity and accidents)
- f) Legislations related to noise, permissible noise exposure levels, workers compensation, OSHA standards, Indian legislations related to noise Instrumentation, measurement and procedure for measuring noise in industry Instrumentation, measurement and procedure for measuring noise in community Hearing conservation program (HCP), steps, record keeping,
- g) Ear protective devices

### **Unit 5: Scope and practice of tele audiology**

- a) Introduction to tele-health: definition, history of tele-health
- b) Terminologies-tele-health, tele medicine, tele practice, Connectivity: internet, satellite, mobile data
- c) Methods of tele-practice-store and forward and real time
- d) Ethics and Regulations for tele-audiology
- e) Requirements/Technology for tele- audiology: Web based platforms, Video conferencing, infrastructure
- f) Manpower at remote end and audiologist end, training assistants for tele-audiology
- g) Audiological screening using tele-technology : new born hearing screening, school screening, community screening, counselling
- h) Diagnostic audiological services using tele-technology : video otoscopy, pure tone audiometry, speech audiometry, oto acoustic emission, tympanometry, auditory brainstem response

- i) Intervention / aural rehabilitation using tele-technology :hearing aid counselling and troubleshooting, tinnitus, counselling, aural rehabilitation services, AVT, and counselling

## Practicals

- a) Undertake the activities such as 'Dangerous decibel" program ([www.dangerousdecibels.org](http://www.dangerousdecibels.org))
- b) Noise measurement and attenuation measurement of ear protection devices. Sound level meter measurement in different areas (generator room, audio rooms)
- c) Speech in noise assessment for 10 subjects
- d) Visit an audiologist in different practice settings and provide a report
- e) Administer ICF protocols for patients with different disorders
- f) Explore websites of national institutes, hearing aid companies, NGOs in disability field and describe the accessibility features and information provided
- g) Remote control a PC based audiology equipment connected to internet using any authorized desktop sharing software
- h) Develop one pamphlet/poster/ in local language that would address some aspect of audiology practice
- i) Perform Accessibility ability of your institute/center and prepare a report

## Recommended Reading

- a) Audiology Telepractice; Editor in Chief, Catherine V. Palmer, Ph.D.; Guest Editor, Greg D. Givens, Ph.D. Seminars in Hearing, volume 26, number 1, 2005.
- b) Bergland, B., Lindwall, T., Schwela, D.H., eds (1999). Guidelines on Community noise <http://www.who.int/docstore/peh/noise/guidelines2.html> WHO 1999
- c) BIS specifications relating to Noise Measurements.- IS:7194-1973 Specification for assessment of noise exposure during work for hearing conservation purposes.
- d) Census of India information on disability
- e) Dobie, R. A (2001). Medical legal evaluation of hearing loss, 2nd Ed.
- f) Hearing health and strategies for prevention of hearing impairment WHO (2001). International classification of Functioning, Disability and Health. Geneva: WHO <http://www.asha.org/Practice-Portal/Professional-Issues/Audiology-Assistants/Teleaudiology-Clinical-Assistants/>
- g) <http://www.asha.org/uploadedFiles/ModRegTelepractice.pdf>
- h) IS:10399-1982 Methods for measurement of noise emitted by Stationary vehicles
- i) IS:6229-1980 Method for measurement of real-ear
- j) IS:9167-1979 Specification for ear protectors. 95
- k) IS:9876-1981 Guide to the measurement of airborne acoustical noise and evaluation of its effects on man- IS:7970-1981 Specification for sound level meters.
- l) IS:9989-1981 Assessment of noise with respect to community response.

- m) John Ribera. Tele-Audiology in the United States. In *Clinical Technologies: Concepts, Methodologies, Tools and Applications* (pp. 693-702), 2011. Hershey, PA: Medical Information Science Reference. doi:10.4018/978-1-60960-561-2.ch305
- n) Lipscomb, D. M. (1994). Hearing conservation – In industry, schools and the military.
- o) Mandke, K and Oza R.K ( 2014). Private practice in speech pathology and audiology, 2014 ISHA
- p) Philippe Valentin Giffard. *Tele-Audiology*. Tort, 2012. ISBN 6139256615, 9786139256617
- q) Rawool, V. W. (2012). *Hearing conservation in occupational, recreational, educational and home setting*. Thieme: New York
- r) RCI, PWD and National Trust, and Right to education act
- s) Richard Wootton, John Craig, Victor Patterson, editors. *Introduction to telemedicine*. Second edition. London: The Royal Society of Medicine Press Ltd. 2006. p. 206 ISBN: 1 85315 677 9.
- t) Salamanca statement and framework for action Scope of practice by RCI
- u) Swanepoel de W, Hall JW 3rd .A systematic review of tele health applications in audiology. *Telemed J E Health*. 2010 Mar;16(2):181-200. doi: 10.1089/tmj.2009.0111.



## **B 6.5 Clinicals in Speech-language Pathology**

Marks - 100

### **General considerations:**

Exposure is primarily aimed to be linked to the theory courses covered in the semester.

After completion of clinical postings in Speech–language diagnostics, the student will know (concepts), know how (ability to apply), show (demonstrate in a clinical diary/log book based on clinical reports/recordings, etc.), and do (perform on patients/ client contacts) the following:

### **Know:**

Procedures to assess motor speech disorders in adults.

Differential diagnosis of motor speech disorders in adults.

Procedures to assess individuals with adult language disorders, and other related abnormalities.

### **Know-how:**

To administer at least two standard tests for adult language disorders.

To administer at least two standard tests/protocols for motor speech disorders in adults.

To record a sample for analysis of language and speech skills in adults with neuro- communication disorders.

To assess posture, breathing, speech and swallowing in adults with motor speech disorders.

To consult with inter-disciplinary medical/rehabilitation team and counsel the individual/family regarding management options and prognosis.

### **Show:**

Language assessment - minimum of 2 individuals after stroke.

Associated problems in individuals after stroke and its evaluation.

Dysphagia assessment – minimum of 2 children & adults.

Goals and activities for therapy (including AAC) based on assessment/test results for adults with neuro-communication disorders.

### **Do:**

Voice therapy - Minimum of 2 individuals with voice disorders.

Fluency therapy - Minimum of 2 individuals with fluency disorders.

Bed side evaluation of individuals with neuro-communication disorders – Minimum of 2 individuals.

Apply speech language stimulation/therapy techniques on 5 children with language disorders/speech sound disorders/ motor speech disorders – minimum 5 sessions of therapy for each child.

**Evaluation:**

Internal evaluation shall be based on attendance, clinical diary, log book and learning conference.

External evaluation: Spot test, OSCE, Record, Viva-voce, case work

## **B 6.6 Clinicals in Audiology**

Marks – 100

### **General considerations:**

Exposure is primarily aimed to be linked to the theory courses covered in the semester, however, not just limited to these areas.

After completion of clinical postings in auditory diagnostics and auditory rehabilitation, the student will Know (concept), know how (ability to apply), show (demonstrate in a clinical diary/log book), and do (perform on patients/client contacts) the following:

### **Know:**

National and international standards related to noise exposure. Recommend appropriate treatment options such as speech reading, AVT, combined approaches etc.

### **Know-how:**

To carryout noise survey in Industry and community

To carryout mapping of cochlear implant in infants and children using both objective and subjective procedures

To trouble shoot cochlear implant.

### **Show:**

Analysis of objective responses like compound action potential, stapedial reflexes on at least 3 samples.

Comprehensive hearing conservation program for at least 1 situation.

### **Do:**

AVT on at least 1 child with hearing impairment.

Trouble shooting and fine tuning of hearing aids on at least 5 geriatric clients.

At least one activity for different stages involved in auditory training

### **Evaluation:**

Internal evaluation shall be based on attendance, clinical diary, log book and learning conference.

External evaluation: Spot test, OSCE, Record, Viva-voce, case work

## Semester 7 and 8

### B7.1 and 8.1 Clinicals in Speech-language Pathology

Marks – 100

**General:** Clinical internship aims to provide clinical exposure and experience in different set ups. The students would not only carry out greater quantum of work, but also work varied clinical populations and in different contexts. Internship will provide greater opportunity for the students to liaise with professionals from allied fields. The intern is expected to demonstrate competence and independence in carrying out the following, among others:

- Diagnosis and management of speech, language, and swallowing disorders across life span.
- Report evaluation findings, counsel and make appropriate referrals.
- Plan and execute intervention and rehabilitation programs for persons with speech language, communication, and swallowing disorders
- Develop and maintain records related to persons with speech-language, communication, and swallowing disorders
- Engage in community related services such as camps, awareness programs specifically, and community based rehabilitation activities, in general.
- Make appropriate referrals and liaise with professionals from related fields. Gain experience in different set ups and be able to establish speech centres in different set-ups
- Demonstrate that the objectives of the B.ASLP program have been achieved. Advise on the welfare measures available for their clinical clientele and their families.
- Advise and fit appropriate aids and devices for their clinical population.

## **B 7.2 and 8.2 Clinicals in Audiology**

Marks – 100

**General:** Clinical internship aims to provide clinical exposure and experience in different set ups. The students would not only carry out greater quantum of work, but also work varied clinical populations and in different contexts. Internship will provide greater opportunity for the students to liaise with professionals from allied fields. The intern is expected to demonstrate competence and independence in carrying out the following, among others:

- Diagnosis and management of hearing disorders across life span.
- Report evaluation findings, counsel and make appropriate referrals.
- Plan and execute intervention and rehabilitation programs for persons with hearing disorders
- Develop and maintain records related to persons with hearing disorders
- Engage in community related services such as camps, awareness programs specifically, and community-based rehabilitation activities, in general.
- Make appropriate referrals and liaise with professionals from related fields. Gain experience in different set ups and be able to establish hearing centres in different set-ups
- Demonstrate that the objectives of the B. ASLP program have been achieved. Advise on the welfare measures available for their clinical clientele and their families.
- Advise and fit appropriate aids and devices for their clinical population.



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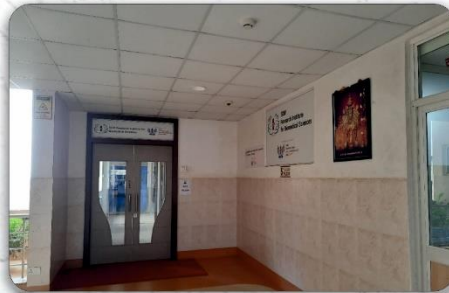
SDM College of Dental Sciences & Hospital



SDM College of Physiotherapy &  
SDM Institute of Nursing Sciences



Shri Dharmasthala Manjunatheshwara University



SDM Research Institute for Biomedical Sciences



Panoramic View of Campus