A.NO- 62

CURRICULUM

DIPLOMA IN HEARING AID AND EAR MOULD TECHNOLOGY

REHABILITATION COUNCIL OF INDIA

(Statutory Body under the Ministry of social justice and Empowerment)
B-22, Qutub Institutional Area
New Delhi – 110 016

e-mail : rehabstd@nde.vsnl.net.in, www.rehabcouncil.nic.in

DIPLOMA IN HEARING AID AND EAR MOULD TECHNOLOGY

PURPOSE

There are more than one million hearing aid users in the country and it is expected that there is 7% growth rate in hearing aid industry. Due to dearth of services in this area a large number of hearing aids are either unutilized or underutilized by the majority of persons using hearing aid in India particularly among the children in special schools, rural population and women with hearing impairment. Hence to enable better utilization of amplification and assistive devices by the hearing impaired persons, there is a felt need to conduct a diploma or certificate course for hearing aid technicians. The course is also designed so as to meet the pragmatic needs of the hearing aid industry.

2. AIM

To cater to the use, care, maintenance and repair of hearing aids, assistive devices and ear mould needs of the persons with hearing impairment all over the country.

3. OBJECTIVES

i) To increase the availability of hearing aid repair and earmould making facility

ii) To regulate and improve the quality of hearing aid dispensing

iii) To meet the needs of children in special schools

iv) To enable optimal utilization of hearing aids.

4. DURATION OF THE COURSE

One academic year.

5. ELIGIBILITY CRITERIA

12^{th} class pass with physics background or any recognised diploma in electronics/ electrical or qualified dental technicians.

6. TEACHER STUDENT RATIO: 1:5

7. PAPERS FOR THEORY

Theory papers: for 200 marks

Paper I - Hearing aids

Paper II - Ear moulds

8. PRACTICALS

Weightage for Internal and External examinations of 200 and 100 marks respectively totaling 300 marks.

9. CRITERIA FOR PASSING

40% each in theory and practical.

10. ATTENDANCE

Attendance for both theory and practical training is 9000 compulsory for all students. Students may avail 8 days leave in a year by applying in writing.

11. EXAMINATION

There shall be one examination at the end of the course.

12. CERTIFICATE

Certificates shall be issued by the institution recognized by Road.

13. INFRASTRUCTURE

A list of tools to set-up the earmould lab for hard acrylic Earmoulds and for hearing aid repair is enclosed (appendix I)

13.1 EQUIPMENT

- UV curing machine, equipment for Biopor and Micropor technology
- Bench motor (2880 RPM)
- Flanging Motor (5000-20000 RPM)
- Hearing aid analyzer
- Illuminating magnifying lens 3 x for BTE aids.

13.2 SPACE REQUIREMENT TOTAL : 500 Sq.Ft

- Storage for raw materials, workbenches, taps with sinks and waste bins 30 Sq, Ft.
- 10'x15'ofliceroom 150 Sq. Ft
- 10' x 15' classroom with students desk and black. Boards 200 Sq. Ft
- Hearing aid repair cubicles - 3 numbers each 40 Sq. Ft. 120 Sq. Ft

13.3 FURNITURE

- Necessary furniture required for the ear mould lab
- Furniture for storing finished material and furniture for the equipment.
- Chairs for work benches
- Wooden table measures 2'x *4'* with 2' height 2 nos
- Chairs 4 nos
- Steel almairah 6' 2 nos
- *5* amps multisocket with switch 2 nos

14. STAFF

Core faculty

- Earmould/Dental Technical with experience in earmould making
- Electronics engineer

Guest faculty

- 2 Audiologist

15. SUGGESTED HOURS ALLOCATED FOR THEORY AND PRACTICALS

THEORY PAPERS:

Hearing Aids: 5-1 / 2 hrs / week for 40 weeks - 220 hrs
Earmoulds : 5-1/2 hrs / week for 40 weeks - 220 hrs

Total - 440 hrs

PRACTICALS:

25 hours /week for 40 weeks - 1000 hrs

16. PAPERS FOR THE COURSE

PAPER I: HEARING AID

Objectives:

At the end of the training the student is expected to realise the following:

1. To identify, describe and tell the purpose(s) of each component used in hearing aids and assistive devices in Indian market, and its market value.
2. To undertake repair of all types of hearing aids and assistive devices.
3. To procure hearing aid repair kit and hearing aid assessment gadgets
4. To undertake minor repairs of audiometer

Unit 1: i) Introduction to Electricity -Basic electronics circuits — Circuit elements R,C,L -series and parallel circuits using RC, RL, RLC, Circuits — Circuit theorems — Principles of magnetism — Mutual Inductance — Transformer theory & magnetic coupled circuits.

ii) Introduction to AC & DC electrical circuits — Electrical resonance & brief introduction to transient circuits.

iii) Introduction to electrical machinery — transformers — DC motors — AC motors etc., brief introduction to electrical power distributions.

iv) Electrical devices — different types of switches — relays — circuit breakers - fuses grounding — wires and cables used.

Unit 2: i) Introduction to electronics — Atomic structure formation of bonds and bond theory — conductors —semi-conductors and insulators — semiconductors material science formation of semi-conductor junction

ii). Introduction to electronic components — PN junction diodes Led —zener diode negative resistance diodes, etc.

iii) Transistors - junction transistors - field effect transistors - unijunction transistors etc., - SCR & thyristors etc., Discussion of IC technology.

Unit 3: i) Amplifiers: Introduction — classification — transistor used as an amplifier in CC, CE, CB configuration - small signal and large signal amplifiers-wide band amplifiers — power amplifiers — pushpull amplifiers, complementary & symmetry amplifier coupled amplifiers (RC coupled, transformer coupled, direct coupled amplifiers) feed back amplifiers (series and shunt voltage feedback amplifier; series and shunt current feed back amplifiers) discuss AGC circuits — characteristics of amplifiers - frequency response - input and output impedance, voltage gain, current gain, power gain, fidility of the amplifier — and other characteristics — operational amplifiers.

ii) Filters - power filters - transmission line filters — classification of TL filters based on frequency characteristics - type of components used - active & passive filters discussion about different types of active filters equalizer

Unit 4: i) Oscillators theory of oscillations - sinewave oscillators - Wein bridge oscillator -RC phase shift oscillators - Hartle colpits, Crystal oscillators, etc.,

ii) Modulation & demodulation - necessity for modulation - different types of modulation — theory of amplitude modulation — frequency modulation and demodulations.

Unit 5: Digital electronics - introduction - characteristics of digital signal -electronic gates — combination of gates — counters (up-down counter, ring counter, decade counter etc.) shift registers - Different types of flip -flops, Multivibrators (Monostable, Astable, and Bistable) semiconductor memories like RASM, ROM EPROM, EEPROM etc -Buffer - analog to Digital to analog converters - Digital display devices like LED, LCD, etc.

Unit 6: Introduction to hearing aids - familiarization with different components used in the hearing aids - type of hearing aids - body level - behind the ear - in the canal - etc., introduction to digital hearing aids - trouble shooting of different types of hearing aids - Elector Acoustical measurement of hearing aids -Discussion of hearing aid standards used in different types of hearing aids like Bodylevel, BTE, etc.

Unit 7: Assistive. Listening Devices - working principles - brief discussion about different types of ALDs - like visual telephone bell indicator, Vibralarm, induction loop system, group hearing aids etc., Discussion of different type of measuring and analyzing equipment - trouble shooting of ALDs.

U**nit 8**: Brief introduction to computers and its applications

16.2 PAPER II- EARMOULDS

Objectives:

At the end of the training the student is expected to learn

1. (i) Preliminary examination of the ear, injuries/ allergies
   (ii) Impression taking
   - Institution based
   - Community/ Home Based

   (iii) Elasking
   - Institution based
   - Community / home based
   - Making plaster cast

   (iv) Scooping

   (v) Packing and curing
   - Institution based
   - Community / home based

   (vi) Processing
   - Trimming
   - Drilling
   - Making sound bore
   - Smoothening
   - Polishing
   - Ring fixing with metal and plastic rings
   - Dispensing
   - Trouble shooting and repair

2. To perform Electro acoustic analysis of hearing aid
3. To interpret Electro acoustic analysis of hearing aid
4. To organize and administer a hearing aid repair and ear mould lab.

Unit 1: **Properties of earmold materials:**

- Earmould — definition
- Earmoulds and its role
- Type - physical modification
- Custom & standard
- Procedure to make Earmoulds
- Acoustic modification of Earmoulds - Vents, dempers, horns
- Care and maintenance — Counselling
- Trouble shooting & repair of Earmoulds
- Acrylic technology in India / Abroad
- Heat - cure, cold — cure
- Earmoulds for body level hearing aid, tubing, connectors for BTE.
- Softmould earplugs for swimmers and for protection against, noise/infection

Unit 2

- Definition of sound, its transmission with reference to hearing, hearing aids and Earmoulds.

- Essential anatomy and physiology of the external ear, middle ear and inner ear.

Unit 3 Hearing - How we hear, importance of hearing, hearing Evaluation, Audiogram, speech discrimination, hearing and vacation, audiometer and its uses.

Unit 4 **Hearing impairment:**

- What is hearing impairment
- Types and causes of hearing impairment (Prenatal, Perinatal and Postnatal)
- Management of persons with hearing impairment
- Medical / surgical treatment
- Audiological rehabilitation.

17. READING LIST

Alpiner & Mc Carthy. (1987) “Rehabilitative Audiology - Children and Adults” Baltimore: Williams & Wilkins

Chapter in V.D Larsen et al. Ed (1974) “Contributing Hearing ~d Performance by Earmould Design” in Auditory and Hearing Prosthetic Research NY: Grune Stratton

Pollack. M.C (1980) Amplification for the hearing impaired. NY: Grune and Stratton

Robert E. Sandlin (Ed.) (1995) “Hand Book of Hearing Aid Amplification : Theoretical & Technical Consideration”. Vol I, Williams & Wilkins, Baltimore

Samuel E. Lybarger. (1978) Chapter on Earmoulds in Jack Katz (Ed.) Handbook of clinical and audiology, 2 Ed. Williams & Wilkins, Baltimore.

Schow, R.L. & Nerbonne, M.A (Ed.) (1989). “Introduction to Aural Rehabilitation”. 2 July Ed. Allyn & Bacon.

LIST OF TOOLS AND OTHER ITEMS REQUIRED FOR REPAIRING THE HEARING AID

TOOLS:

1.	Street noseplayer	5”
2.	Steel outtr	4”
3.	Screwdrivers	3”,4”,5”
4.	Brush	
5.	Forceps	
6.	Knife	
7.	Round file	Jewellers
8.	Flat file	Jewellers
9.	Cuttingplier	6”
10.	Benchvice	
11.	Small Hacksaw	
12.	Hand drill with bits	0.8 mm to 2mm
13.	Watch mechanic screwdriver set	

Other items:

1.	Soldering Iron (Soldron or Tony make)	25 watts with different tips
2.	Soldering Iron stand	
3.	Soldering paste	
4.	Soldering lead 100 gins	60-40
5.	Battery compartment or battery bolder	
6.	Signal injector	
7.	Cellotape	
8.	Bonefix	
9.	Flexible wire	7 stand
10.	Disposable syrinee	
11.	Stethoscope without diaphragm	
12.	Spare hearing aid cords	2 pin single cord 2 pin v cord 3 pin single cord
13.	Cleaning liquids	Carbon tetrachloride Denstured spirit and switch and cleaning oil
14.	Cotton	surgical
15.	Cord tester and cell tester or multimeter	
16.	Desoldering pump	
17.	Bee wax	
18.	Table lamp and 2 tube lights.	

******