



M.Sc (Audiology) Semester Course Regulations - 2002

1.0 Course offered and duration of the course

- 1.1 M.Sc (Audiology)
- 1.2 Duration of the course: 4 Semesters / 2 years

Note: Each semester shall extend over a minimum period of eighteen weeks excluding examination days.

2.0 Eligibility for admission

- 2.1 Candidates with a B.Sc (Speech & Hearing) degree of the University of Mysore or any other University considered as equivalent thereto with an average of not less than 55% of marks are eligible for admission subject to 2.2 (In case of SC/ST candidates, percentage will be relaxed upto 5%).

Note: "Average" refers to average of the aggregate marks obtained in all the years/semesters of B.Sc (Speech & Hearing) course.

- 2.2 Only those candidates who have not completed 30 years of age as on 1st July of the relevant academic year shall be eligible for admission.
- 2.3 Admission shall be made only on the basis of the marks obtained in the entrance examination conducted by the Institution for this purpose. Further, only those candidates who secure more than 40% in the entrance examination are eligible for admission.
- 2.4 Entrance Examination
 - 2.4.1 The object of entrance examination is to assess the knowledge and skill of the candidates in the core subjects of B.Sc (Speech & Hearing).
 - 2.4.2 The Head of the Institution shall appoint a committee of examiners to conduct the entrance examination.
 - 2.4.3 The entrance examination shall be conducted at the Head Quarters of the Institution.
 - 2.4.4 Duration of the entrance examination shall be for 100 minutes with 100 questions of the multiple choice type.
 - 2.4.5 Candidates can appear for the entrance examination in anticipation of results of qualifying examination. However, they have to fulfill the condition of 2.1 and provide records for the same before the stipulated date for admission.
 - 2.4.6 The selection committee shall consist of the Head of the Institution, as Chairperson, one faculty member of the institution nominated by Head of the Institution, and one member nominated by the Vice-Chancellor.

3.0 Scheme of Instruction

- 3.1 In each semester there shall be five papers. The detailed scheme of examination and paper titles are as given in **Annexure I**.
- 3.2 Dissertation/Clinical practicum shall be in lieu of a paper.
- 3.3 The syllabus of every paper shall as far as possible, be divided in to five units.
- 3.4 Candidates shall attend camps/extension programs/educational tour conducted by the institution.
- 3.5 Hours of instruction (contact hours) per week
 - Theory : 4 hours per subject per week
 - Practical : I year – 15 hours per week
 - : II year – 20 hours per week

4.0 Attendance

- 4.1 Each semester shall be taken, as a unit for purpose of calculating attendance and a candidate shall be considered to have put in the required attendance for the semester, if he/she has attended not less than 80% in case of theory classes and 90% in clinical practicum during each semester.



- 4.2 Shortage of attendance up to 15% may be condoned by the Vice Chancellor on the recommendation of the Head of the Institution on payment of a fee prescribed by the University. There shall be no condonation if attendance is below 65% in theory classes and 75% in clinical practicum during any semester.
- 4.3 A candidate who is having shortage of attendance in clinical practicum is permitted to make up this shortage by attending clinical work during vacation immediately after that semester but before commencement of the next semester.
Note: The candidates are permitted to avail this facility (4.3) in the I & III semesters only, with prior permission of the Head of the Institution.
- 4.4 A candidate, who fails to satisfy the requirement of attendance in a semester, shall rejoin the same semester in the immediate next academic year.
Note: This facility shall be available only **once** in the entire course.
- 4.5 If a candidate represents his/her Institution in Sports/NSS/Cultural or any official activities, he/she is permitted to avail to a maximum of 30 days in an academic year based on the recommendation and prior permission of the Head of the Institution.

5.0 Medium of Instruction

- 5.1 Medium of instruction shall be English.

6.0 Appearance for the Examination

- 6.1 Candidates on satisfactorily completing a semester shall apply for the examination in all papers prescribed for that semester.

7.0 Scheme of Examination

- 7.1 There shall be a University Examination at the end of each semester. The detailed scheme of examination is as given in **Annexure I**.
- 7.2 Duration of examination of theory paper of 80 marks shall be for 3 hours.
- 7.3 Every theory paper shall comprise of Five Questions with internal choice covering the entire syllabus
- 7.4 Each theory paper shall comprise of FIVE questions with internal choice, covering entire syllabus. Each full question shall carry 16 marks with internal divisions such as 8+8, 10+6, 8+4+4, 12+4 and so on. The subdivisions in a question shall not be more than **three**.
Note: Model question paper pattern is as given in **Annexure II**.
- 7.5 In case of theory paper the internal assessment will be for 20 marks, assessed through tests, seminars, camps and other assignments.
- 7.6 The Head of the Institution may decide to give test/seminar to candidates who absent themselves for the same, only if he is convinced that the absence of the candidate is on valid grounds. This facility shall only be availed **within the duration of that semester**.
- 7.7 The statement of internal assessment marks shall be sent to the Registrar (Evaluation) at least one week prior to the commencement of theory examination of that semester.
- 7.8 Clinical Practicum
- 7.8.1 The clinical practicum examinations shall be in the main subjects of study, i.e., in Audiology/Speech-Language Pathology (including the components of speech sciences).
- 7.8.2 Clinical practicum is part of all the semesters. However, internal assessment and clinical practicum examination with respect to clinical practicum of I and II semesters shall be conducted at the end of II semester. And that of III and IV semesters shall be conducted at the end of the IV semester.
- 7.8.3 Break up of marks of clinical practicum shall be as follows:
- (a) 50 marks are allotted for internal assessment which is awarded on the basis of continuous evaluation of the clinical work of the candidate by the faculty of the departments to be nominated by the Director. The faculty shall evaluate each candidate on the following bases:
- Clinical skill/repertoire
 - Planning of therapy and execution
 - Maintenance and quality of clinical diary, lessons plans and progress report



- iv. Rapport with case/family
 - v. Development of teaching aids
 - vi. Efficient use of time/skills in execution
 - vii. Professional attitude/motivation/aptitude for clinical work.
- (b) 50 marks for clinical viva-voce conducted by an external examiner who shall examine the candidates' clinical skills while working with clinical population. Each candidate shall be assigned one or more subjects for this purpose by the heads of the concerned departments with the approval of the Head of the Institution.
- 7.8.4 Candidates failing/absenting in the clinical practicum examination shall repeat the clinical work of the previous two semesters i.e., candidates failing in clinical practicum of II semester shall repeat I and II semesters with respect to clinical practicum. Such candidates are not permitted to go to III semester. Candidates failing in clinical practicum of IV semester shall repeat III and IV semesters with respect to clinical practicum.
- 7.9 Dissertation work
- 7.9.1 There shall be 100 marks for dissertation work.
- 7.9.2 The candidates shall submit three copies of dissertation before the commencement of theory examination of that semester. Candidates who fail to submit their dissertations on or before the stipulated date shall not be permitted to appear for the final semester examination.

8.0 Board of Examiners, Valuation

- 8.1 There shall be a Board of Examiners for scrutinizing and approving the question papers and scheme of valuation.
- 8.2 About 50% of the examiners appointed for setting of question papers in each semester shall be from outside the Institution.
- 8.3 There shall be double valuation (internal and external) for all theory and dissertation work, the average of the marks awarded by the two examiners is taken as final award.
- 8.4 In cases of 20% or more deviation in the marks awarded by two examiners, the script shall be referred to the third valuer (who shall be an external) and the average of the nearest two shall be considered for the final award of marks.
- 8.5 Challenge Valuation: A student who desires to challenge the marks awarded to his/her may do so by submitting an application along with the prescribed fee to the Registrar (Evaluation) within 15 days after the announcement of results. Such candidates shall be provided with a photocopy of the answer book after concealing the name of the valuers. The answer scripts for which challenge valuation is sought for shall be sent to another external examiner. The average of the marks awarded in the challenge valuation and the marks of the earlier valuation, which is closer to the challenge valuation, shall be the final award.

9.0 Classification of successful Candidates

- 9.1 Minimum for a pass in each paper shall be 50% (exam. proper and internal assessment put together) and 50% in aggregate of all the semesters put together. There shall be no separate minima either for exam proper or for internal assessment.
- 9.2 Minimum for a pass in clinical practicum in each part (a & b of 7.8.3) shall be 50%.
- 9.3 For declaration of, First class with Distinction / First Class / Second class, the aggregate of the total marks secured by a candidate (including repeaters) in all the semesters shall be considered as detailed below:

70	≤	P	≤	100	First Class with Distinction
60	≤	P	<	70	First Class
50	≤	P	<	59	Second Class

Here P is the percentage of total marks secured in all the semesters of that course.

10.0 Provisions for Repeaters

- 10.1 A candidate is allowed to carry all the previous unleared papers **except clinical practicum** to the subsequent semester/semesters subject to Regulation 7.8.3.



- 10.2 Such of those candidates who have failed/remained absent/opt to improve in any one or more papers (theory/dissertation work), henceforth called as repeaters, shall appear/improve in such paper/s during the two immediate successive examinations.
- 10.3 Examination for odd/even semester shall be conducted respectively at the end of odd/even semester (odd with odd, even with even).
- 10.4 The candidate shall take the examination as per the syllabus and the scheme of examination in force during the subsequent appearances.
- 10.5 A candidate who seeks improvement has to surrender the **provisional pass certificate**/original marks cards of that semester.
- 10.6 The marks secured in the previous attempt shall be retained if the same is higher. There is no provision for improvement of internal assessment or clinical practicum.
- 10.7 A candidate is permitted to apply for improvement in any paper of the particular semester within 30 days from the date of announcement of results of that semester.

11.0 Award of Grace Marks

- 11.1 Grace marks shall be awarded to a paper to a maximum of 2%, if after gracing, the candidate gets minimum prescribed marks and passes in that paper. The maximum grace marks for the whole examination shall not exceed 10 marks.
- 11.2 A candidate shall be eligible to a maximum of 5 grace marks, provided, the candidate
 - i. appears for entire examination
 - ii. he/she has failed in only one paper
 - iii. passes the examination by such gracing
 - iv. gets the minimum prescribed marks in the paper and aggregate for passing by such gracing.
- 11.3 Gracing shall also be done for the purpose of declaring classes (First Class with Distinction, First Class and also Second Class) on the following guidelines:
 - a) For an examination with a maximum of 500 marks or less there shall be a gracing of TWO marks only.
 - b) If the maximum marks prescribed for an examination is more than 500 marks, every unit of 500 marks or part thereof shall be graced by **ONE MARK**. However, such gracing shall not exceed **Four Marks in all**.
 - c) This provision is applicable only in the last (final semester examination of the course).
- 11.4 Gracing under 11.1 and 11.2 shall not be applied simultaneously for the same candidate in any examination.
- 11.5 Grace marks awarded as per 11.1 for passing a paper and 11.2 for passing the whole examination are shown only in the ledger and not in the statement of marks. However, the grace marks awarded for class declaration shall be indicated along with the aggregate marks actually awarded.
- 11.6 Grace marks awarded for making up of deficiency in a paper/s of a semester, shall be deducted first from out of the component/s of the same paper which has no minimum for pass. After such deduction the balance of grace marks if any, shall be deducted equally (as far as possible) from the marks obtained in other paper/s of that semester, in the order of their appearance, without affecting the results (pass etc.) of the candidate.
- 11.7 Any fraction in the calculation of percentage of grace marks as above may be rounded off to meet higher digit (on the principle of approximation).
- 11.8 In case of tie, the candidate or a candidate who secures marks without grace or less grace marks is preferred for ranking/awarding prizes/medals.

12.0 Declaration of Rank

- 12.1 Ranks shall be declared for the number of persons equal to 10% of the total number of candidates appearing for any final semester examinations (fractions being rounded off to the nearest integer as per convention), subject to a minimum of one and maximum of ten (provided there were at least five candidates appeared for the examination).
- 12.2 Ranks shall be declared on the basis of the aggregate of the total marks secured by a candidate in all the semesters.



- 12.3 Ranks shall be given from one onwards in the descending order of the total marks obtained in all the examinations considered for the purpose.
- 12.4 If more persons than one are bracketed with the same marks, all of them shall get the same rank which is the highest possible rank for them. E.g. If two persons are bracketed with the same marks for the top position, both will get the same rank (Rank-I) and so on.
- 12.5 Rank certificate shall be issued only up to Rank-X for ranks actually declared as per 12.1 above.
- 12.6 A repeater (including a candidate who seeks improvement) shall not be eligible for rank.

13.0 Marks Cards

- 13.1 The marks cards shall be issued after affixing the security hologram of the University and laminating it on both sides.

14.0 Barring of simultaneous study

- 14.1 No candidate admitted to a degree course in a College/Institution under the jurisdiction of this University shall be permitted to study simultaneously in any other course leading to a degree (regular, evening & morning) offered by this or any other University.
- 14.2 If a candidate gets admitted to more than one course, the University shall cancel without giving prior notice, his/her admission to all the courses to which he/she has joined.

15.0 Miscellaneous

- 15.1 These revised regulations will apply to candidates admitted for the academic year 2002-03 and onwards.
- 15.2 Any other issue, not envisaged above, shall be resolved by the Vice Chancellor in consultation with the appropriate bodies of the university, which shall be final and binding.

REGISTRAR

VICE-CHANCELLOR



Annexure-1

**M.Sc (Audiology) SEMESTER SCHEME
SCHEME OF EXAMINATION**

Sem No.	Paper No.	Paper Code	Title of the Paper	Marks for		
				Theory	I.A.	Total
1	2	3	4	5	6	7
I	1.1	AA 010	Research Methods in Speech-Language & Hearing	80	20	100
	1.2	AA 020	Statistics in Speech-Language & Hearing	80	20	100
	1.3	AA 030	Technology for Speech-Language & Hearing	80	20	100
	1.4	AA 040	Auditory Physiology	80	20	100
	1.5	AA 050	Basics in Auditory Perception	80	20	100
II	2.1	AB 010	Neurophysiology of Hearing	80	20	100
	2.2	AB 020	Psychophysics of Audition in Normals	80	20	100
	2.3	AB 060	Implantable Devices for the Hearing Impaired	80	20	100
	2.4	AB 040	Physiological Assessment of the Auditory System	80	20	100
	2.5*	AB 050	a) Clinical Practicum (Internal) b) Clinical Practicum Examination (External)	- -	50 -	50 50
III	3.1	AC 010	Psychophysics of Audition in the Hearing Impaired	80	20	100
	3.2	AC 020	Seminars in Assessment of the Hearing Impaired	80	20	100
	3.3	AC 060	Speech Perception	80	20	100
	3.4	AC 040	Electrophysiological Assessment of the Auditory System	80	20	100
	3.5	AC 070	Seminars in Rehabilitative Audiology	80	20	100
IV	4.1	AD 010	Assessment and Management of Central Auditory Processing Disorders	80	20	100
	4.2	AD 060	Audiology in Practice			
	4.3	AD 070	Speech Perception in Clinical Population	80	20	100
	4.4*	AD 040	a) Clinical Practicum (Internal) b) Clinical Practicum Examination (External)	- -	50 -	50 50
	4.5	AD 050	Dissertation**	-	-	100

* (a) Clinical Practicum (Internal) shall begin from I/III semester. The Internal assessment marks are based on performance of I & II / III & IV semester's clinical work taken together.

** Candidates shall begin Dissertation work in III semester.

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Note: Changes recommended in the UOM Notification No.AC.2(S)/315/04-05 dated 26th March 2005 have been incorporated.



M.Sc (Audiology) Degree Course (Semester Scheme 2002)

Gracing Marks Regulation

Regulation No.11.0

Regulation 11.1 Illustration – 1 (Semester I and III)

Paper No./ Title	Theory / Practical		IA/Viva		Total			Grace Marks (GM)	Total after adding (GM)	Net ded	Total after net ded (Final total)	Remarks	
	Max	Marks Scored	Max	Marks Scored	Max	Min	Marks Scored						
2	3	4	5	6	7	8	9	10	11	12	13	14	
1.1	A	80	41	20	08	100	50	49	01	50	-	50	Passes
1.2	B	80	40	20	07	100	50	47	-	47	-	47	Fails
1.3	C	80	42	20	06	100	50	48	02	50	-	50	Passes
1.4	D	80	46	20	11	100	50	57	-	57	05	52	Passes
1.5	E	80	40	20	08	100	50	48	02	50	-	50	Passes

Regulation 11.1 Illustration – 2 (Semester II)

Paper No./ Title	Theory / Practical		IA/Viva		Total			Grace Marks (GM)	Total after adding (GM)	Net ded	Total after net ded (Final total)	Remarks	
	Max	Marks Scored	Max	Marks Scored	Max	Min	Marks Scored						
2	3	4	5	6	7	8	9	10	11	12	13	14	
2.1	A	80	42	20	09	100	50	51	-	51	01	50	Passes
2.2	B	80	40	20	08	100	50	48	02	50	-	50	Passes
2.3	C	80	43	20	06	100	50	49	01	50	-	50	Passes
2.4	D	80	41	20	10	100	50	51	-	51	01	50	Passes
2.5	E1(P)	-	-	50	22	50	25	23	02	25	-	25	Passes
2.6	E2(P)	50	24	-	-	50	25	24	-	24	-	24	Fails

Note: For practicum with a total of 100 marks, 2 GM can be given to E1 or to E2. Total GM should not exceed 2.

Regulation 11.2 Illustration – 1 (Semester I to IV)

Paper No./ Title	Theory / Practical		IA/Viva		Total			Grace Marks (GM)	Total after adding (GM)	Net ded	Total after net ded (Final total)	Remarks	
	Max	Marks Scored	Max	Marks Scored	Max	Min	Marks Scored						
2	3	4	5	6	7	8	9	10	11	12	13	14	
1.1	A	80	42	20	09	100	50	51	-	51	01	50	Passes
1.2	B	80	43	20	08	100	50	51	-	51	01	50	Passes
1.3	C	80	39	20	08	100	50	47	03	50	-	50	Passes
1.4	D	80	40	20	11	100	50	51	-	52	01	50	Passes
1.5	E	80	45	20	10	100	50	55	-	55	-	55	Passes

Note: Under Regulation 11.2, 5 marks can be added to any paper (including practicals of 50 marks each i.e. a candidate scoring 20 out of 50 can get 5 GM in practicals)

Regulation 11.3 Illustration – GRACING FOR CLASS DECLARATION

Total Marks: 2000

Maximum Gracing Allowed: 04

For	Minimum Marks Required	Marks Secured	Grace marks	Total after adding grace marks	Remarks
First Class	1200	1199 1195	02 -	1200 1195	First Class Second Class
First class with Distinction (70% & above)	1400	1397	03	1400	First class with Distinction



MASTER OF SCIENCE (Audiology)
INTEGRATED SEMESTER SCHEME (MODEL QUESTION PAPER PATTERN)
(All Units are Compulsory)

Paper Title:

Max. Marks 50

Paper Code:

Unit No.	Question Number	Question/s	Marks	
I	1(a)	Axxxxxxxxxxxxxxxxxxxxxxxx	10	
	(b)	Bxxxxxxxxxxxxxxxxxxxxxxxx	06	
	2(a)	OR		
		(b)	Cxxxxxxxxxxxxxxxxxxxxxxxx	08
	(b)	Dxxxxxxxxxxxxxxxxxxxxxxxx	08	
II	3(a)	Exxxxxxxxxxxxxxxxxxxxxxxx	07	
	(b)	Fxxxxxxxxxxxxxxxxxxxxxxxx	09	
	4(a)	OR		
		(b)	Gxxxxxxxxxxxxxxxxxxxxxxxx	12
	(b)	Hxxxxxxxxxxxxxxxxxxxxxxxx	04	
III	5(a)	Ixxxxxxxxxxxxxxxxxxxxxxxx	04	
	(b)	Jxxxxxxxxxxxxxxxxxxxxxxxx	04	
	(c)	Kxxxxxxxxxxxxxxxxxxxxxxxx	08	
	6(a)	OR		
(b)		Lxxxxxxxxxxxxxxxxxxxxxxxx	06	
	(b)	Mxxxxxxxxxxxxxxxxxxxxxxxx	10	
IV	7(a)	Nxxxxxxxxxxxxxxxxxxxxxxxx	05	
	(b)	Oxxxxxxxxxxxxxxxxxxxxxxxx	03	
	(c)	Pxxxxxxxxxxxxxxxxxxxxxxxx	08	
	8(a)	OR		
(b)		Qxxxxxxxxxxxxxxxxxxxxxxxx	10	
	(b)	Rxxxxxxxxxxxxxxxxxxxxxxxx	06	
V	9(a)	Sxxxxxxxxxxxxxxxxxxxxxxxx	08	
	(b)	Txxxxxxxxxxxxxxxxxxxxxxxx	08	
	10(a)	OR		
		(b)	Uxxxxxxxxxxxxxxxxxxxxxxxx	09
	(b)	Vxxxxxxxxxxxxxxxxxxxxxxxx	07	

Regulation No.9.5a: For a theory paper carrying 50 marks, each full question shall carry 10 marks with internal division like, 8+2, 6+4, 5+5, 5+3+2 and so on. Maximum number of subdivision in a question shall be THREE.

REGISTRAR

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**MASTER OF SCIENCE IN AUDIOLOGY
I Semester**

AA 010: RESEARCH METHODS IN SPEECH-LANGUAGE & HEARING

Unit 1

- . Review of basic research methods, strategies & designs in sp-lang pathology & audiology.
- . Types of research in speech language pathology and audiology. ex-post facto research, normative research, standard group comparison, experimental research, clinical & applied research, sample surveys, evaluation research.
- . Methods of observation & measurement in speech language pathology & audiology.

Unit 2

- . Experimental designs - The structure & logic of experimental designs, single subject designs & group designs.
- . Documentation (a) Organization, format & writing style. (b) Legal, ethical & cultural considerations for research in speech language pathology & audiology.

Unit 3

- . Review of studies in speech & hearing as established in standard journals. Critical analysis of methods employed and identification of models of research that may be unique to different areas.

Unit 4

- . Evolution of research methods in speech & hearing since 1920s.

Unit 5

- . Methods of experimental research in allied areas – linguistics, neurology, clinical psychology, genetics, physics & acoustics and their application to speech & Hearing.
- . Epidemiological research in speech and hearing.

AA 020: STATISTICS IN SPEECH-LANGUAGE & HEARING

Unit 1

- . Review of basic statistics, statistical measures & their features.
- . Statistical inference: Methods of correlation & regression, cause & effect relation, chi-square, population estimate, probability, probability laws & hypothesis testing. The concept, theoretical distributions, estimation – point & interval estimation. Application to speech-language pathology & audiology with specific examples.

Unit 2

- . Analysis of variance & covariance (ANOVA & ANCOVA): Basic models, assumptions, one way & two way classifications. Need for non-parametric tests. Consequence of failure of assumptions underlying ANOVA. Tests for additivity, homogeneity, transformation. Post – hoc tests analysis of covariance. Repeated measure.
- . Correlation, regression analysis and prediction including multiple regression & path analysis.

Unit 3

- . Non-parametric statistics: Non-normal distributions, central limit theorem.

Unit 4

- . Analysis of qualitative data: Contingency tables, measures of association, Kappa coefficient, log linear models. Content analysis.

Unit 5

- . Multivariate analysis: Need for multivariate analysis, various methods, principal component analysis, factor cluster, discriminant function, MANOVA, MANCOVA, multiple regression & path analysis, logistic regression multidimensional scaling.



AA 030: TECHNOLOGY FOR SPEECH-LANGUAGE & HEARING

Unit 1 - Introduction to Basic Electronics and Computers

- . Basic principle of operation & working of – (a) Diodes, Transistors, FET's & UJT's, LED's, LCD's & IC's (b) D.C. Power supplies, a-c Voltage stabilizers & UPS
- . Fundamentals of Digital Electronics – (a) Binary number system, Hex code, ASCII code, bit, byte, etc (b) Logic gates, Counters, Flip-flops etc.
- . Fundamentals of Computers – (a) Block Diagram of a computer & its working (b) Hardware, memory devices & other peripherals (c) Operating system, languages, application software (d) Programs, Flow charts (e) Internet & networking of computers

Unit 2 - Fundamentals of Digital Signal processing & Communication systems

- . Analog & Digital systems – (a) Analog signal & Digital Signals (b) Analog to Digital & Digital to analog converters (c) Need & advantages of digital systems & digital signal processing
- . Principles of digital signal processing – (a) IIR system, its realization & implication (b) FIR system, its realization & implication (c) Basics of IIR & FIR filters & their implementation
- . Fundamentals of communication systems – (a) AM transmission & reception (b) FM transmission & reception (c) Digital modulation Techniques such as delta modulation, PCM, PPM, PWM & their application in speech analysis (d) Satellite communication

Unit 3 - Biomedical signals & Signal Processing

- . Principles of generation of acoustic stimuli – (a) Pure tones, tone bursts, clicks, filtered clicks & warble tones (b) Acoustic/Physical characteristics of all stimuli (c) Generation gating & filtering of stimuli
- . Evoked potential – (a) Working principle (b) Electrodes (c) Recording of responses
- . Electrodes & transducers – (a) Signal acquisition techniques from electrodes & transducers (b) Signal processing techniques such as differential amplification, common mode rejection, artifact rejection, filtering, signal averaging etc. (c) Addition & subtraction of waves

Unit 4 - Technology of Hearing Aids & Speech Processing and Analysis

- . Principle & working of – (a) Body level hearing aid (b) BTE hearing aid (c) Digital, DSP based/programmable hearing aids (d) FM hearing aid
- . Evaluation of hearing aids – (a) Electro acoustic characteristics (b) National & International standards (c) Hearing aid evaluation systems
- . Techniques of speech processing and analysis – (a) Voice response system (b) Speaker recognition system & speech recognition system (c) Speech synthesis methods

Unit 5 - Advanced Technology for Speech & Language Disorders

- . Electro-physiological methods in diagnosis- (a) Fundamental principles of EEG (b) Fundamental principles of EMG
- . Neuro-radiological methods in diagnosis (a) Working principles (b) Interpretation & implications
- . Tools/studies to understand the organization of speech & language disorders and functions - (a) Cortical blood flow studies (b) Radio imaging techniques, functional MRI (c) Application of tools in studying genetic bases of speech language disorders

AA 040: AUDITORY PHYSIOLOGY

Unit 1

- . External ear: Anatomy & physiology of lower animals & humans. Role of Pinna & External auditory meatus in hearing. Resonance properties of external ear in lower animals & human.
- . Temporal bone anatomy.

Unit 2 - Middle ear: Anatomy & Physiology of lower animals and humans

- . (a) Middle ear transformer action (b) Concept of acoustic impedance (c) Acoustic and non acoustic reflex pathways (d) Anatomy & physiology of the eustachian tube



Unit 3 - Cochlea: Anatomy in lower animals and human

- . (a) Macro & microanatomy (b) Blood supply (c) Innervation (d) Cochlear fluids - Origin, absorption, composition, dynamics and functions

Unit 4 - Physiology of the Cochlea

- . (a) Modes of bone conduction (b) Cochlear mechanics - basilar membrane mechanics -historical & current status (c) Cochlear transduction (d) Cochlear electrophysiology (e) Cochlear potentials their generation and properties (f) Cochlear non-linearity - two tone suppression, otoacoustic emission & other recent advances.

Unit 5 - Theories of hearing

- . (a) Historical aspects (b) Place theory – resonance & nonresonance (c) Frequency theory (d) Traveling wave theory (e) Other recent advances like motor theory etc.
- . Vestibular system: Anatomy & physiology of Vestibular structure and vestibular nerve.

AA 050: BASICS IN AUDITORY PERCEPTION

Unit 1

- . Psychoacoustic: (a) Introduction (b) Psychophysical methods
- . Theory of signal detection: (a) Basic concepts (b) Application

Unit 2 - Loudness

- . (a) MAP & MAF (b) Equal loudness contours (c) Loudness level (d) Scaling (e) Temporal integration (f) Loudness of complex tones (g) Loudness growth (h) Parameters of loudness (i) Psychophysical power law (j) Recruitment in normal ears (k) Relationship between loudness and pitch (l) Differential sensitivity for frequency & intensity (m) Absolute/relative DL's (n) Methods for measuring DL's (o) Clinical application

Unit 3 - Pitch

- . (a) Factors affecting pitch perception (intensity frequency & duration (b) Pitch scales (c) Pitch of complex tones (d) Theories of pitch perception (e) Ohm's acoustic law (f) Objective beats (g) Consonance, dissonance, musical intervals (h) Combination tones (i) Relationship between frequency & pitch (j) JND for frequency (k) Effects of phase on the pitch of complex sound

Unit 4

- . Temporal processing in the auditory system: (a) The detection of gaps in broad band noise (b) The detection of temporal gaps in narrowband sounds (c) The detection of gaps in sinusoids (d) Duration discrimination
- . Auditory pattern perception: (a) Timbre perception & object identification (b) Time-invariant pattern & timbre (c) Time varying patterns

Unit 5

- . Auditory object perception: (a) Information used to separate auditory objects (b) Fundamental frequency (c) Onset disparities (d) Contrast with previous sounds (e) Correlated changes in amplitude and frequency (f) Sound location
- . Perception of temporal system: (a) Perception of rhythm (b) Auditory streaming (c) Judgement of temporal order (d) General principles of perceptual organization (e) Similarity (f) Figure-ground phenomenon and attention.



MSc (Audiology) II Semester

AB 010: NEUROPHYSIOLOGY OF HEARING

Unit 1 - Auditory nerve

- . Anatomy – (a) Structure & tonotopic organization
- . Physiology (a) Electrophysiology - Action potential, generation & properties (b) Stimulus coding - frequency, intensity & temporal coding (c) Non-linearity seen at auditory nerve.

Unit 2 - Central auditory pathway

- . Anatomy - Ascending pathway & tonotopic organization at the different levels.
- . Physiology - Neurophysiology of the central auditory pathway -stimulus coding.

Unit 3 - Auditory cortex

- . (a) Anatomy & tonotopic organization of the primary & secondary auditory area (b) Neuro-biological relationship between auditory cortex & other areas (c) Physiology - Neurophysiology of the auditory area - stimulus coding.

Unit 4

- . Efferent pathway: Anatomy - Anatomy of the cranial nerves related to ear
- . Physiology – (a) Effect on cochlear physiology and auditory nerve and CN (b) Perception of auditory stimulus (c) Protective function.

Unit 5

- . Neuro-transmitters in the auditory system – (a) Type of synapse (b) Physiology of the nerve (c) Neuro-transmitters vs. neuro-modulator (d) Properties and function of neuro-transmitter (e) Afferent and efferent neuro-transmitters

AB 020: PSYCHOPHYSICS OF AUDITION IN NORMALS

Unit 1

- . Masking & critical band concept – (a) Critical band concept (b) Masking & excitation pattern (c) Non-simultaneous masking (d) Frequency resolution (d) Tone-on-tone masking (e) Relationship between masking level & threshold shift (f) Central masking (g) Pulsation threshold (continuity effect) (h) Two-tone suppression

Unit 2

- . Adaptation – (a) Definition (b) Adaptation vs fatigue (c) Methods of studying adaptation (d) Stimuli parameters affecting adaptation (e) Neurophysiological process in adaptation
- . Space perception - (a) Binaural hearing (b) Localization vs. lateralization (c) Localization of puretones (d) Cues for localization

Unit 3

- . Localization of complex tones – (a) The acuity of lateralizing transients (b) Acuity as a function of frequency (c) Onset disparities vs ongoing disparities (d) Time-intensity trading (e) Binaural adaptation (f) Binaural interference

Unit 4

- . Miscellaneous concepts related to space perception – (a) Monaural localization & role of pinnae (b) The cone of confusion & the role of head movements (c) Influence of vision on auditory localization (d) Perception of distance (e) Factors affecting localization (f) Clinical application (g) Performance in localization & lateralization (h) (Beats, rotating tones, time separation pitch, time-intensity trade, masking level difference) (i) Neurophysiological process (j) Time-intensity trading (k) Sluggishness of binaural system (l) Binaural fusion of pulsed stimuli (m) Models of binaural hearing (n) JND for dichotic phase

Unit 5

- . Perception of music - (a) Musical scales/Musical notes (b) Factors affecting perception of music



AB 060: IMPLANTABLE DEVICES FOR THE HEARING -IMPAIRED

Unit 1

- . Bone anchored hearing aids (BAHA): (a) Candidacy (b) Components (c) Types (d) Rehabilitation (e) Assessment of benefit
- . Middle ear implants: (a) Candidacy (b) Components (c) Types (d) Rehabilitation (e) Assessment of benefit

Unit 2

- . Cochlear implants: (a) Biological safety (b) Candidacy – pre-operative evaluation (c) Components (d) Types – design & features (e) Evaluation of benefits

Unit 3

- . Psychophysics of cochlear implants - Speech processor & strategies -Post-operative mapping and follow-up

Unit 4

- . (a) Habilitation of infants & children with cochlear implants (b) Habilitation of adults with cochlear implants

Unit 5

- . (a) Other implantable devices including brainstem implant. (b) Current trends & future needs in implantable devices

AB 040: PHYSIOLOGICAL ASSESSMENT OF THE AUDITORY SYSTEM

Unit 1

- . Tympanometry: (a) Principle & instrumentation of immittance evaluation (b) Tympanometry: Low frequency vs Multifrequency tympanometry, Single vs Multicomponent tympanometry (c) Variables effecting tympanometry

Unit 2

- . Reflexometry: Acoustic & non-acoustic reflexes, reflex adaptation, latency of acoustic reflex, reflex averaging, reflex sensitisation, temporal summation of acoustic reflex, binaural summation of acoustic reflex

Unit 3

- . Application of Immittance: (a) Variables effecting their measurement of acoustic reflexes (b) Implication of immittance evaluation in differential diagnosis & management, Research needs in immittance evaluation.

Unit 4

- . (a) Origin of OAEs, classification of OAEs (b) Principles in recording of OAEs (c) Interpretation of OAEs: Amplitude, latency, phase & reproducibility

Unit 5

- . (a) Factors affecting measurement of OAE (b) Contralateral suppression, ipsilateral suppression of OAE (c) Implication in differential diagnosis and management, Research needs in OAE



M.Sc (Audiology) III Semester

AC 010: PSYCHOPHYSICS OF AUDITION IN THE HEARING-IMPAIRED

Unit 1

- . Threshold detection: (a) Psychometric function for human hearing with clinical population (b) Adaptive test procedures in audiology
- . Loudness perception in hearing impaired: (a) Recruitment (b) Dynamic range (c) Loudness adaptation

Unit 2

- . Pitch perception in the hearing-impaired: (a) Perception of pitch of pure tones (b) The frequency discrimination of pure tones (c) Perception of pitch of complex tones

Unit 3

- . Auditory temporality in hearing-impaired: (a) Temporal integration (b) Differential sensitivity for duration (c) Acoustic temporal order (d) Auditory numerosity

Unit 4

- . Masking phenomenon: (a) Threshold shift in hearing-impaired (b) Relationship between masking level & threshold shift in hearing-impaired (c) Central masking (d) Forward & Backward masking in hearing-impaired

Unit 5

- . Differential sensitivity & its measurement
- . Binaural Hearing/ Binaural Amplification: (a) Temporal dimension of binaural hearing in hearing-impaired (b) Binaural phenomenon in hearing-impaired (c) Factors affecting Binaural hearing in hearing-impaired

AC 020: SEMINARS IN ASSESSMENT OF THE HEARING-IMPAIRED

Unit 1

- . Correlation of audiological findings to histopathological findings in (a) Conductive hearing loss (b) Genetic hearing loss: (i) Tests for identifying genetic disorders including gene mapping, amniocentesis (ii) Applications in management

Unit 2

- . Correlation of audiological findings to histopathological findings in Cochlear pathology and Retro-cochlear pathology

Unit 3

- . Assessment of auditory disorders in the special population such as deaf-blind, MR, autism, cerebral palsy
- . Assessment of patients with hyperacusis: (a) condition/disorders in which it occurs (b) tests, interpretation (c) implications of findings in rehabilitation

Unit 4

- . Evaluation of patients with Vestibular problems: (a) condition/disorders in which it occurs (b) tests, interpretation (c) implications of findings in rehabilitation
- . Tinnitus: (a) Condition associated with tinnitus (b) Types of tinnitus (c) Evaluation

Unit 5

- . Non-audiological tests: (a) X-rays, PET, MRI, CT Scan, other tests (b) Lab tests for differential diagnosis of auditory disorders



AC 060: SPEECH PERCEPTION

Unit 1

- . Acoustic of speech in relation to production
- . Coding of speech in the auditory pathway
- . Theories of speech perception (a) Acoustic theory (b) Neurological theory (c) Auditory theory (d) Motor theory (e) Analysis by synthesis
- . Methods used to study speech perception – (a) Analysis by synthesis (b) Parametric synthesis (c) Articulatory synthesis

Unit 2

- . (a) Cues for perception of vowels & consonants in normals (b) Effects of co-articulation on speech perception

Unit 3

- . (a) Dichotic listening (b) Theories (c) Factors affecting dichotic perception (d) Application in the field of speech and hearing

Unit 4

- . Short-term memory & speech perception – (a) Stages of memory (b) Theories of short-term memory (c) Perception of consonants & vowels in short-term memory
- . Animal perception – (a) Perception of consonants & vowels (b) Categorical perception (c) Animal vs. human perception

Unit 5 - Infant perception

- . (a) Perception of consonants & vowels in infants (b) Comparison of adult & infant perception (c) Universality in speech perception

AC 040: ELECTROPHYSIOLOGICAL ASSESSMENT OF THE AUDITORY SYSTEM

Unit 1

- . Classification & generators of auditory evoked potentials: (a) Exogenous potentials such as EcochG, ABR, MLR, LLR (b) Endogenous potentials such as P₃₀₀, MMN, CNV (c) Steady state evoked potential
- . General principle in recording of auditory evoked potentials: (a) Exogenous potentials such as EcochG, ABR, MLR, LLR (b) Endogenous potentials such as P₃₀₀, MMN, CNV (c) Steady state evoked potential

Unit 2

- . Factors affecting recording & interpretation of early responses (including EcochG, ABR): (a) Subject variables (b) Stimulus variables (c) Recording variables

Unit 3

- . Factors affecting recording and interpretation of middle latency response: (a) Subject variables (b) Stimulus variables (c) Recording variables
- . Factors affecting recording and interpretation of long latency response: (a) Subject variables (b) Stimulus variables (c) Recording variables

Unit 4

- . Factors affecting recording & interpretation of endogenous potentials such as P₃₀₀, MMN, CNV: (a) Subject variables (b) Stimulus variables (c) Recording variables

Unit 5

- . (a) Factors affecting recording & interpretation of early responses, steady state evoked potentials: Subject variables, Stimulus variables, Recording variables (b) Implications in differential diagnosis & management, research needs



AC 070: SEMINARS IN REHABILITATIVE AUDIOLOGY

Unit 1

- . Digital / programmable technology in hearing instruments - Applications in hearing aids, Assistive listening devices
- . Signal enhancing techniques: including technology to improve SN ratio, frequency response shaping, spectral contrast enhancement, control feedback, reduce distortion and circuit noise, etc.

Unit 2

- . Electroacoustic performance of hearing instruments and ALDs, related standards

Unit 3

- . Overview & rationale of selection procedures (a) hearing aids (linear and non-linear) (b) Assistive listening devices (c) Future trends in hearing aid fitting strategies
- . Aural rehabilitation and effective counseling for: (a) hearing aid use (b) use of assistive listening devices

Unit 4

- . Special needs for rehabilitation of children: (a) Need for early intervention (b) Educational placement (c) Auditory learning; learning to listen (d) Strategies for management of multiply handicapped children (e) Language training for different age groups (f) Psychosocial aspects in rehabilitation
- . Special needs for rehabilitation of geriatrics: (a) Speech reading (b) Communication strategies (c) Assertiveness training (d) Strategies for management of individuals with associated problems (e) Psychosocial aspect in rehabilitation

Unit 5

- . Tinnitus management (a) Use of different techniques for individuals with normal hearing (b) Use of different techniques for individuals with degrees of hearing loss
- . Hair cell regeneration, gene therapy for hearing loss



M.Sc (Audiology) IV Semester

AD 010: ASSESSMENT & MANAGEMENT OF CENTRAL AUDITORY PROCESSING DISORDERS

Unit 1

- . (a) Theoretical basis for CAPD problems (b) Classification of CAPDs - Conditions in which CAPD exist

Unit 2

- . Behavioral tests in the assessment of CAPD – Paediatric, Adults

Unit 3

- . Objective test in the assessment of CAPD – Paediatric, Adults

Unit 4

- . (a) Correlation of audiological with non-audiological findings in CAPD (b) Influence of linguistic variations in assessment and management

Unit 5

- . Management of CAPD: (a) Choice of management based on audiological test results (b) Environmental modification (c) Devices (d) Auditory perceptual training (e) Communication strategies (f) Cognitive/language management (g) Recording improvement in therapy (h) Others

AD 060: AUDIOLOGY IN PRACTICE

Unit 1

- . Audiological practice in rural/tribal areas (setting-up the center; equipment for the center; test protocols; rehabilitation; follow-up)
- . Audiological practice in a school setup (setting-up the center; equipment for the center; test protocols; rehabilitation; follow-up)

Unit 2

- . Audiological practice in a paediatric setup (setting-up the center; equipment for the center; test protocols; rehabilitation; follow-up)
- . Audiological practice in an otorhinolaryngological setup (setting-up the center; equipment for the center; test protocols; rehabilitation; follow-up)
- . Audiological practice in a neurological setup (setting-up the center; equipment for the center; test protocols; rehabilitation; follow-up)

Unit 3

- . Audiological practice in an industrial setup (setting-up the center; equipment for the center; test protocols; rehabilitation; follow-up)
- . Audiologist as a private practitioner

Unit 4

- . Medico-legal aspects in audiology: (a) Forensic audiology (b) Audiologist as a witness (c) Ethics in practice (in India & other countries)
- . Legislation - International & national

Unit 5

- . Welfare measures for the hearing-impaired
- . National/International Standards related to Audiology: (a) Test environment (b) Equipment (c) Ear protective devices (d) Hearing aids



AD 070: SPEECH PERCEPTION IN CLINICAL POPULATION

Unit 1

- . Perception of vowels & consonants in the hearing-impaired;
- . Perception of coarticulation in the hearing-impaired
- . Perception of suprasegments in the hearing-impaired

Unit 2

- . Perception of speech through the visual modality - Perception of segmental & suprasegmental cues
- . Perception of speech through the tactile modality - Perception of segmental & suprasegmental cues

Unit 3

- . Perception of speech through cochlea implants modality: (a) Perception of segmental & suprasegmental cues through single channel implants (b) Perception of segmental & suprasegmental cues through multi channel implants (c) Comparison of speech perception through different devices

Unit 4

- . Speech intelligibility: (a) Methods: Subjective & objective (b) Factors influencing (c) Application of Audiology

Unit 5

- . Speech perception in adverse listening conditions: (a) comparison of normals vs hearing- impaired (b) importance of S/N ratios
- . Application in research, evaluation and rehabilitation of the hearing-impaired



REFERENCES
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AB 020: PSYCHOPHYSICS OF AUDITION IN NORMALS

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AB 060: IMPLANTABLE DEVICES FOR THE HEARING-IMPAIRED

- . Clark, G.M., Cowan, B.S. and Dowell, R.C. (1997). Cochlear implantation for infants and children: Advances. San Diego: Singular Publishing Group Inc.
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AB 040: PHYSIOLOGICAL ASSESSMENT OF THE AUDITORY SYSTEM

- . Berlin, C.I. (Ed.) (1996). Hair cells & hearing aids. London: Singular publishing group.
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- . Sahley, T.L., Nodeer, R.H. & Musiek, F.E. (1997). Efferent auditory system: Structure & function. San Diego: Singular Publishing Group Inc.
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M.Sc (Audiology) - III Semester

AC 010: PSYCHOPHYSICS OF AUDITION IN THE HEARING-IMPAIRED

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- . Brain, C.J. Moore (1995). Hearing. CA: Academic Press Inc.
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- . Shprintzen, R.J. (1997). Genetic, Syndromes & communication disorders. San Diego: Singular Publishing Group, Inc.
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AC 030: SPEECH PERCEPTION

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- Miller, J.L & Eimas, P.D (1995). Speech, language & communication. San Diego: Academic Press.
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- Sanders D.A. (1977). Auditory perception of speech - An introduction to principle and problems. New Jersey: Prentice Hall.
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AC 040: ELECTROPHYSIOLOGICAL ASSESSMENT OF THE AUDITORY SYSTEM

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- Ferraro, J.A. (1997). Laboratory exercises in auditory evoked potentials. San Diego: Singular Publishing Group, Inc.
- Hall, J.W. & Mueller, H.G. (1997) Audiologists' desk reference Volume 1: Diagnostic Audiology Principles, Procedures and Protocols. San Diego: Singular Publishing Group.
- Hood, L.J. (1998). Clinical applications of auditory brainstem response. San Diego: Singular Publishing Group Inc.
- Jacobson, J.T. (Ed) (1985). Auditory brainstem response. London: Taylor & Francies.
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- Katz, J. (Ed.). (1994). Handbook of clinical audiology. Baltimore: Williams & Wilkins.
- McPherson, L.D. (1995). Late potentials of the auditory system, London: Singular Publishing Group.
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AC 050: SEMINARS IN REHABILITATIVE AUDIOLOGY

- Mueller, H.G., Hawkins, D & Northern, L.J. (1992). Probe microphone measurements: Hearing aid selection & assessment. San Diego: Singular Publishing Group Inc.
- Sandlin, E.R (Ed) (1995). Handbook of hearing aid amplification - theoretical & technical considerations. Vol. I. San Diego: Singular Publishing Group Inc.
- Studebaker, G.A. & Hochberg, I. (1993). Acoustical factors affecting hearing aid performance. 2nd Edn. Boston: Allyn & Bacon.
- Valente, M. (1994). Strategies for selecting & verifying hearing aid fittings. New York: Thieme Medical Publishers Inc.
- Valente, M. (1996). Hearing aids standards, options & limitations. New York: Thieme Medical Publishers Inc.
- Valente, M., Dunn, H.H & Roeser, R.J. (2000). Audiology -Treatment. New York: Thieme Medical Publishers Inc.

M.Sc (Audiology) – IV Semester

AD 010: ASSESSMENT & MANAGEMENT OF CENTRAL AUDITORY PROCESSING DISORDERS

- Bellis, T.J. (1996). Assessment & management of central auditory processing disorders in the educational setting -from science to practice. London: Singular Publishing Group Inc.
- Chermak, G.D. & Musiek, F.E. (1997). Central auditory processing disorders - New Perspectives. San Diego: Singular Publishing Group Inc.
- Friel-Patti, S. (1999). Treatment for central auditory processing disorders: Clinical decision - making in the assessment & intervention of central auditory processing disorders. Language, Speech & Hearing Services in schools, 30, 345-352.
- Katz, J. (Ed) (1994). Handbook of clinical audiology. 4th Ed. Baltimore: The Williams & Wilkins, Company.
- Musiek, J.F., Baran, J.A & Pinherio, M.L. (1994). Neuro-Audiology: Case studies, San Diego: Singular Publishing Group.
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AD 020: AUDIOLOGY IN PRACTICE

- Dunn, H.H, Dunn, D.R. & Harford, E.R. (1995). Audiology Business & practice management. San Diego: Singular Publishing Group Inc.
- Dunn, H.H., Roeser, R.J. & Valente, M. (2000). Audiology – practice management. New York: Thieme Medical publishers Inc.
- King, P.F. et al (1993) Assessment of hearing disability - Guidelines for medico-legal Practice, London: Whurr Publishers
- Rizzo, S.R. & Trudeau, M.D. (1994). Clinical administration in audiology and speech language pathology. San Diego: Singular Publishing Group Inc.
- Stephen, R.R, Jr., Trudeau, D.M. (Eds.) (1994). Clinical administration in Audiology & Speech-Language pathology. San Diego: Singular Publishing Group Inc.
- Trivedi, P.R. & Raj Gurdeep (1992). Noise pollution. New Delhi: Akashdeep Publishing House.

AD 030: SPEECH PERCEPTION IN CLINICAL POPULATION

- Ainsworth, W.A. (1990). Advances in speech, hearing & language processing. Vol.1. London: Jai Press Ltd.



- Bailey, P.J. (1983). Hearing for speech: The information transmitted in normal impaired & speech. In M.E. Lutman & M.P. Haggard (Eds.), Hearing science & hearing disorders. London: Academic Press.
- Clark, G.M., Cowan, R.S.C. & Richard, C.D. (1997). Cochlear implantation for infants and children. advances. London: Singular Publishing Group, Inc.
- Cooper, H. (1991) (Ed). Cochlea implants, a practical guide. London: Whurr Publishers Ltd.
- Cox, R.M. & McDaniel, D.M. (1989). Development of speech intelligibility rating test for hearing aid comparisons. *Journal of Speech & Hearing Research*, 32, 347-352.
- DeFilippo, C.L. (1982). Tactile perception. In D.G. Sims, G.C. Water & R.L. Whitehead (Eds.) *Deafness & communication*. Baltimore: Williams & Wilkins.
- Fant G. (Ed.) (1972). International symposium on speech communication ability & profound deafness. Washington: Alexander Graham Bell Association for the Deaf.
- Flanagan, J.L. (1972). *Speech analysis, synthesis and perception*. 2nd Ed. New York: Springer-Verlag.
- Hirsh, I.R. (1952). *The measurement of hearing*. New York: McGraw Hill Book Company.
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- Lim, J.S. (1983). *Speech enhancement*. London: Prentice-Hall International, Inc.,
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- Sanders, D.A. (1982). *Aural rehabilitation. A management model*. 2nd Ed. New Jersey: Prentice-Hall Inc.
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- Tyler, R.S. Ed. (1993). *Cochlear implants - Audiological foundations*. San Diego: Singular Publishing Group, Inc.
- Warren, R.M. (1999). *Auditory perception - A new analysis and synthesis*. UK: Cambridge University Press.

List of Journals for reference in subjects related to Audiology

Asia Pacific Journal of Sp, Lang & Hearing
Audiology and Neuro-otology
British Journal of Audiology
Ear & Hearing
Hearing Journal
Journal of Acoustical Society of America
Journal of India

Journal of Sp, Lang & Hearing Research
Language, Sp & Hearing Services in School
Noise and Health
Scandinavian Audiology
Seminars in Hearing
Hearing Aid

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