

VOCATIONAL HIGHER SECONDARY
TEACHERS SOURCEBOOK

**ECG AND AUDIOMETRIC
TECHNICIAN**
FIRST YEAR



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SCERT – 2005-'06

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VIDYABHAVAN, POOJAPPURA, THIRUVANANTHAPURAM -12, KERALA

TEACHERS' SOURCEBOOK

ECG AND AUDIOMETRIC TECHNICIAN

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Preface

Dear Teachers,

One of the aim of education is to help the learners to internalise to the maximum the immense possibilities of the ever-expanding body of knowledge. The revision of curriculum and transactional strategies is aimed at changing the educational scenario. It is with this view that the ECG & AMT Sourcebook for Standard XI has been prepared.

This Sourcebook for teachers includes many new concepts and principles along with suggestions for transactional strategies. The teacher is expected to select and use these strategies judiciously and transact them to learners. If the acquired knowledge is to contribute to the over all development of the learner, it has to be internalised through activities. For the effective transaction of concepts, clarity is as important as involving in meaningful activities.

The sourcebook has been prepared as an instrument to equip the teacher with indication to make the activities more purposeful by specifying what help is to be given at which stage and how. It is hoped that the activities suggested in this book are suitable to the existing situation in our schools. It is also expected that the teacher has to seek help from other sources like general reference books available in various libraries, websites, etc. Only then we can attain the objectives of learning science practically and meaningfully.

It is report that this Sourcebook will be utilised to its maximum for the effective transaction of the curriculum.

With regards,

Dr E Valsala Kumar

Director

SCERT, Kerala

Thiruvananthapuram

25.11.2005

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APPROACH

Introduction

The ultimate aim of education is human refinement. Education should enable the learner to formulate a positive outlook towards life and to accept a stand which suits the well being of the society and the individual as well.

The attitude and potential to 'to work' has determined the destiny, progress and cultural development of the human race. As we all are aware, the objective of education to form a society and individuals having a positive work culture. The educational process expected in and outside our formal schools should concentrate upon inculcating concepts, abilities, attitudes and values in tune with these 'work culture.' Hence vocationalised education cannot be isolated from the main stream of education. In another sense, every educational process should be vocationalised. However, due to our inability to utilise the resources wisely, scarcity of job opportunities is a severe issue of the present society. For overcoming this deep crisis, emergent techniques have to be sorted out and appropriate researches have to be seriously carried out. It is in the sense that the content and methodology of vocational Higher

Secondary Education have to be approached.

The Vocational Higher Secondary course was envisaged as a part of the National Policy on Education with the noble idea of securing a job along with education. The relevance of Vocational education is very great in this age of un employment. This education system, which ensures a job along with higher education, stands aloof from other systems of education.

A learning environment which ensures vocational aptitude, vocational training, basic life skills, competencies related to different subjects, appropriate values and attitudes and existential readiness has to be provided here.

The curriculum should be one which recognises the specific personality of the learner and should develop it in a desirable way. It should provide opportunity to imbibe novel ideas to follow a critical approach and for learning through experiences.

The competency to transform ones own resources for the betterment of the society and the individual is to be ensured in each individual. Training in the sense of equality, democratic sense, environmental consciousness

and devotion to the constitution is an inseparable factor of the curriculum.

The need of a systematic curriculum is prevailing in vocational subjects. A scientifically structured curriculum incorporating the unique features peculiarity of Kerala ensuring the possibility of higher education and utilising the national and international possibilities of employment is required.

The new curriculum should be capable of assimilating the life skills, scientific temper, attitude of co-existence, leadership qualities and mental health to face the challenges of life. It should be capable of strengthening the competencies imbibed by the learners up to the tenth class.

A curriculum for selecting vocational areas according to the aptitude of the students, learning it in depth, acquire general awareness in the basic areas and to secure jobs has become the social need of the day. A learner centred, process oriented, need based vocational curriculum is envisaged.

What is learning?

- Learning is construction of knowledge and so it is a live and continuous mental process.
- Learning is a process of advancement through adding and correcting in the light of comparing the new issue with the previously learned concepts.
- Learning takes place as a part of the effort to solve problems.
- Learning takes place by assimilating bits of knowledge into ones own cognitive structure.
- Learning is not a linear process. It is a spiral process growing deeper and wider.
- Learning is an intellectual process rather than the mere memorisation of facts. Learning is a conglomeration of a variety activities like problem analysis, elucidation, critical thinking, rational thinking, finding out correlations, prediction, arriving at conclusions, applications, grouping for other possibilities and extracting the crux. When opportunities are provided for intellectual processes learning will become effective and intellectual ability will get strengthened.

Theoretical foundations of learning

Education is the best device that can be adopted for creation of a new society. It should be democratic in content and process and should acknowledge the rights of the learner. It should also provide opportunity for better citizenship training. The concept of equality at all areas should get recognition in theory and practice.

There should be consious programme of action to develop nationality, humanness and love and against the enchroachment of the sectarianism of caste and religion.

The learner should be able to take firm steps and deferred against the social crisis like privatisation, liberalisation, globalisation etc and against all kinds of dominations.

They should develop a discrimination to use the acquired learning as a liberative weapon.

They should be able to view education and life with the perspective of social well being.

They should get opportunity to recognise that co-operation is better than competition and that co-operation is the key to social life and culture.

A basic awareness of all the subjects needed for life essential for all students.

The remnants of perspectives formed in us during the colonial period still influence our educational philosophy. The solution to the present day perplexities of the society which approaches education on the basis of competitions and marketisation is only a comprehensive view of life.

It is high time that education was recognised on the basis of the philosophy of human education. The human approach to education has to reflect in its content, learning process and outlook. The perspective of 'learning to be ' and learning to live together as expressed by the UNESCO and the concepts of existentialist intelligence intrapersonal and interpersonal intelligence.

The basis of new approaches on curriculum, teaching- learning process are derived from the developments place in the east and west of the world.

When we begin to see the learner at the centre of the learning process, the teaching process has to be changed timely. It is the result of the rapid growth and development of Science and Technology and Pedagogy. If we want to undergo the changing process, we have to imbibe the modern hypothesis regarding learner, they have;

- Great curiosity
- Good imagination

- Numerous other qualities and interests
- Independent individuality
- Interest in free thinking and working in a fearless atmosphere.
- Have interest in enquiring and questioning.
- Ability to reach conclusions after logical thinking.
- Ability for manifest and establish freely the conclusions arrived at.
- Interest for recognition in the society.
- Determination to face the interference of society and make components which is a part of social life.

• When we consider the learning system, the domains to be stressed in education according to the modern development becomes relevant.

The **knowledge** domain consists of

- Facts
- Ideas
- Laws
- The temporary conclusions and principles used presently by scientists.

The learning is a process. The continuous procedures we undergo to reach a particular goal is process. The skills which are parts of the process to analyse the collected ideas and proofs and come to a conclusion is called *process skills*. Some important **process skills** are,

the skills;

- To observe
- To collect data and record
- To classify

- To measure and prepare charts
- To experiment
- To predict
- To recognise and control the variables
- To raise questions
- To generalise
- To form a hypothesis and check.
- To conclude
- To communicate
- To predict and infer
- To use tools.
-

Observation is the process of acquiring knowledge through the senses. It is purely objective oriented. Learning experiences which provide the opportunity to use all the senses may be used.

The process of grouping is known as **classifying**. Starting from simple groupings of data, it can extend to the level of classification into minute sub-groups.

In addition to this, consider the skills related to **creative domain** also, they are skills:

- To visualize
- To connect facts and ideas in new ways
- To find out new and uncommon uses of objects
- To fantasize
- To dream
- To develop creative isolated thoughts
-

Creativity is an essential component of process and activities. The element of creativity is involved in finding out problems, formation of hypothesis, finding 'solutions' to problems etc. Through activity oriented learning experiences, opportunities to express creativity can be created.

Again, the following factors consisting in the **Attitudinal domain** are also important as;

- Self confidence
- Love for scientific knowledge
- Attitude to know and value history
- Respect human emotions
- Decide with reasonable present problems
- Take logical decisions regarding personal values

'Hypothesis' is a temporary conclusion drawn using insight. Based on knowledge and experiences relating to the problems the causes and solutions can be guessed.

As regards the **application domain** the important factors are the ability to:

- observe in daily life examples of ideas acquired.
- take the help of scientific process to solve the problems of daily life.
- choose a scientific life style
- connect the ideas acquired with other subjects.
- integrate the subjects with other subjects.

Some basic stands have to be taken on the new scientific knowledge about intelligence learning and teaching. When such basic concepts are accepted changes are required in the following factors.

- The vision, approach, structure and content of the curriculum.
- The vision, approach, structure and content of the textbooks.
- Role of the teacher and the learner.
- Learner atmosphere, learning materials and learning techniques.

Some scientific perspectives accepted by modern world in

educational psychology are given below.

Constructivism

This approach puts forward the concept that the learner constructs knowledge. New knowledge is constructed when ideas are examined and practiced in new situations relating them with the previously acquired knowledge and experience. That is assimilated into the cognitive structure of one's knowledge. This method which gives priority to critical thinking and problem solving provides opportunity for self motivated learning.

Social Constructivism

Social constructivism is a sub section of constructivism. Knowledge is formed, spread and imbibed and it becomes relevant in a social environment. Interactive learning , group learning, co-operative participatory learning, all these are concepts put forward by social constructivism.

The main propounders of constructivism are piaget, vygotsky and Bruner.

Discovery learning and interactive learning have prime importance. Learning takes place as a part of the attempt for problem solving. The activities of a learner who confronts cognitive disequilibrium in a learning situation when he tries to overcome it leads to the renewal of cognitive structure. It is through this process construction of new knowledge and the assimilation of them that learning take place. Observation and enquiry are unavoidable factors. The learner advances towards new areas of

acquisition of knowledge where he tries to compare his new findings with the existing conceptions.

Learning is a live mental process. Rather than the ability for memorisation of facts cognitive process has to be given emphasis. The process of problem analysis, elucidation, critical thinking, rational thinking, finding out co-relation, prediction, hypothesis formation, application, probing for other possibilities, extracting the crux and other processes are of critical importance in learning.

Constructivism gives greater predominance to co-operative learning. Social and cultural factors influence learning. Sharing of knowledge and experience among learners, collective enquiry, assessment and improvement, group activity and collaborative learning, by sharing responsibilities with the objective of public activity, provide opportunity for effective learning.

In learning internal motivation is more important than external motivation. The learner should have interest and initiative in learning. Learning situation should be capable of forming a sense of ownership in of the learner regarding the learning process.

Learning is not a linear process. It progresses in a spiralled way advancing deeper and wider.

Learner-his nature and features

The learners in standard XI has undergone a learner centered and process oriented learning experience up to X standard. He is adequately competent to select vocational subjects

according to his aptitude and interest and to acquire higher education and profession as he wishes. The aspirations about future life is framed in this particular age foreseeing national and international job opportunities. Some of the peculiarities of the learner at this stage are:

- Physical, intellectual and emotional planes are intensive changes during this age and their reflections can be observed.
- Ability to enquire, discover and establish cause-effect relationship between phenomena.
- Readiness to undertake challenges.
- Capacity to shoulder leadership roles.
- Attempt to interpret oneself.
- Susceptibility to different pressures.
- Doubts, anxieties and eagerness about sex.
- Longing for social recognition.

Needs of the learner

- To make acquaintance with a job through vocational education.
- To acquire more knowledge in the concerned area through higher education.
- To recognise and encourage the peculiar personality of the later adolescent period.
- To enable him to defend against the unfavourable circumstances without any help

Role of the Learner

- Active participant in the learning process.
- Acts as a researcher
- Sharer of information

- Sharer of responsibilities
- Collects information
- Takes leadership
- Involves in group work
- Acts as a co-participant
- Observes his environment
- Experiments and realises
- Makes interpretations and draws inferences.

Role of the Teacher

The teacher should;

- consider the 'Stress and strain' of the teenagers
- understand the socio-economic and cultural background of the students.
- promote and motivate the students to construct knowledge.
- arrange proper situations to interact in and outside of the classroom.
- guide the students by explanations, demonstrations etc.
- promote opportunity for co-operative learning and collaborative learning.
- facilitate interpersonal and intra-personal interactions.
- act as a democratic leader.
- act as a problem solver
- effectively guide the students for the selection and conduct of various continuous evaluation elements.
- continuously evaluate the progress of the learners.
- gives scaffolding/support wherever necessary.
- motivate for learning
- promote divergent thinking.
- act as a democratic group leader.
- act as a co-learner

- gives variety of learning experiences.
- be a constant student
- facilitate for reference/data collection
- have a clear understanding about the age, needs, peculiarities, abilities, nature, aptitude etc. of the learner.
- have the ability to motivate the learner in order to acquire and enrich their knowledge.
- be a guide to the learner in developing insights and creating responses on current affairs.
- be capable to lead the learner into a variety of learning methods and process based on curricular objectives.
- be a link between school and community.
- be a good organiser, guide, friend, philosopher and co-learner.
- have an inter disciplinary approach in learning activities.
- be able to guide the learner in his/her career prospects based on his interest aptitude and ability.
- be impartial and democratic.
- provide ample experiences to attain the basic values and objectives of the curriculum.
-

New Concepts of Learning

1. Discovery Learning-

The teacher has to create a motivating atmosphere for the learner to discover concepts and facts, instead of listening always. Creating occasion to progress towards discovery is preferred. Instead of telling everything before and compelling to initiate the models, situations are to be created to

help the children act models as themselves.

2. Learning by discussion

That discussion leads to learning is Burner's theory. Here discussion is not opposing each other. It is a sharing on the plane of ideas. New ideas are arrived at by seeking explanations, by mutual giving and taking of ideas and by problem solving.

3. Problem solving and learning

Only when the learner feels that some thing is a problem to be solved that he takes the responsibility of learning it. It is an inborn tendency to act to solve a problem that causes cognitive disequilibrium in a particular area. It is also needed to have confidence that one is capable of doing it. The problems are to be presented in consideration of the ability and level of attainment of the learner.

4. Collaborative learning

This is the learning in which the responsibilities are distributed among the members of the group keeping common learning objectives. The common responsibility of the group will be successful only if each member discharges his duties. All the members will reach a stage of sharing the result of learning, equally through the activity with mutual understanding. The teachers who arrange collaborative learning will have to make clear the responsibilities to be discharged. This is possible through the discussion with the learners. Collaborative learning will help to avoid the situations of one person working for the whole group.

5. Co-operative learning

This is the learning in which the learners help one another. Those who

have more knowledge, experience and competency, will help others. By this exchange of resources the learners develop a plane of social system in learning also. As there are no high ups and low ones according to status among the learners they can ask the fellow students doubts and for helps without any hesitation or in hesitation Care should be taken not to lead this seeking of help to mechanical copying. It should be on the basis of actual needs. So even while encouraging this exchange of ideas among the members of the group cautions acceptance is to be observed as a convention. There should be an understanding that satisfactory responses should come from each member and that the achievement of the group will be assessed on the basis of the achievement of all the members

6 Zone of Proximal Development

Vygotsky observes that these is a stage of achievement where a learner can reach by himself and another higher zone where he can reach with the help of his teachers and peers and elders. Even though some can fulfil the learning activity by themselves there is the possibility of a higher excellence. If appropriate help is forth covering every learner can better himself.

7 Scaffolding

It is natural that the learner may not be able to complete his work if he does not get support at the proper time. The learner may require the help of the teacher in several learning activities. Here helping means to make the learner complete the activity taking responsibility by himself. The teacher has to keep in mind the objective of

enabling the learner to take the responsibility and to make it successful.

8 Learning: a live mental process

Learning is a cognitive process, only a teacher who has an awareness as to what the cognitive process is alone can arrange learning situations to the learner to involve in it. Learning can be made effectively and intellectual sharpness can be improved by giving opportunity for the cognitive processes like reminding, recognising compromising, co-relating, comparing, guessing, summarising and so on. How is cognitive process considered in language learning? Take guessing and prediction for example.

- Guessing the meaning from the context.
- Guessing the content from the heading.
- Predicting the end of the story.
- Guessing the incident, story from the picture.
- Guessing the facts from indications.
- and other such activities can be given the following activities can be given for the cognitive process of summarisation.
- Preparation of blue print.
- Preparation of list.
- Preparation of flow chart.
- Epitomising in one word.
- Giving titles and so on.
- Symbols, performance of characters indications, lines of a poem, tables, pictures, concepts, actions, body language and such things can be given for interpretation. Process based language given for interpretation. Process based language learning has to give prime importance to the cognitive process.

9 Internal motivation

Internal motivation is given more importance than external motivation. The teacher has to arouse the internal motivation of the learner, A person internally motivated like this alone can immerse in learning and own its responsibility. How motivating is each of the activities is to be assessed.

10 Multiple intelligence

The Theory of Multiple Intelligence put forward by Howard Gardener has created a turning point in the field of education. The National curriculum document has recommended that the curriculum is to be designed taking into consideration of this theory.

Main factors of the intellect :

1. Verbal/linguistic Intelligence -

Ability to read and write, making linguistic creations , ability to lecture competence effective a communication , all these come under this . This can be developed by engaging in language games and by teaching others.

2. Logical /mathematical Intelligence

Thinking rationally with causes and effect relation and finding out patterns and relations come under this area, finding out relations and explaining things sequential and arithmetical calculations are capable of developing this area of intelligence.

3. Visual /spatial Intelligence

In those who are able to visualise models and bringing what is in the imagination into visual form and in philosophers, designers and sculptors this area of intelligence is developed. The activities like modelling using clay and pulp, making of art equipments,

sculpture, and giving illustrations to stories can help the development of this ability.

4 Bodily Kinaesthetic Intelligence

The activities using body language come under this. This area of intelligence is more developed in dancers and actors who are able to express ideas through body movements and in experts in sports, gymnastics etc.

5 Musical Intelligence

This is an area of intelligence which is highly developed in those who are able to recognise the different elements of music in musicians and in those who can here and enjoy songs. Playing musical instruments, initiating the songs of musicians, listening silently to the rhythms and activities like this are capable of developing this area of intelligence.

6 Interpersonal Intelligence

Those in whom this area of intelligence is developed show qualities of leadership and behave with others in a noble manner. They are capable of understanding the thought of others and carrying on activities like discussion successfully.

7 Intrapersonal Intelligence

This is the ability to understand oneself. These people can recognise their own abilities and disabilities. Writing diaries truthfully and in an analysing way and assessing the ideas and activities of others will help developing this areas of intelligence

8 Naturalistic Intelligence

A great interest in the flora and fauna of the nature, love towards fellow

beings interest in spiritual and natural factors will be capable of developing this area.

9. Existential Intelligence

The ability to see and distinguish ours own existence as a part of the universe, ability to distinguish the meaning and meaninglessness of life, the ability to realise the ultimate nature of mental and physical existences, all these are the peculiarities of this faculty of intelligence.

10 Emotional Intelligence

The concept of emotional intelligence put forward by **Daniel Golman** was used in framing the new curriculum. The fact that one's **Emotional Quotient (E.Q)** is the greatest factor affecting success in life is now widely accepted. The teacher who aims to focus on improving the emotional intelligence of students need to concentrate on the following.

i) Ability to take decisions

Rather than imposing decision on students while planning and executing activities, the students may be allowed to take part in the decision making process. Taking decisions through open discussion in the class, inviting students suggestions on common problems etc. are habits to be cultivated.

ii) Ability to reach consensus

- When different opinions, ideas and positions arise the students may be given the responsibility to reach a consensus.
- Imaging what would be the course of action in some situations, allowing to intervene in a healthy

way in problems between individuals.

iii) Problem solving

- Developing the idea that there is reason and solution to any problem.
- Training in finding reasons for problems.
- Suggesting solutions through individual or group efforts.
- Discussing social problems.
- Analysing the shortcomings in methods to solve problems.

Whether plastic can be banned within school premises can be given as a problem. Group discussion will provide reasons and solutions. Problems which can influence classroom learning and for which the learner can actively contribute solutions need to be posed.

- Self criticism, evaluation
- Ability to face problem-situation in life
- Thinking what one would do if placed in the situation of others, how one would respond to certain experiences of others - All these foster the growth of emotional intelligence.

iv) Life skills

Life skills need to be given a prominent place in education. W.H.O. has listed ten skills required for success in life.

- Self awareness
- Empathy
- Inter personal relations
- Communication
- Critical thinking
- Creative thinking
- Decision making

- Problem solving
- Copying with emotion
- Copying with stress

The new curriculum addresses these areas.

Knowing the characteristics of the learner, role of the teacher and how to use the teachers handbook help the teacher to plan and effectively implement learning activities.

Objectives of the Vocational Higher Secondary Curriculum.

- To facilitate higher education while giving opportunity to enter in the field of employment.
- To develop enviornmental awareness, sense of national integration, tolerence and human values so as to ensure social and cultural improvement.
- To enable the learner to find on his own employment.
- To inculcate mental courage in the learner to face unfavourable situations.
- To make human resource development possible.
- To enable the learner to understand social problems and to react appropriately.
- To develop the learner to identify and develop his own competencies.
- To develop vocational aptitude, work culture and attitude in the learner so as to provide useful products and services to the society.
- To create an awarenss about mental and physical health.
- To acquire awareness about different job areas and to provide backgrounds for acquiring higher level training in subjects of interest.

- To develop possibilities of higher education by creating awareness about common entrance examinations.
- To provide situation for the encouragement of creative thinking and organising training programmes in each area, creative abilities and to develop artistic talents.

Nature of Approach

The learning device is to be organised in the selected vocational subjects in such a way that adequate practical experience should be given, making use of the modern technology. The development in each area on the basis of information technology is to be brought to the learner. The work experience in the respective fields(OJT, Field trip, Production/Service training, Survey, Workshop, Exhibition, Youth festival, Physical fitness etc.) are to be adjusted suitable to the learning and evaluation process. The participation and leadership of the students in planning and execution is to be ensured through this kind of activities. Social service is to be made a part of the course.

Approach towards Vocational Higher Secondary Education

The learning methodology has to be organised so as the learning provide adequate practical thinking on the opted vocational subject utilising the new technology. The development of information technology should be made available in each sector. Work experience, OJT, Field trip production, Service cum training centre, Survey, Workshops, Exhibitions, Youth festivals, Physical fitness etc should be

systematised well appropriate to learning and evaluation. Learner participation should be ensured in the planning and implementation of these activities. Social service should be a part of the course. If a learner has to change his school, he should be provided an opportunity to continue his studies in the new school. While considering criteria for admission to higher courses, grades of vocational subjects should also be given due weightage. In tune with the changes in the Vocational Higher Secondary Education changes should be ensured in the field of higher education.

The teachers have to take special care in arranging learning activities for

the development of all the faculties of intelligence.

Learning activities and learning atmosphere.

A proper learning atmosphere is essential for the betterment of learning activities.

They are:

- Proper physical environment
- Healthy mental atmosphere
- Suitable social atmosphere
- Active participation of PTA, Local bodies and SRG
- Reference materials and visual media equipments.
- Academic monitoring
- School Resource Group (SRG)

PARAMEDICAL APPROACH

There is tremendous growth in medical science recently and knowledge in this field is advancing rapidly. Consequently considerable changes have occurred in diagnostic methods and patient care. Service of skilled persons in the several fields of diagnostic and patient care has become essential. As a result there is considerable increase in employment opportunities in the paramedical field. Six such paramedical courses are included in the present VHSE curriculum. They are:

1. Domestic Nursing
2. Medical laboratory technology.
3. E.C.G and audiometric technician.
4. Physio therapy
5. Dental technology
6. Maintenance and operation of Biomedical Equipment.

Aim

To mould persons capable enough to help diagnosing and caring for patients in accordance to modern medical sciences.

Objectives

- To familiarise the latest technologies of modern medicine.
- To make learners able to use new and updated diagnostic methodologies.

- To make learners capable enough to adopt the methods of recovery and improving health with a service approach.
- To make learners capable enough to adopt the methods of recovery and improving health with a service approach.
- To make aware of the fact that the paramedical stream help the physician in accurate diagnosis and better treatment.
- To make aware the people about the important social issues connected with health.

Learning Approach

- The learning process has to be learner centered and activity oriented enabling learners to acquire skills and efficiency.
- The learning process must enable learners to acquire more operational skills based on previous knowledge and experience.
- It should assimilate the up to date technological developments in the field of modern medical science.
- Learning approach shall enable the learner to develop multiple intelligence.

Contents

Course details of each and every one of the six paramedical courses are prepared to meet the needs of the particular course. This also is in tune with the objectives of each course.

Learning Techniques

The learning techniques that could be used in paramedical courses are as below:

1. Project
2. Assignment.
3. Seminar.
4. Group discussion
5. Practical experiments.
6. Demonstration.
7. Debate.
8. Collection.
9. Internet/IT
10. Quiz.
11. Role play.
12. Field visit.
13. Reference- books, journals.
14. Discussion.
15. Models.
16. Charts.
17. Vocational survey.
18. Exhibition.
19. Production cum training.
20. OJT.
21. Viva
22. CD/Slide show.
23. Slide show in OHP
24. Brain storming.

Evaluation

- Continuous and comprehensive evaluation is envisaged.

- Evaluation methods are to be transparent, flexible, valid, reliable and practicable.
- Evaluation indicators are to be practicable.
- New curriculum should always be kept in mind for evaluation.
- Evaluation methods will have to motivate learners to develop multiple intelligence.

Planning

There is a year plan, unit plan, and lesson plan.

Support mechanism

Financial management, infrastructure development including acquisition of equipments and maintenance of all assets could be thorough the support mechanism consisting of

- School PTA
- Local and collaborative institutions.
- Local bodies.
- VHSE regional office.
- VHSE directorate.
- NGO's
- Government support.
- Staff support.
- Local community.
- Public library etc.



SUBJECT APPROACH

Electrocardiography and Audiometry is one of the paramedical courses included in the science group of VHSE. The curriculum emphasises two important diagnostic measures- ECG & Audiometry.

The risk of heart diseases increases now a days due to the change in life style and social set up. In these circumstances ECG & Other Cardiovascular measurement techniques included in the curriculum are essential for proper diagnosis. The purpose of this course is to create skilled technicians to meet the health need of society.

Despite the appearance over the last decades of the large number of novel instrumental techniques for the diagnosis of cardiovascular diseases, electrocardiography remains the most important and commonly used single diagnostic procedure, in this field. Millions of ECGs are recorded annually and then often help the physicians to make the correct diagnosis, evaluate myocardia function and monitor the efficiency of treatment. It has been demonstrated by many authorities that the adequate clinical diagnosis is now a days nirtually impossible without ECG. As a result electrocardiograophy found wide spread application not only in cardiology but also in pulmonology. Internal therapy, endocrinology,

heamatology, survey, sports medicine, regular checkup and for screening purpose.

Audiology is a scientific subect which is continually developing and changing. A firm knowledge of audiology is essential for all those working in audiology laboratories and with hearing impaired pupils. The aim of the course curriculum is to create an awareness about clinical audiological procedures and there by assists the audiologist. Rehabilitation of hearing impaired is also included.

Aims

- To obtain job as ECG technician.
- To assist the audiologist.
- To acquire self employment.
- To undergo higher education.
- To develop skills for self learning, continuous learning and communicating the ideas about the subject.
- To develop skills in various learning activities in a co-operative, collective and creative way.
- To develop an idea about the operation of advanced cardiovascular measurement techniques and equipments.
- To develop an idea about routine and special audiological investigations.

The learner shoud be exposed to activities like projects, assignments,

seminar, discussion, debates, symposium, field visit, camps, clinical practice and experiments. To develop their vocational skillm, OJT and field visit are necessary. The above learning activities help the students to enhance their opportunity higher studies.

The learning of ECG should also be through activities. The content based approach should be replaced by the process approach which gives adequate emphasis to develop their vocational skill.

Learning of ECG needs to be

- Activity oriented
- Process oriented
- Learner centered
- Environmental based

- Life oriented
The new approach gives emphasis to
- Multiple intelligence
- Co-operative learning
- Constructivism
- Emotional quotient

Content

The course content in first year ECG includes an overall view to human anatomy, detailed study of anatomy and physiology of heart, transducers and electrodes, biological amplifiers.

The course content in first year AMT includes Physics of sound, Anatomy of ear, Physiology of hearing, study of Hearing loss, Introduction to audio metry and room acoustics

TEACHING LEARNING STRATEGIES

The explosion of knowledge has resulted in a new vision of knowledge. Earlier, it was thought that the most effective method was the transmission of knowledge by teacher to the student. However, the modern view is that the student has the responsibility and the right to construct knowledge. The teacher of modern times hence has to use instructional approach that motivates the students to construct knowledge by his own.

Instructional strategies should be viewed as a social skill which is part of the educational environment and not as a technique to be mastered. They are to be considered as important components of teacher-student interaction and not as teacher activities alone. While instructional methods are planned the social and psychological aspects of the learner need to be taken into consideration.

Let us examine here some instructional strategies helpful in bringing out the curricular objectives of ECG & AMT.

Project

Project is one of the most suitable methods of instruction for learning. It is a method of self instruction using the method of science and useful in the development of a number of process skill and hence it is essential to use projects in science education right from the primary stage to higher level of education.

What is a project?

When a problem is fact, data regarding the problem is collected. The collected information is summarised and analysed. The conclusions that are obtained from analysis is used to solve the problem. These steps reflect the essentials of a projects. By doing projects the students are given the opportunity to train in the method of knowledge. In doing so, the students acquire problem solving ability which helps to tide over problematic situations in life and progress in life.

Stages of a project

1 Feeling the problem

The project topic should not be arbitrarily created. It should reflect a felt problem in the learning situation and which requires a solution to proceed further.

Project topics arise when discussions relating to lessons are held on the class. It is important that the student has an internal urge to find out a solution to the particular problem. When the topic is presented the teacher must ensure this.

2 Defining the aim

If the student is to tackle the problem in a way suitable to his/ her abilities, thinking skills and available facilities, the aim of the project need

to be defined precisely. To state the aims of the project simply and clearly, the students need the help of the teacher.

3 Planning

a Hypothesising

Drawing temporary conclusion on the basis of information available at the time is known as hypothesising.

b Methods and instrument

Study methods and instruments are to be selected based on the aims of the project and the hypothesis drawn. The nature of the topic, instruments used and the scientific approach followed should be correlated. Some methods and instruments are listed below.

- *Survey*

One survey method is selected, where, when and how to conduct the survey must be decided. What will be the sample and who are to be contacted for data will also be considered. Questionnaires and survey forms are to be discussed in detail. Teacher must interact with the students, give suggestions and ensure the instructions are suitable and effective.

- *Experimentation*

When experimental method is to be used, it must be considered whether necessary equipment is available. If not can these be improvised? How can materials and instruments be made available? These questions must be considered.

C. Tabulation of data

- What information is to be collected?
- What method can be used for collecting information?

- When should observations be made?
- How to tabulate data?
- Are pictures, samples and working model required?
- Are checklists, rating scale and score cards needed?
- The method of analysis should be decided in advance keeping to schedules, honest collection of data, accuracy of data and precision are important.

D Analysis

The collected and tabulated data can be analysed to examine the validity of the hypothesis. The collected data need to be classified and compared. Comparison with standard information may also be required.

Graphic and similar representation will make the analysis easier.

E. Conclusion

Based on similarities, differences and relationships evident from analysis of data, the validity of hypothesis may be examined. Those found invalid are rejected and others are accepted as conclusions.

4 Evaluation of the project

An outline of the project based on the components discussed above may be drawn up. The project activities may be carried out according to this plan with necessary modifications at the appropriate stages. Difficulties faced during execution of the project data obtained and information collected, are to be entered in the project diary. This all be helpful during report writing.

Visits during the conduct of the project, experiments, arranging

equipment, recording data and analysis should be supervised by the teacher. Teacher must take care to conduct discussions with students frequently to evaluate the progress of the project.

Application

The suggestions that arise from the project must be used for problem solving where it is applicable.

5 Project report

A model for project report is given below. Report is to be prepared by the students themselves. The structure of the report should be finalised through discussion with the students. It must be ensured that it is not too complex and hinders activities.

The cover page may show title of the project name of the student/ members of the group and school address.

1 The report may contain

- 1 Title
- 2 Introduction
- 3 Hypothesis/ Aims
- 4 Method of study
- 5 Collected data
- 6 Analysis and conclusions
- 7 Suggestions (if any)
- 8 Reference (if any)
- 9 Appendix (questionnaire, observation schedule, checklist, etc.)

The project diary should be made use of to prepare the project report. The aims and method of study of the project would be recorded in the project diary during the time of doing the project. The credibility of the project and data can be established with the help of project diary. Teacher

may give necessary directions to prepare the project diary. At frequent intervals the teacher must check whether the recordings are made in the diary.

- A project diary should be maintained by the learner which is considered as the product of the authenticity of the work done.
- It should contain all the activities for the learner in detail.
- It should be recorded along with each process of project work.

6 Project presentation

The project can be evaluated and the work done be assessed when the project is presented. Ideas can be communicated and shared with others through presentation of the project.

The project can be presented in

- Class itself.
- Science club meeting.
- Science fairs.
- School annual day meeting.
- PTA meeting
- Ayalkootam
- Other selected forums during presentation, bear in mind:
- Sufficient preparation must be done.
- Make appropriate use of charts/ pictures/ articles/ transparencies.
- Doubts raised must be cleared convincingly
- Presentation must be brief and simple.

When learning takes place in the class in the project way, the topic must be discussed and activities planned systematically information must be recorded in an ordered way and analysed objectively to draw

appropriate conclusions. Collected information must be shared with others. The learning process is complete only when the relevant information is summarised efficiently.

The project method helps to train the students in the method of science to familiarise them with self study habits and to find solutions for local problems. We must take care to cultivate this as an important method of study in our schools.

Seminar

Report is core component of learning of ECG. In seminar data relating to a specific topic is collected analysed and presented as paper for the benefit of others. It helps the learner to improve his/ her communications skills and provide opportunities for collection of secondary data and for drawing conclusions. It is useful in cultivating interests and attitude in science, topics and in personality development. Topics chosen for seminars may be contemporary and should have social relevance.

Organisation of seminar

- Topic presentation
- Finding out subtopics or different areas
- Group formation
- Assigning sub topics to different groups.
- Discussion by each group on the assigned information can be gathered from area or sub-topic (books, magazines, internet, institutions, place and persons)
- Organising ideas
- Paper writing
- Seeking the opinion of the teacher

- Presentation
- Discussion
- Summarising

The teacher may provide reference materials and give directions at all stages.

- Paper writing
- The paper may include new information gained through data collection, conclusions and findings.
- The information collected by all the member may be included.
- Tables, charts, books and other source materials may be included.

Teacher may examine the paper at different stages and provide guidelines. The activities and participation of each student in the group may be assessed.

Paper presentation

- Teacher may function as the moderator during the initial stages, but it is better to assign this role to students themselves.
- The paper to be presented must be written out completely.
- All the group members must be present in the ideas during presentation and must actively participate in the discussion after presentation by the leader.
- Questions from the audience are to be answered by group members taking turns.
- Teacher may intervene when necessary to provide instructions and help.
- When sub topics are presented, after all the presentation are over general discussion may be held. Teacher may summarise the discussion.

- A summarised version of the report may be recorded in the science diary.
- Seminar papers and reports may be kept in the information corner.

Class tests

Class tests are integral part of the educational system. Within a term, class test must be conducted after the completion of each unit.

The features of the class test are.

- It is a tool to find out and solve the learning problem faced by pupils.
- It may be used as a tool to collect feed back from pupils during learning process.
- Class test need not to be written test. It can also be organised as a performance test.
- Attendance of all students may be ensured during class test.
- Class test should be informal. No time table or printed question paper is required.
- Questions should be suitable for subject approach.
- Should be completed in one period.
- Discussion of value points with pupils and peer evaluation and self evaluation may be used.

How to conduct class room discussions.

Discussion is the most commonly used medium for communication. This is a very good activity that can be used in the learning process. Effective discussion will stimulate the intelligence of the student. It will make the absorption of the knowledge easier. Discussion is neither merely asking questions and answering nor explanations given by teachers. Class room discussions will become effective

only if it is systematically organised. The following points are to be considered while conducting a discussion.

- There should be a problem or a question or a topic that requires clarification or a decision.
- If possible the topic of discussion should be informed in advance. Books for reference can also provide. Then the students get an opportunity to think about it and study.
- Information about the discussion should be given an opportunity. This is not possible for discussions that are planned there itself. Then each person can be given a chance, or those who express a desire at that time to take part can be given an opportunity. Those who keep quiet also should be brought forward by asking them to give their opinion or according to their turn.
- If many people are participating in the discussion. Strategies can be used to make effective use of the available time.
- When everyone has to speak, speak briefly limit may be specified for time, numbers of points or sentences. Write down the important points that are mentioned in the discussion. Repetition of the same points are to be discouraged. Through this, methods of expressing ideas briefly. Clearly and precisely may be familiarised. More than one round of discussion can be had if there is time.
- It is good to have a chair person to control the discussion.
- Allow only one person to talk at a time and others should listen carefully. Some students may feel

like replying during this time. But they should wait till they get their turn. They should participate in the discussion when they get an opportunity. Only good listeners can react properly.

- One or two people can be given responsibility to write down the opinions that are understandings arrived in the discussion should be noted down.
- Students should be trained to stick to the timing themselves.
- Very different opinions may arise in the discussion. Responses should be healthy and in a democratic spirit. Opposition or support should be only to the opinion expressed it. The discussion should be taken forward through mutual respect.

Debate

Debate is a 'hot' and interesting learning activity. A debate can be organised only on a topic on which there is difference of opinion. Therefore a topic suitable for debate has to be found.

Debate can be on relevant topic that is different and interesting to the students and relevant to society. Students with different opinions have to be identified for the discussion. Those who have similar opinion should join together to form a side. Those who hold the opposite view will form the other side. It would be good to write down the topic of the debate on the black board in advance. There should also a person to control the debate.

Students should be given opportunity to absorb the ideas obtained from discussions and debate, develop the ideas through reading and study, and to express them through writing or other means.

Quiz

How to organise a quiz in the class room.

Quiz is an activity that is very much helpful for self learning. Students should be instructed to read and classify the ideas, technical terms, methods of activity definitions, different procedures, etc. discussed in the textbook. This can be given as an assignment to be done at home. Quiz can be conducted in different ways as follows.

Team Quiz

Divide the class into two equal teams. The teams may be named A and B, or one and two. The points they receive can be marked on the black board in two ways. For instance, a member from team A asks a question aloud and members of team B is specified to answer the question. If he/ she fails, this can be continued up to four other members. When all the five fail, any one from team B answer the question will have to give the answer and 5+ marks will be added to team A (5 marks for defeating five students). If no one from team B answers the question, then team A gets one more 'plus' (total 6 + marks). If the first student of team answers correctly, then team A gets no points. If the answer given by the student of team A who asked the question is not correct, then also team A get no points. The next question is asked by team B by which they can get their marks.

Team quiz can be conducted in another way also. Here, when a student asks a question, it is the teacher who identifies the student who has to give the answer. Therefore the

teacher will control the quiz. In the other case, all questions will be directed towards the weaker children in the opposite team. This will spoil the interest in the quiz.

It may also be stipulated that only the children sitting next to the student who was first asked can be given subsequent chances to answer the question. Then also the above problem arises. That has to be avoided. The method and rule of conducting the quiz can be devised in consultation with the students.

Group quiz

Divide the class in to convenient groups. A group can consist of students sitting on one or two benches. Let group A ask a question and group B thinks and answer the question. In group quiz marks go to the group that answers the question.

Practicals

Practicals familiarises the students with the technique and develops the process skills. It serves the following aims.

- Development of process skill.
- Ability to handle equipment.
- Development of interest in technique, sense of responsibility, aptitude and attitude.
- Providing direct experience.

Points to note

- Introductory discussions must help the students to understand the need and aims of procedure. The students should develop an idea about what variables are to be controlled. Similarly they should decide on what to observe. They are also to be instructed on the manner

of recording and safe handling of equipments.

- The practicals must be interesting to the student.
- Practical must proceed according to instructions given.
- It must be ensured that measurements are accurate.
- Observations must be recorded immediate.
- Time limits must be maintained.

Evaluation

- Record book containing observations and conclusions.
- Quality control, discipline and use of process skill.
- Handling of equipments in proper way.

Teachers must be present during all stages of the practicals to provide necessary instructions.

Out door learning

As ECG & AMT course is in paramedical stream the activities which has to be performed is not limited in the class room. To fulfill the curricular objectives the students must be exposed to outdoor learning activities such as OJT and hospital visit.

OJT and hospital visit help the students.

- To develop a vocational skill in the subject.
- To develop personal qualities.
- To develop values, attitudes and interests.
- To direct learning experiences are gained.
- Helps to apply their knowledge in real situations.
- Helps to evaluate the development of emotional domains.

Community level programmes

Since it is a service oriented field the teacher can participate the students in conducting medical camps and community awareness programmes with the help of local authorities and skilled professionals.

Assignments

Assignments are learning activities helping to achieve the curriculum objectives and also lead the students from the present level to a higher level of learning.

Assignments may be of the type writings, drawings, construction of models, etc. The discussion and planning may be carried out in classroom to complete the assignments in time. Clarifications may be given about the sources. Teacher may provide the sources if needed.

Observation book.

The student carries out a number of activities as a part of learning observations, collections, data organisations in tables, analysis, diagram drawing and reports are some of these. So the student should record all the activities in an observation book. It is useful to the student as well as to other who want to evaluate the students work and progress.

Library

Effective learning of ECG may require activities that need extensive time for collection of secondary sources, analysis and drawing of conclusions. Materials that facilitate learning may be collected for the library. Library should contain reference books in anatomy,

physiology, electronics/ audiology and biomedical instrumentation. Journal and CDs in the subject can also help the student in collecting advanced data. A library committee may be constituted under the leadership of the teacher in charge of the library and including teachers from all subjects.

Multimedia Room

To provide appropriate learning experiences in the new curriculum, advances in science and technology may be made use of setting up a multimedia room in each school would help in this aim. The multimedia room may have the following equipment.

- Over Head Projector
- Computer & Internet
- Liquid Crystal Display (LCD) projectors

Media like TV, VCD, DVD and tape recorders may also be utilised appropriately. Education programmed in channels is also useful.

Medical Club:

With the change in scenario curriculum can gain strength by organising medical club. Interested students can take an active role in the various activities of the club under the leadership of teacher.

- Organise classes by experts from among doctors, audiologists or other health persons regarding recent advances in medical field.
- Organisation of quiz programmes, film shows, study tours, etc.
- Celebration of medically important days like world heart, world diabetic day, etc.

CURRICULUM OBJECTIVES

ECG

Unit 1 - Human Anatomy Overview

- To obtain an idea about the anatomical terms of positions through chart, human torso model and CDs.
- To understand and identify the various cellular structures through chart, discussion, assignments and seminar.
- To understand the cell membrane transport and electrical activity associated with cell through chart, discussion and seminars.
- To develop a general idea about various bones of human body with the help of human skelton.
- To make an idea about the parts and function of respiratory system through chart models and discussion.
- To develop an idea about the parts of nervous system through models, chart, group discussion and seminar.
- To develop a brief idea about the structure of media stinum through discussion, observation and seminar.

Unit 2 - Cardiovascular System

- To develop an idea about the structure of heart, its relation, features, layers of heart, properties of cardiac muscle, chambers of heart, valves, circulation of blood, blood supply of heart, conductive system of heart, cardiac cycle heart sounds through

discussion, chart, models and multimedia.

- To develop an idea about various physiological parameters like cardiac out put, Stroke volume, blood pressure, heart rate, pulse rate through discussion and demonstration.

Transducers and electrodes.

Unit 3

- To develop an idea about transclucers and its working principle through discussion, demonstration, experiments and observation
- To understand the uses of different bio-medical transducers through demonstration, discussion, assignment, field visit
- To develop an idea about the different type of electrodes used for the measurement of various bioelectric potentials through demonstration, discussion, practical and field visit.

Unit 4 - Biological Amplifiers

- To develop an idea about the basic amplifier configurations through demonstration, discussion and chart.
- To understand the working principle and application of transistor amplifiers, differential amplifiers and isolation amplifier through demonstration, assignment and discussion.

Audiometry

Unit 1 - Physics of Sound

- To create an idea about the production of sound and their propagation
- To develop an idea about the physical and psychological attributes of sound such as frequency intensity pitch, loudness and timbre
- To understand the properties of sound such as reflection, refraction and diffraction
- To create an idea about the different types of sound

Unit 2 - Structure of Ear

- To understand the structure of outer middle and inner ear through group discussion, demonstration of chart, model, preserved specimen and multimedia

Unit 3 - Physiology of Hearing

- To understand the mechanism of hearing which enable the students to identify the types of hearing loss.
- To develop an idea about the physiology of balance by the vestibule and semicircular canal

- To develop an idea the theories related to hearing
- To understand the binaural hearing effect
- To understand the capacity of ear to locate the direction of a sound source

Unit 4 - Study of Hearing Loss

- To develop an idea about hearing loss, type and classification of hearing loss.
- To understanding the causes of hearing loss.

Unit 5 - Introduction of Audiometry

- To develop an idea about the different types of audiometer available for various audiological evaluation
- To understand the different parts of audiometers and its function
- To develop an idea about the biological check and subjective calibration of audiometers.

Unit 6 - Room Acoustics

- To develop an idea about the importance of sound proof rooms used for the routine audiometric procedure

VI

SYLLABUS

Objectives:

Acquire knowledge about the recording of E.C.G and operation of other cardiology equipments.

- To work as an E.C.G Technician.
- To acquire knowledge about the operation of Audiometric equipments

- To assist the audiologist

Total duration	560 hrs
Theory	140 hrs
Practical	420 hrs

ELECTROCARDIOGRAPHY (for First year)

Unit No.	Name of the Unit	Theory	Practical
1	Human anatomy overview	20 Hrs	
2	Cardio vascular system	30 Hrs	
3	Transducers and electrodes	20 Hrs	50 Hrs
4	Biological amplifiers	8 Hrs	25 Hrs
Total		78 Hrs	75 Hrs

AUDIOLOGY (for First year)

Unit No.	Name of the Unit	Theory	Practical
1	Physics of Sound	10 Hrs	
2	Anatomy of Ear	15 Hrs	
3	Physiology of Hearing	10 Hrs	
4	Study of Hearing Loss	15 Hrs	100 Hrs
5	Introduction of Audiometry	10 Hrs	125 Hrs
6	Room Acoustics	2 Hrs	
Total		62 Hrs	225 Hrs

Hospital Visit (<i>for Electro Cardiology & Audiology</i>) - 120 Hrs
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ELECTROCARDIOGRAPHY (for First year)

Unit 1 - Human Anatomy Overview

20 Hrs

- The cell – brief descriptions about organelles
 - Cell membrane transport
 - Bioelectricity
- Skeletal system – classification of bones
 - Thoracic cage in detail
- Respiratory system
 - Upper and lower respiratory tracts
 - Mechanism of respiration
 - Lung volumes
- Nervous system
 - Central and peripheral nervous system (brief descriptions)
- Mediastinum

Unit 2 - Cardio vascular system

30 Hrs

- Anatomy of heart (Detailed study)
 - Heart and blood vessels
- Properties of cardiac muscle
- Conductive system of heart
- Cardiac cycle
- Heart sounds
- Pulse, Blood pressure, cardiac output

Unit 3- Transducers and electrodes

20 Hrs

- Transducers principles

- Wheat-stone bridge
- Active transducers
 - Inductive transducers
 - Quartz pressure sensors
 - Temperature transducers
 - Thermocouple
 - Thermistor
 - PN junction
- Passive transducers
 - Strain gauge (Resistive transducer)
 - LVDT (inductive transducer)
 - Capacitive transducer
- Electrodes
 - Classification of electrodes
 - Electrodes for recording E.C.G (detail)

Unit 4- Biological Amplifiers

8 Hrs

- Basic transistor configurations
- Basic Amplifier configurations
- Differential Amplifiers
- Isolation Amplifiers

Practical

75 Hrs

- Demonstration and familiarization of various types of transducers and electrodes. (50 Hrs)
- Basic transistor amplifier circuits (CE, CB, CC) (25 Hrs)

Hospital Visit - 60 Hrs

AUDIOLOGY (for First year)
Unit 1 - Physics of sound 10 Hrs

- Detailed study of production and propagation of sound.
- Physical and psychological attributes of sound.
- Properties of sound-absorption, reflection, refraction, diffraction.
- Types of sound - pure tones, complex and types of complex tones.
- Introduction to IC

Unit 2 - Anatomy of Ear 15 Hrs

- Detailed study of the Anatomy of outer, middle, inner ear and central auditory pathway.

Unit 3 - Physiology of hearing 10 Hrs

- Theory of hearing
- Physiology of balance
- Binaural hearing effect, localisation.

Unit 4 - Detailed study of hearing loss - definition 15 Hrs

- Types-conductive, mixed, sensorineural, congenital, acquired, prelingual, postlingual, functional hearing loss.

- Degree of hearing loss.
- Causes
- Case history evaluation of deaf peoples.

Unit 5 - Introduction of Audiometry 10 Hrs

- Types and parts of an Audiometre, Biological check of Audiometre and subjective Calibration.

Unit 5 - Room acoustics 2 Hrs**Practical 225 Hrs**

- Observation of case history of adults and children with hearing impairment (20 cases)
- Collection of case history information of adults and children with hearing impairment (10 cases)
- Identifying different parts of audiometer with the help of different chart. Familiarizing with its different parts.
- Demonstration of subjective calibration of Audiometers preparing correction charts.

Hospital Visit - 60 Hrs

PLANNING

To learn electrocardiography the learning process must be activity oriented. We have to provide learning experiences that would help to develop practical skills and components of multiple intelligence. Whether the activities are conducted in the class or outside, they are to be completed in a time bound manner.

The teachers has to plan the activities necessary to make learning effective, time required, evaluation methods and all other aspects.

Teachers must prepare at least three planning documents.

Year plan

Unit plan

Daily plan

Yearplan

The year plan will include the total number of units to be transacted through the three terms, units to be covered during each month and the number of periods required for each unit.

YEAR PLAN - E.C.G

Unit	Nameof Unit	Period		Month	Activity/ Strategy
		Theory	Practical		
1	Human anatomy overview	20 Hrs		June-July	Discussion, seminar, assignment, chart, models
2	Cardiovascular system	30 Hrs		July August	Discussion, seminar, models, chart, slide, photographs, preserved specimen, multimedia
3	Transducers Electrodes	20 Hrs	50 Hrs	Sept. October	Demonstration, experiments models, chart, assignment, practicals
4	Biological amplifiers	8 Hrs	25 Hrs	October	Demonstration, expreiments, models, practicals, chart preparation, discussion, assignment

YEAR PLAN - A.M.T

Unit	Nameof Unit	Period		Month	Activity/ Strategy
		Theory	Practical		
1	Physics of sound	10 Hrs		Oct. - Nov	Discussion, demonstration, experiments
2	Anatomy of ear	15 Hrs		November	Discussion, seminar, models, chart, slide, photographs, multimedia
3	Physiology of hearing	10 Hrs		Nove.-Dec.	Discussion, demonstration using chart and animated CDs.
4	Hearing Loss	15 Hrs	100 Hrs	January	Discussion, Demonstration, Chart preparation, field visit, data collection
5	Introduction of audiometry	10 Hrs	125 Hrs	Jan.-Feb.	Discussion, demonstration, chart preparation.
6	Room acoustics	2 Hrs		February	Discussion, field visit
	Hospital Visit		120 Hrs	February	

UNIT PLAN

Teacher may prepare unit plan before the actual transation of the unit in the class room. This plan must make clear the curriculum objectives,

instructional strategies to be used and material required. How the outcomes are to be evaluated may also be spelt out.

UNIPIAN
2- CARDIOVASCULAR SYSTEM

Objectives	Concepts/Ideas	Process skills	Activity	Materials	Evaluation	Periods
<ul style="list-style-type: none"> To understand the position, size and shape of heart 	Location, size, shape relations of heart	Observation Identification Communication	Demonstration of chart, model Processed specimen Preparation of chart, discussion	Chart, human torso model CDs - processed specimen Library books	Perfection in chart preparation Presentation of notes Identification of models Class test	4
<ul style="list-style-type: none"> To understand the layers of heart. 	Pericardium Myocardium Endocardium	Observation Communication Differentiation	Demonstration of chart, CDs Discussion Preparation of charts	Chart Animated CDs Processed specimen	OT, Class test Perfection in chart preparation	2
<ul style="list-style-type: none"> To understand the coverings of the heart 	Pericardium serous layer Fibrous layer Pericardial fluid	Communication Observation Identification Differentiation	Discussion, Demonstration Preparation of charts	Chart Animated CDs	OT, Class test, Perfection on chart preparation	2
<ul style="list-style-type: none"> To create an idea about properties of cardiac muscle. 	Automaticity Conductivity Tonicity Excitability Contractility Rhythmicity	Communication Observation Identification	Observation of slide, chart, discussion, Assignment	Slide, chart IT	Presentation of assignment OT, CT	1
<ul style="list-style-type: none"> To create an idea about the chambers of heart & associated blood vessels 	Right and left atrium great blood vessels	Communication Observation Differentiation Identification	Discussion Demonstration Preparation of model Assignment	Chart Model Animated CDs Library books	Perfection in model preparation, Drawing of diagram, OT, CT	4

Objectives	Concepts/Ideas	Process skills	Activity	Materials	Evaluation	Periods
<ul style="list-style-type: none"> To understand the structure and functions of valves of heart. 	Arterioventricular valves Mitral valves Significance of valves	Communication Observation Identification	Discussion Demonstration Assignment	Chart CDs Book for reference	Evaluation of prepared chart CT, OT Participation in discussion	1
<ul style="list-style-type: none"> To understand the circulation of blood in human body 	Pulmonary and systemic circulation	Communication Observation Identification	Discussion Demonstration Seminars	Chart CDs Book for reference	Presentation of seminar Response to questions, CT	3
<ul style="list-style-type: none"> To understand the blood supply of heart 	Coronary arteries Area of supply	Communication Observation Identification	Discussion Demonstration Assignment Data collection	Chart CDs Books	Evaluation of collected data, OT, CT, Response to question	3
<ul style="list-style-type: none"> To understand the conduction system of heart 	SA node AV node Inter node I path way Purkinje fibres	Communication Observation Identification	Discussion Assignment Demonstration Preparation of models	Chart Animated CDs Models Library books	Perfection Model preparation Participation in discussion, OT, CT	3
<ul style="list-style-type: none"> To develop an idea about the cyclic events taking place in the heart 	Systole Diastole Action of valves	Communication Observation Identification	Discussion Brain storming Demonstration Preparation of chart	Chart Animated CDs Reference book	Participation in brain storming session Perfection of chart, OT, CT	3
<ul style="list-style-type: none"> To understand the production and types of heart sound 	First sound Second round Third round Fourth round	Communication Observation Identification	Brain storming Discussion Auscultation of heart sound	Stethoscope	Response to questions OT, CT	2

Objectives	Concepts/Ideas	Process skills	Activity	Materials	Evaluation	Periods
<ul style="list-style-type: none"> To understand the physiological variables associated with heart 	Blood pressure Pulse Heart rate Cardiac output Stroke volume	Communication Observation Identification	Demonstration Discussion Assignment Seminar	B.P Apparatus Reference book	Identification OT, CT	2

DAILY PLAN

The daily plan includes curriculum period, learning activities, learning objectives to be transacted class aids and feed back.

DAILY PLAN

Class: **Fisrt Year** Subject : **ECG & AMT** Unit : **Cardiovascular System**
 Date: Topic : **Valves of heart** Time : **1 Hrs**

Curricular Objectives: To develop an idea about the position, structure, function an significance of valve

Concept/ Ideas : Structure and position of valve function of different valves

Previous knowledge: Tricuspid valve, bicuspid valves, semilunar valves

Process skills: Observation, Communication, Identification, Comparison

Materials required: Models, chart, digital support, library books

Activity/ Strategies	Response/ Evaluation
<p><u>Introduction:</u> After establishing rapport with the students, elicit information regarding the valves of heart. To enhance their knowledge on the topic further activities can be conducted.</p> <p><u>Activity 1</u> The teacher can demonstrate charts, diagrams and animated CDs explaining the structure of valves. Ask them to draw the diagrams on their book.</p> <p><u>Activity 2</u> Divide the students in to four groups. Select a group leader from each group. Give information regarding the rules of group discussion.</p> <p><u>Points for discussion</u> What are the different types of valves? What about the position of valves? Structure of valves Significance</p>	<p>All students observed carefully. Kavitha and Smitha are every efficient in drawing diagrams</p> <p>Ajay and Adarsh actively participated discussion.</p>

Activity/ Strategies	Response/ Evaluation
<p>Presentation</p> <p>The points discussed in each group are presented by the group leaders. Teacher can highlights the points by giving additional information.</p> <p>Consolidation</p> <p>From the above activities the teacher can consolidate the topic with an idea that</p> <p>Two types of valves in heart - AV valves and semilunar valves</p> <p>Position of valves</p> <p>Structure of valves</p> <p> Cusps</p> <p> Attachments</p> <p>Significance of valve function</p>	<p>The presentation of Pradeep was very excellent.</p> <p>Rajeev found it difficult in presentation.</p>

Assignment

Ask the students to collect informations about valve problems with the help of references and internet.

Preparation of chart which explains, the structure of valves.

EVALUATION

Introduction

As the curriculum is based on a particular vocation, evaluation becomes an inevitable procedure. Evaluation is done along with learning process throughout the course of study. In order to make an evaluation, the teacher should be able to understand the students, their scholastic and co-scholastic knowledge. Capacity building in the selected vocation is the most important part in vocational education and it should be evaluated accordingly. The technical skills, interest and devotion in the particular field, communication skills, analysis, organising and presentation skills etc. have to be evaluated. The personal and social qualities also have to be evaluated. Thus evaluation is an integral part of learning process which assesses the implementation of the curriculum.

Need and importance of Evaluation

Evaluation is to assess the scientific knowledge of students and to recognise to what extent they have achieved the specified capabilities. A written examination at the end of an year which is purely based on a textbook is not of much use. "Evaluation is a systematic process of collecting, analysing and interpreting evidence of students' progress and achievement both in cognitive and non-cognitive areas of learning for the purpose of taking a variety of discussions".

The teacher can properly assess the level of the learner and can identify his/her strength and weakness. This will help each student to evaluate themselves and to improve their level of learning by taking necessary assistance from the teacher (self evaluation) classmates can evaluate themselves through interaction (peer group evaluation) Evaluation even help the teacher to analyse and improve their performance. Evaluation helps to integrate the teacher, learner and even the parents. Thus student who are socially useful and can perform productive work are created. This will improve the quality of our young generation.

Theories of constructivism and multiple intelligence are the basis of modern learning. So evaluation strategies have also to be changed. Evaluation must be;

- Continuous and comprehensive
- Scholastic and co-scholastic
- Depending on grading system.
- Depending on a vocational or trade proficiency.

Continuous and Comprehensive Evaluation

Most of our traditional evaluation methods are related only to the area of scientific knowledge or the memory of students. To eliminate the limitations of this method we are forced to evaluate the multi-dimensional competencies of the

learner with respect to the practicability and nature of the subject.

Continuous and Comprehensive evaluation is an essential ingredient of any learning process. It helps the learner to understand and evaluate his own progress and to develop adequate strategy for further improvement. Continuous Evaluation also helps us to measure the attained

goals of formulated curriculum objectives.

Continuous Evaluation

Indicators of continuous evaluation can be

1. Assignment
2. Seminar
3. Class test
4. Project etc.

* For continuous evaluation class test (CT) is made compulsory taking any two of the above said indicators. CT can be a written test, oral test (viva), Practical test.

CE Item	Evaluation Indicators	Weightage	Score
1. Assignment	1. Awareness of the content	4/3/2/1	20
	2. Comprehensiveness of the content	4/3/2/1	
	3. Systematic and sequential arrangement	4/3/2/1	
	4. Observation/suggestions/Views Judgements/ Evaluation	4/3/2/1	
	5. Timely Submission	4/3/2/1	
2. Seminar	1. Ability to plan and organise	4/3/2/1	20
	2. Skills in the collection of data	4/3/2/1	
	3. Awareness of the content (presentation of the paper, participation in discussion, ability to substantiate the ideas and views)	4/3/2/1	
	4. Ability to prepare the report (sequence in the presentaionof the concepts, authenticity and clarity of ideas/views/ concepts)	4/3/2/1	
	5. Quality of Seminar Document	4/3/2/1	
3. Project	1. Ability to plan (Selection of the method for solution of the problem, identifying suitable tools, planning the various activities to be carried out in each stage)	4/3/2/1	
	2. Ability to collect data (sufficiency and Relevance of data. Classification and arrangement of data for analysis, reliability and authenticity of the Collected data.)	4/3/2/1	

CE Item	Evaluation Indicators	Weightage	Score
	3. Ability to analyse the elements and procedure (Structuring of elements and developing logic. Efficiency in using the package/tool. Recognising design errors and correcting them)	4/3/2/1	
	4. Ability to prepare the project report (Reflection of the process skills. Communicability and authenticity of the report in relation with the Project diary)	4/3/2/1	
	5. Viva Voce(Knowledge of the content and Process)	4/3/2/1	20

CE item calculation

Subject:.....						Item: Assignment	
Sl. No	Name	Evaluation Indicators					Total Score (20)
		I (4)	II (4)	III (4)	IV (4)	V (4)	
1	Anand	2	3	4	4	4	17
2	Shibu	4	3	4	4	4	19

TotalCE calculation

Sl. No	Name	CE Items			Total (60)	Total CE Out of 20
		1 Class Test (20)	2 Assignment (20)	3 Seminar/ Project (20)		
1	Anand	18	17	19	54	18
2	Shibu	20	19	18	57	19

Terminal Evaluation (TE)

Terminal Evaluation is in written form. The test should not be aimed to test the memory alone. The terminal evaluation questions give more emphasis on application level, analysis and synthesis. The questions are framed so that the students are able

to apply their different mental process. The maximum score is 80 and the minimum score of TE is 24 (30%).

The terminal evaluation questionnaire should be capable of measuring

- Content validity
- Criterion validity

- Constant validity
- Reliability
- Class test, term evaluation and annual examination should be in tune with the new approach.
- Should not be prepared to test the rote memory.
- Questions asked should provoke the thinking abilities of students.
- Questions to test the competency of application analysis, synthesis and evaluation are to be given. In other words the questions should be framed in such a way that the students are able to apply their various mental processes.
- Questions should be based on the learning process and the new approach to each subject.
- Results should be scientifically analysed.
- Evaluation results should be analysed and follow up may be carried out at relevant levels (remedial measures).
- Eighty percent marks are set apart for the common examination as the part of the Term Evaluation.

Subject Consolidation

Sl. No	Name	CE (20)	TE (80)	Total CE+ TE (100)	Grade

The maximum score of CE + TE is 100 and the minimum score is 30(30%)

Grading

It is not scientific to assess the achievement of a student solely based in the marks in the terminal examinations. Marking system proved unscientific in evaluating the growth and development of students both in cognitive and non-cognitive areas. To overcome this shortcomings, a popular mode of evaluation based on students' performance- grading system- has been evolved. At the Higher Secondary stage, it is desirable to use a point absolute grading to co-ordinate and record the evaluation. After giving the score, they are changed into

percentages and appropriate letter grades are awarded corresponding to each percentage. The score percentage and corresponding letter grades in ECG & AMT is given below.

Score in Percentage	Grade
90-100	A+
80-89	A
70-79	B+
60-69	B
50-59	C+
40-49	C
30-39	D+
20-29	D
Below 20	E

Practical Evaluation (PE)

PE is the important part of vocational practicals. The practical skills must be evaluated after completing all practical experiments in each term and at the end of the

academic year. PE must cover all required indicators to evaluate the technical skill and practical knowledge of the different topics covered.

Indicators for PE are given below.

Distribution of scores for Practical Examination

1	Spotting and indentification	20%	30
2	Record book	10%	15
3	Viva voce	10%	15
4	Experiments (ECG & AMT)	60%	90
Total		100%	150 marks

Individual break up for experiments

<i>Experiments & details</i>	<i>ECG</i>	<i>AMT</i>
Procedure writing	10	10
Collection of components	10	10
Technique	10	10
Reporting	10	10
Practical oral	5	5
Total	45 marks	45 marks

The maximum score of PE is 150 and the minimum score is 60(40%)

Vocational Competency Evaluation

Being a vocational course, a system to judiciously evaluate the required value addition and consequent capacity building in the selected vocational subject is highly essential. As the other evaluation components like CE, PE and TE cannot assess the vocational competencies and professional skills acquired by the students, an internship evaluation (IE)

component has been introduced to meet this requirement.

Internship evaluation should be done based on the following components.

I. Regularity and punctuality.

A regular presence and habit of time bound completion of task is a must for attaining maximum efficiency.

Rating scale

		1	2	3	4	5
1	Regularity	Never regular	Often regular	Usually regular	Most of the time regular	Always regular
2	Punctuality	Never Punctual	Often Punctual	Usually Punctual	Most of the time Punctual	Always Punctual

Regularity and punctuality can be assessed by using attendance of the student and time bound completion of tasks.

II. Value addition

Value addition can be evaluated through conducting field visits/survey. The experiences gained through field visit and survey increases the level of intrinsic motivation and positive attitude towards the vocational field and there by increase his value as a skilled semi- professional.

The aim of value addition is to measure the interest, devotion Group managment, persevernce of the learner in specific areas Value addition can be evaluated from field visit, survey and simulated experiments.

III. Capacity building

Capacity building can be evaluated through conducting the following activities.

1. OJT/Simulated experiment
2. Performance- Camp/ Exhibition/ Clinic.
3. Performance- Production/Service cum Training centre.

These components helps the students to practice the acquired skills in the real situation and there by increasing self confidence and promoting self reliance.

Capacity building is aimed at measuring the skills of the learner from OJT/ production cum training centre/ research and development/ graded area exposure.

<i>IE Item</i>	<i>Evaluation Indicators</i>	<i>Weightage</i>	<i>Score</i>
1. Regularity and Punctuality			10
2. Value addition	<p>Field Visit</p> <ol style="list-style-type: none"> 1. Attitude and readiness towards the task. 2. Capacity for observation. 3. Data collection. 4. Application of ideas. 5. Documentation/ recording. 	<p>4/3/2/1</p> <p>4/3/2/1</p> <p>4/3/2/1</p> <p>4/3/2/1</p> <p>4/3/2/1</p>	20

IE Item	Evaluation Indicators	Weightage	Score
	OR Survey 1. Planning. 2. Data collection. 3. Consolidation of data and analysis. 4. Drawing inference. 5. Reporting.	4/3/2/1 4/3/2/1 4/3/2/1 4/3/2/1 4/3/2/1	
3. Capacity building	OJT/ Simulated Experiment/ Practical skill 1. Involvement/ Participation. 2. Skills in doing work/ Communication skill. 3. Time bound action. 4. Capacity for observation, analysis and innovation. 5. Documentation, Recording and display. OR Performance in camp/Exhibition/ clinic 1. Ability for planning and organising. 2. Mastery of subject. 3. Ability for communication. 4. Innovation. 5. Involvement/Social commitment. OR Performace in production/ service cum training centre (PSCTC) 1. Mastery of vocational skills. 2. Managerial capacity. 3. Promoting self confidence. 4. Innovative approach. 5. Promoting self -reliance.	4/3/2/1 4/3/2/1 4/3/2/1 4/3/2/1 4/3/2/1 4/3/2/1 4/3/2/1 4/3/2/1 4/3/2/1 4/3/2/1 4/3/2/1 4/3/2/1	20

Vocational Competency Items for Internship Evaluation

Items	Score
Regularity & Punctuality	10
Field visit/survey(any one)	20
OJT/simulated experiment/ Performance- Camp/exhibition/ Clinic Performance- PSCTC (any one)	20
Total	50

A minimum of 80% attendance is required for promotion to the second year. Those who have shortage of attendance should repeat first year. Those who have 80% and above attendance but failed to achieve 30% of Internship Evaluation (IE) will be promoted to the second year. He has to improve the component in which he performed poor. He has to attain the minimum by improving the particular component to get eligible for appearing second year public examination.

GOVERNMENT OF KERALA BOARD OF VOCATIONAL HIGHER SECONDARY EXAMINATIONS

Reg: No.

Thiruvananthapuram

Dated : _____

EVALUATION SHEET

Sri./Smt. _____ is awarded
Scores/grade as detailed below in the First Year Vocational Higher Secondary
Examination held in _____

Name of School : _____ Admission No : _____

Name of Vocational Course : _____

Subject	Score Obtained					Positional Grade	Grade in words
	CE 20	TE 80	PE 150	IE 50	Total		
Part- I							
English			—	—			
General Foundation Course			—	—			
Part- II Vocational Subjects							
Vocational Theory			—	—			
Vocational Practical	—	—		—			
Vocational Competency	—	—	—				
Part- III Optional Subjects							
	20	60	20				
Physics				—			
Chemistry				—			
Biology				—			

CE- Continuous Evaluation, TE- Term End Evaluation, PE- Practical Evaluation, IE- Internship Evaluation.

Grades	A+ 90% and Above Outstanding	A	80- 89%	Excellent.
	B+ 70 - 79% Very Good	B	60- 69%	Good
	C+ 50 - 59% Above Average	C	40- 49%	Average
	D+ 30 - 39% Marginal	D	20- 29%	Need improvement
	E Below 20% Need improvement			

Marks Entered by _____

Marks checked by _____

Supdt/ T. O _____

SECRETARY

UNIT WISE ANALYSIS

ECG

1

HUMAN ANATOMY OVERVIEW

Introduction

For anyone concerned with the paramedical field, it is essential to know the structure of human body. Anatomy is the study of the structure of the body and of the relationship of its constituent parts to each other. In the previous classes students have already studied the structure and functions of various systems in our body. By brushing their previous knowledge about each system will help them to recollect the necessary points. This unit introduces the important anatomical terms, Cell which is the basic structural and functional unit of life, electrical potentials associated with the cell. This unit also familiarises some of the system in the body like skeletal system, Respiratory system and Nervous system. Mediastinum is also included to understand the position of heart. Necessary activities should be planned to create interest in the topic.

Curriculum Objectives

- To understand the location and orientation of various organs in the body through anatomical terms.
- To understand the basic structure of cell.

- To develop a concept about bioelectricity.
- To understand the classification of bones and bones of thoracic cage in detail.
- To identify the parts and functions of respiratory organs.
- To identify the different parts of nervous system.
- To understand the structure of mediastinum

Syllabus

- Anatomical terms and position
The cell, cell membrane transport, bioelectricity, skeletal system, respiratory system, nervous system, mediastinum

1 Anatomical terms and Position

Suggested strategy-Discussion and demonstration

The teacher first demonstrate the anatomical position of the body by positioning one of the students as model.

Ask them to discuss about the position of the body.

Discussion points

- Standing erect
- Eyes looking forward

- Upper extremities at the sides of body, palms turned forward.

Consolidation

Consolidate the concept of anatomical position.

Anatomical terms

The teacher can help the students to introduce the common anatomical terms like anterior, posterior, superior, inferior, medial, lateral, central, peripheral, proximal, distal, Superficial, deep.

Suggested strategy- Identification of position and relations of various organs using chart, model and discussion.

Discussion points

- The heart is to the sternum
- Abdomen is to thorax
- The thorax is to abdomen

Consolidation

From the response of students the teacher can consolidate the idea of anatomical terms.

Cell is a basic unit of life

Students have already acquired knowledge about the structure of cell, different types of cells from their previous classes.

Suggested strategy- Demonstration and assignment

Teacher can demonstrate the chart which explains the structure of cell.

Ask the students to draw the diagram and prepare an assignment on the structure of cell.

Cell membrane transport

Recollect the students knowledge about the semipermeability of plasmamembrane and osmosis.

Suggested strategy- Discussion.

Discussion points

- Diffusion
- Drift
- Active transport

Consolidation

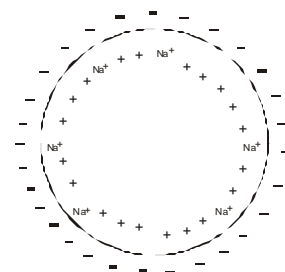
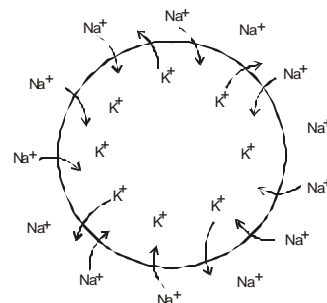
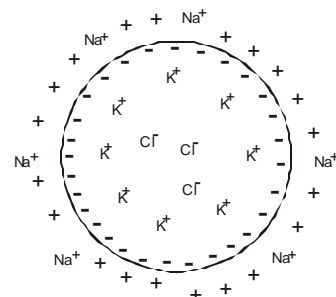
Through this discussion the teacher can consolidate the concept of cell membrane transport.

Bioelectricity

Previous knowledge - cell, cell membrane transport

Suggested strategy- demonstration & Discussion.

Demonstrate the diagram



Observe the three figures and ask them to compare the three phases of

electro chemical reaction taking place in a cell.

Let them to discuss about it.

Discussion points

- Resting state
- Excited state
- RMP
- AP
- Polarisation
- Depolarisation
- Repolarisation

Consolidation

Summarise the discussion points to create an idea about the electrical activity associated with the cell.

Skeletal system

The students are already familiar with skeletal system as a frame work of the human body. The main purpose of the skeletal system is to provide mechanical stability to the body, to protect the delicate organs and to serve as an anchorage for the muscles in order to make possible through lever action.

Classification of bones-based on position

The teacher can review the previous knowledge of students about the bones of human body. Then introduce the terms-axial skeleton and appendicular skeleton.

Suggested strategy-Observation of skeleton and group discussion.

Discussion points

- Axial skeleton
- Appendicular skeleton

Activity

Identification of bones using bone set.

Consolidation

Through the above activities the teacher can consolidate the classification of bones based on their position.

Classification based on size and shape

As the students to observe a human skeleton or chart.

Divide the students in group and lead them to a discussion.

Discussion points

- Long bones
- Short bones
- Long short bones
- Flat bones
- Irregular bones
- Pneumatic bones
- Sesamoid bones

Consolidate the discussion points by adding additional information.

Further activity

- Ask the students to identify different bones using human skeleton.
- A quiz programme can be conducted in the classroom based on this topic.

Thoracic cage

Suggested strategy-Demonstration, identification, discussion

Demonstrate the bones of thoracic cage using a skeleton or chart. Lead them to a group discussion.

Discussion points

- Sternum
- Ribs - structure and classification
- Thoracic vertebrae

Activity

Identification of bones of thoracic cage using specimens.

Consolidation

From the above activities the teacher can consolidate the bones of thoracic cage.

Respiratory system

The respiratory system is concerned with respiration and associated organ. This topic deals with the identification of respiratory passages and lungs, mechanism of respiration and parameters of respiration.

Structure of respiratory system in brief

Suggested strategy-Demonstration, Group discussion, Assignments

After recollecting previous knowledge about respiratory organs teacher can demonstrate the structure of respiratory system by using models, charts and animated CDs

Discussion points

- Upper respiratory tract
- Lower respiratory tract
- Lungs

Ask them to note the points on a diary.

Activity

Prepare charts explaining the structure of respiratory system.

The teacher can consolidate the structure of respiratory system by adding additional points.

Mechanism of respiration and parameters of respiration**Suggested strategy-Assignments**

Ask the students to prepare an assignment on the mechanism of respiration and parameters of

respiration with the help of teacher and proper reference material.

Nervous system

Students have the previous knowledge about nervous system i.e. a system which controls and coordinates all the activities of body. This chapter familiarises the various parts of central and peripheral nervous system.

Suggested strategy-Demonstration, discussion, seminar

Demonstrate the parts of central and peripheral nervous system using chart, models and animated CDs.

Discussion points

- Identification of the parts of brain.
- Naming of cranial nerves
- Spinal cord

Activity

Ask the students to prepare a seminar on the structure of neuron using reference books and IT.

Mediastinum

Collect the previous knowledge about thoracic cage, position of lungs.

Then the teacher can introduce the term mediastinum.

Suggested strategy-Demonstration and discussion

Demonstration using charts to explain the position of mediastinum

Discussion points

- What is mediastinum.
- What are the contents of mediastinum

Consolidate

After collecting their response the teacher can highlight the structure of mediastinum.

UNIT PLAN

1- HUMAN ANATOMY OVERVIEW

Objectives	Concepts/Ideas	Process skills	Activity	Materials	Evaluation
<ul style="list-style-type: none"> To understand the location and orientation of various organs in the body through anatomical terms 	Anterior Posterior Inferior Superior Medial Lateral Central Peripheral Proximal Distal Superficial Deep	Communication Observation Comparison Identification	Observation of chart Models Discussions	Human torso Model Chart Observation of skeletons	To identify the position and relations of organs independently To response questions
<ul style="list-style-type: none"> To understand the basic structure of the cell and cell membrane transport 	Cell as a basic unit of life Identification naming and function of cellular organelles such as plasma membrane mitochondria, Ribosomes Endoplasmic reticulum Diffusion Golgibodies Drift Lysosomes Active Centrioles Transport Nucleus	Communication Observation Identification Presentation	Observation of slides Charts Discussion Preparation of chart	OHP Slides Chart Reference books Photographs	Presentation of labelled charts Identification of organelle by CT OT
<ul style="list-style-type: none"> To develop a concept about bioelectric potentials associated with cell. 	Resting stage Depolarisation Repolarisation	Communication Observation Identification	Discussion Demonstration	Chart Diagrams	OT, CT

Objectives	Concepts/Ideas	Process skills	Activity	Materials	Evaluation
<ul style="list-style-type: none"> To understand the classification of bones and bones of thoracic cage in detail 	Skull Axial and appendicular skeleton Thoracic cage Sternum Ribs Vertebral column	Observation Identification Classification	Observation of slides Demonstration of chart, model and human skeleton Seminar	Slides OHP Model Human Skeleton Digital support	Identifications of bones, Presentation of seminars, OT, CT
<ul style="list-style-type: none"> To understand the parts and functions of respiratory organs 	Upper respiratory tract, lower respiratory tract lungs Mechanism of respiration Parameters of respiration	Communication Observation Identification	Discussion Demonstration of chart, Model preparation of chart	Chart Model OHP CD Library Books	Proficiency in preparation of chart, Identification, Participation in discussion.
<ul style="list-style-type: none"> To identify the different parts of the nervous systems 	Central nervous system Peripheral nervous system Neurons	Observation Identification	Observation of charts models Processed specimen Preparation of charts	Chart Model Reference book Processed specimen	Presentation of prepared chart, CT, OT, Identification of parts with models
<ul style="list-style-type: none"> To develop an idea about mediastinum 	Position of mediastinum contents	Observation Identification Communication	Observation of chart, model Discussion	Chart Model	Participation in discussion, CT, OT Identification of parts with models.

CARDIOVASCULAR SYSTEM

Introduction

Before learning electrocardiography and other cardiovascular measurements it is essential to understand the system behind it. Students have already learned that cardiovascular system consists of heart and blood vessels. Heart is the chief organ maintaining the circularion through out the body. The purpose of this unit is to create an idea about the anatomy and phy siology of heart . The physiological variables associated with heart is also introduced. The students have already learnt about the different parts of cardiovascular system, in lower classes. By considering the importance of the chapter, necessary learning activities should be planned and introduced so as to reinforce the ideas and develop activity.

Curriculum Objectives

- To understand the position of heart, size, shape and relations of heart.
- To develop an idea about layers of heart and pericardium.
- To create an idea about properties of cardiac muscle.
- To understand the chambers and associated blood vessels of heart.
- To develop an idea about the structure and function of valves.
- To understand the circulation of blood.
- To create an idea about blood supply of heart.
- To understand the conduction system of heart.
- To understand the events of cardiac cycle.
- To create an idea about heart sounds and its importance.
- To familiarise the physiological variables associated with cardiac physiology.

Syllabus

Anatomy of heart

- Position and relations of heart
- Layers of heart
- Pericadium
- Cardiac muscles
- Chambers of heart and associated blood vessels
- Valves of the heart
- Conduction system of heart
- Cardiac cycle
- Heart sounds
- Physiological variables associated with cardiac cycle.

Anatomy of Heart

Position and relations of heart

Review the previous knowledge of students about anatomical terms, thorax and mediastinum

Activity **-Observation using chart, multimedia and human torso model**

Conduct a general discussion.

Discussion points

- Where the heart is placed?
- How it is placed?
- Can you identify the relations of heart.
- Apex, base, borders & surfaces of heart.
- Size, shape and weight of heart

Note the points on a diary

Consolidation

Teacher can consolidate the discussion points by adding additional information about the position and relations of heart.

Note: Using charts ask the students to explain the position of heart.

Layers of the heart

Suggested strategy-Demonstration and discussion

Demonstrate the layers of heart using chart, animated CDs and models

Discussion points

- Pericardium
- Myocardium
- Endocardium

Consolidation

From the above discussion and demonstration the teacher can

consider that heart muscle consists of three layers.

Pericardium

Suggested strategy-Demonstration and discussion

Demonstration using chart and processed specimen.

Ask the students to draw the diagram in their diary.

Lead them to a discussion.

Discussion points

- Which is the outermost layer of the heart
- Layers of pericardium
- Pericardial fluid and function

Consolidation

By adding additional information the teacher can consolidate the topic.

Cardiac Muscles

Suggested strategy-Discussion & Observation of slides and charts

Conduct a general discussion about the properties of cardiac muscle.

Discussion points

- Automaticity
- Conductivity
- Tonicity
- Contractility
- Rhythmicity

Observation of slides and charts to explain the structure of cardiac muscle. Ask them to observe the structure of cardiac muscle and compare with smooth muscle and skeletal muscle.

Consolidation

Though the above activities teacher can consolidate the portion.

Chamber of heart and associated vessels

Brush up the previous knowledge of students about the chambers of heart.

Activity: Demonstration using chart, model, IT

Discussion points

- Right atrium
- Left atrium
- Right ventricle
- Left ventricle
- Pulmonary artery
- Aorta
- Inferior venacava
- Superior venacava
- Pulmonary vein

Consolidation

After demonstration and discussion the teacher can consolidate the idea about chambers and blood vessels of heart.

Noe: A model explaining the chambers and blood vessels can be prepared by the students using thermocol.

Valves of the heart

Activity: Demonstration, discussion, preparation of chart

Teacher can brush up their previous knowledge about the name of valves.

Then demonstrate the different valves using models and processed specimen. Demonstrate the function of valve using an animated CD.

Discussion points

- Different types of valves
- Position of valves
- Structure of valve
- Function of valves

Note the points in a diary.

Consolidation

Teacher highlights the above discussed points and consolidates the concept of cardiac valves.

Circulation of blood

Recollect the previous knowledge of students about blood circulation and action of valves.

Suggested activity : Demonstration and discussion and seminar:

Using chart and animated CDs teacher can demonstrate the flow of blood. Let them observe it. Then conduct a discussion.

Discussion points

- Circulation of blood in the heart

A seminar can be conducted in this topic.

Subtopics of seminar

- Systemic circulation
- Pulmonary circulation
- Hepatic circulation
- Renal circulation
- Foetal circulation

Students are grouped in to 5 according to the name of circulation. Data should be collected and teacher can provide reference materials.

Data should be collected with the help of teacher. Then make the seminar report and present before the class. Summary of the topic should be consolidated by the teacher and present in the form of seminar report.

Blood supply of heart

Suggested activity : Demonstration and discussion

Blood supply of heart can be demonstrated with the help of charts and animated CDs

Discussion points

- Right coronary artery
- Left coronary artery
- Area of blood supply

Consolidation

The teacher can collect the discussion point with a view to clarify the concept of blood supply of heart.

Note: Instruct the students to collect data from journals and internet about myocardial infarction

Conduction system of Heart

Recollect the previous knowledge of students regarding bioelectricity, properties of cardiac muscle.

Suggested Activity : Demonstration and discussion

Using chart or animated CD's the teacher can demonstrate the conduction of impulse across the heart.

Discussion points

- Can you identify the site from which impulses are generated?
- How it is conducted across the heart.
- What happens when these impulses spread through the heart muscles.

Consolidation

The teacher can consolidate the discussion points by adding additional informations.

Note: Ask the students to prepare and present labelled charts and models explaining conduction system of heart.

Cardiac cycle

Review the previous knowledge about structure of heart, working of heart.

Suggested Activity : Brainstorming

Teacher can ask the following questions.

- How blood reaches all part of our body.
- How heart acts as a pump.
- Do all chambers work simultaneously or not.
- What is the role of cardiac valves in pumping action.
- What is the role of blood vessels in this cycle ?

Response of each student can be marked on the black board. Then teacher can prioritaries the response elicited. Then conduct a general discussion.

Lead points

- Contraction of chambers
- Relaxation of chambers
- Action of valves.
- Duration of cardiac cycle

Consolidation

After brain storming and discussion teacher can introduce new terms associated with cardiac cycle and consolidate the concept of cardiac cycle.

Heart sound

Review the previous topic - cardiac cycle

Suggested Activity : Brainstorming Discussion and demonstration

Teacher can ask the questions like

- What is the use of stethoscope
- Can you experience any sounds coming out from your chest.
- Can you guess how these sounds are produced.

Collect the response of the students. Teacher can give additional information about the portion. Then lead them to a discussion.

Leadpoints

- Closure of valves
- Types of sound
- Nature of sound
- Concept of murmurs

Consolidation

After discussion the teacher can consolidate the idea of heart sound.
Note: Teacher can demonstrate the identification of heart sound using stethoscope.

Physiological variables associated with cardiac cycle

Activity: Assignment

Suggest the students to prepare an assignment on blood pressure, pulse, cardiac output, stroke volume, heart rate. Teacher can give information about reference texts.

Further activity

- Instruct the students to do a project on common ECG abnormalities
- Survey on coronary artery disease and its predisposing factors.

UNIT PLAN

2- CARDIOVASCULAR SYSTEM

Objectives	Concepts/Ideas	Process skills	Activity	Materials	Evaluation
<ul style="list-style-type: none"> Anatomy of heart To understand the size and shape of heart Indicates its position and relations 	Size, shape, position, apex, base, borders, surfaces	Communication Observation Identification	Discussion Observation of models and chart Preparation of charts	Human torso Model Chart Library Books	Perfection in chart preparation Presentation of notes Identification with models Class test
<ul style="list-style-type: none"> To develop an idea about the layers of heart 	Pericardium Myocardium Endocardium	Communication Observation Identification	Discussion Demonstration with chart models multimedia Preparation of chart	Chart Model Digital support Library books	Presentation of chart Participation in discussion Identification with chart
<ul style="list-style-type: none"> To understand the coverings of heart 	Fibrous pericardium Serous pericardium Visceral pericardium Parietal pericardium Pericardial fluid	Communication Comparison Identification	Discussion Demonstration with chart models multimedia Preparation of chart	Chart Model Digital support Library books	Presentation of chart Participation in discussion Identification with chart
<ul style="list-style-type: none"> To understand the structure and properties of cardiac muscles 	Structure of other muscles and comparison with cardiac muscle Properties	Comparison Observation	Observation through slides, OHP, Chart	Slides OHP Chart	Oral test Identification with chart

Objectives	Concepts/Ideas	Process skills	Activity	Materials	Evaluation
<ul style="list-style-type: none"> To develop an idea about the chambers of heart and associated blood vessels 	Right ventricle Left ventricle Right atrium Left atrium Papillary muscles Chordae tendinae Naming and function of blood vessels	Communication Observation Identification Comparison	Communication Observation Seminar Quiz Demonstration of preserved sample Data collection Preparation of chart	OHP CDs Chart Models Reference books Digital support	Perfection in chart preparation Participation in discussion Presentation of seminar Participation in quiz Oral test
<ul style="list-style-type: none"> To understand the structure and function of the valves of the heart 	Structure and position of Tricuspid valve Bicuspid valve Semilunar valves Function of each valve	Observation communication Identification Comparison	Demonstration with chart models Multimedia Discussion Diagrammatic Presentation	Chart Model OHP Digital Support Library books	Drawing of diagram Participation in discussion Identification with chart
<ul style="list-style-type: none"> To develop an idea about the circulation of blood 	Pulmonary circulation Systemic circulation	Communication Comparison Observation	Chart Working models Seminars Assignments	Chart CDs Models Library books	Presentation of seminar assignments Oral test Class test
<ul style="list-style-type: none"> To develop an idea about the blood supply of heart muscles and its importance 	Blood supply of heart by right and left coronary arteries and its branches	Communication Comparison Identification	Demonstration with chart and models Preserved specimen Collection of data Chart presentation Drawing of diagram	Chart Model Digital support OHP Photographs	Presentation of chart, data Diagram drawing

Objectives	Concepts/Ideas	Process skills	Activity	Materials	Evaluation
<ul style="list-style-type: none"> To understand the generation and conduction of bioelectric impulses in the heart 	SA node AV node Internodal pathway Bundle of his Right bundle branch Purkinje fibres	Identification Observation	Demonstration of signals using Working models Chart Multimedia	Model Chart Digital Support	Diagram drawing and presentation Identification with chart
<ul style="list-style-type: none"> To develop an idea about cyclic events taking place in heart 	Systole Diastole Action of valves Pumping of blood to aorta and pulmonary artery	Communication Identification	Discussion Assignment Seminar	Chart Library books Multimedia Models	Participation in discussion Presentation of seminar and assignment
<ul style="list-style-type: none"> To develop an idea about the production and types of heart sounds and its significance 	First sound Second sound Third sound Fourth sound Production Duration Significance Tachycardia Brady cardia	Identification Comparison	Auscultation of heart sound with stethoscope Audible tapes Field visit	Stethoscope, Audible tape, Phonocardiograph Echocardiograph	Identification of heart sound using stethoscope
<ul style="list-style-type: none"> To understand the physiological variables associated with heart 	Pulse B.P Stroke volume Cardiac output	Calculations Testing observation Communication	Discussion Palpating superficial pulse points Measuring pulse rate and B.P	Sphygmomanometer Stethoscope	Perfection on calculating pulse rate Identification of pulse points Calculation of cardiac output with given values

3

TRANSDUCERS AND ELECTRODES

Introduction

The students have previous knowledge about the conversion of one form of energy to another. This unit deals with various transducers and electrodes used to measure the physiological variables like temperature, pressure, blood flow, bioelectric potentials etc. Most medical instruments are electronic devices and so must have an electrical signal for an input. When a biopotential is to be measured, some form of electrode is used between the patient and the instrument. In other cases a transducer is used to convert some non-electrical physical parameters such as force, pressure, etc. to an analog electrical signal proportional to the value of the original stimulus. This chapter deals with different types of transducers and electrodes and their biomedical application. Various learning activities like discussion, demonstration, experiments, assignment can be used to meet the objective.

Curriculum Objectives

- To make an idea about the basic transducer principles.
To develop an idea about the principle of wheatstone bridge

- To develop an idea about the working principle and applications of different active transducers.
- To develop an idea about the working principle and applications of different passive transducers.
- To understand the principle of electrodes.
- To understand the classification and applications of different types of electrodes.

Syllabus

Transducers and Electrodes

- Transducer principle
- Wheatstone bridge
- Active transducers
- Inductive transducers
- Quartz pressure sensors
- Temperature transducers - Thermocouple, thermistor, PN junction.
- Passive transducer
 - Strain guage
 - LVDT
 - Capacitive transducers
- Electrodes
- Classification of electrode
- Electrodes for ECG recording

Practical

- Demonstration and familiarisation of various types of transducers and electrodes.

3.1 Transducers Principles**Suggested Activity-Discussion**

The students have previous knowledge about the conversion of one form of energy to another. Based on that knowledge teachers can develop the concept of transducers

Divide the students in to five groups. Ask them to collect some common examples of devices which convert one form of energy in to another.

e.g. Fan, light, solar panel, microphone.

The teacher can ask some questions about the physiological variables in our body and importance of their measurement.

Lead them to a general discussion.

Discussion points

- For the measurement of physiological variables we use electronic instruments.
- The input of every instrument should be an electrical energy.
- How will we measure the non electrical parameters?

Consolidation

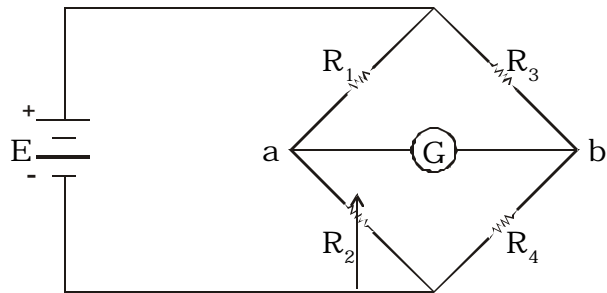
From the discussion students should develop the following concepts.

- Transducer
- Transduction
- Need of transducers for the measurement of physiological variables.

3.2 Wheat Stone Bridge**Suggested Activity-Discussion, demonstration with circuit diagram and experiment**

Conduct a discussion and brush up the previous knowledge about resistance, resistors, galvanometer.

Demonstrate the following circuit diagram.



Divide the students in to groups and give them the circuit components of wheat stone bridge and ask them to arrange the circuit using fixed resistors and rheostat. Change the resistance of the rheostat and ask them to observe the galvanometer deflection.

Consolidation

From this experiment the students got an idea about the working of wheat stone bridge. i.e. wheat stone bridge is ideal for measuring small changes in resistance.

Practical: Arrange a wheat stone bridge.

3.3 Active Transducers**Suggested Activity-Group discussion.**

Review their previous knowledge about transducer principle, wheat

stone bridge, magnetic induction, photoelectric effect, thermoelectric effect.

Discussion points

- Analyse the mode of energy conversion in inductive transducer and thermoelectric transducer

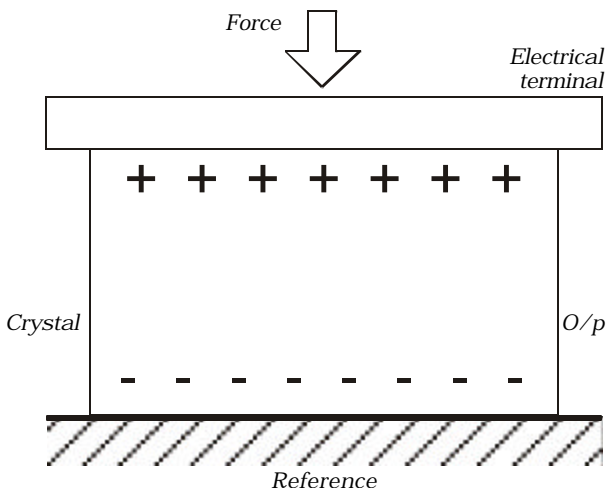
Consolidation

The teacher can consolidate the major findings of discussion with the idea that the above discussed transducers are working in a same manner i.e. they convert one form of energy to another directly without the use of an excitation voltage.

Piezoelectric Transducers

Suggested strategy: Demonstration and discussion

Demonstrate the following diagram.



Discussion points

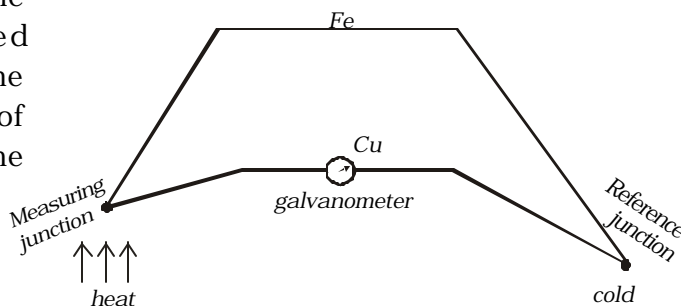
- Piezoelectric effect
- Working of a piezoelectric transducers
- Application of piezoelectric transducers
- Quarts pressure sensors

Consolidation

On the basis of discussion and demonstration students can achieve the concept of piezoelectric effect, working of piezoelectric transducer and its application.

Temperature Trasducer

Suggested Activity : Demonstration and discussion



Take two wires of dissimilar metals (Fe & Cu) and connected together making two junctions. One junction is kept hot and other junction is kept cold. A voltage can be observed at any point of interruption of the wires which is proportional to the difference in temperature between the two junctions.

Demonstration is followed by discussion.

Discussion points

- What is thermoelectric effect?
- What is seebeck and peltier effect.
- What is a thermocouple
- What is a thermistor
- P N Junction
- Biomedical applications of temperature transducers.

Consolidation

From this experiment and discussion students develop the concept of temperature transducer and its biomedical application.

Inductive and photo electric transducers

Suggested Activity: Assignment

Students have already an idea about inductive transducers and photoelectric transducer.

Ask them to prepare an assignment with the help of reference books.

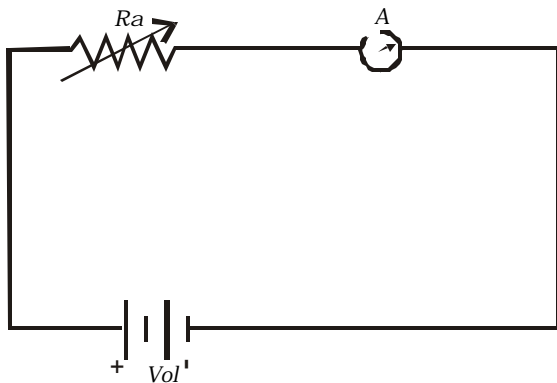
Practicals: Familiarisation of different active transducers discussed above.

3.4 Passive Transducer

Suggested strategy: Demonstration and discussion

Review the previous knowledge about transducer principle, wheat stone bridge, active transducer.

Demonstrate with the diagram and experiment the working of resistive transducer using potentiometer or rheostat



In this circuit linear motion is converted in to change in current with the help of an external voltage source. Let them observe and compare the working of demonstrated transducer and active transducers

The teacher can ask some questions.

- What is an active transducers?
- Can you find any difference between active transducer and the above demonstrated transducer.

Consolidation

Summarise their answer with an idea that passive transducers convert energy from one to another with the help of an excitation voltage.

Divide the students in to groups and lead them to a discussion of different types of passive transducers.

Discussion Points

- Strain gauge
- Inductive transducer
- LVDT
- Capacitive transducer

Consolidation

The teacher can consolidate the discussion points that the above transducers are belonging to the type of passive transducers used for the measurement of different physiological variables

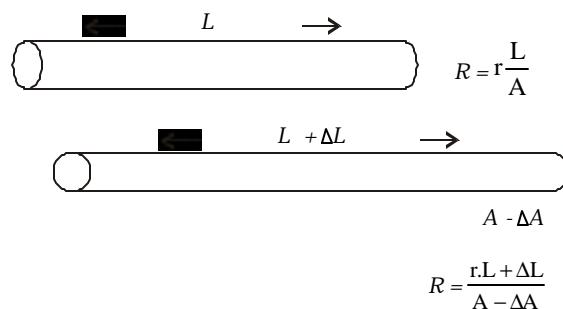
Strain Gauge

Suggested Activity: Discussion and Demonstration

Discussion points

- Stress
- Strain

Demonstration with diagram



Consolidation

From the above discussion points and demonstration the teachers can consolidate the principle of strain gauge.

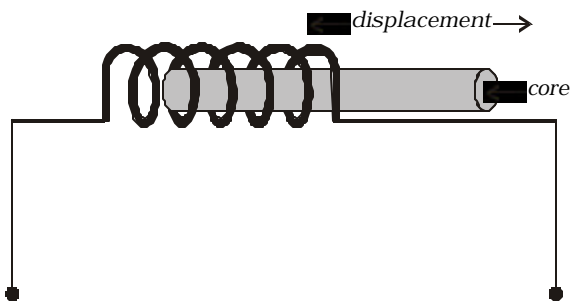
Inductive Transducer

Suggested Activity: Discussion and Demonstration

Discussion points

- Induction
- Inductance

Demonstrate the following diagram.



Consolidation

From the above discussion point and demonstration the teacher can consolidate the principle of inductive transducers.

LVDT

Suggested Activity: Seminar and Discussion

This topic is a continuation of inductive transducer.

Teacher can instruct the students to prepare a seminar by using chart and reference books.

Subtopics for seminar

- Principle
- Working
- Applications

Discussion points

- Biomedical application of LVDT

Consolidation

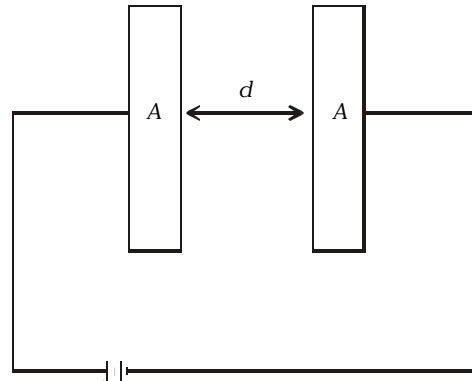
The teacher can consolidate the discussion points in a way to help the students get an idea about the principle, working and application of LVDT in biomedical field.

Capacitive Transducer

Suggested Activity: Discussion & Demonstration

Review the previous knowledge of students about capacitor & capacitance.

Demonstrate the following diagram.



Discussion points

- Principle
- Working
- Application

Consolidation

The teacher can consolidate the discussion points in a way to help the students get an idea about the principle, working and application of capacitive transducers.

Practical: Familiarisation of different passive transducers discussed above.

Electrodes

Principles of electrodes

Suggested Activity: Discussion

The teacher can review previous knowledge of students about bioelectric potential and transducer.

Divide them into groups and conduct a discussion

Discussion points

- Propagation of bioelectric potential
- Need of electrode
- Electrode principle
- Half cell potential
- Electrode skin interphase
- Importance of electrode jelly

Consolidation

Through general discussion students develop an idea about need of electrodes and their basic principles.

Classification of electrodes

Suggested Activity: Discussion and demonstration of diagrams

Students have an idea about electrode principle

Discussion points

- How will you measure potentials from different sites of body?
- Do one type of electrode is enough for measuring potentials from different sites of human body.
- Let them discuss.
- Teacher can demonstrate diagrams of different types of electrodes.

Consolidation

Through discussion and demonstration teacher can consolidate that mainly three types of electrodes depending up on their

application namely - microelectrodes, surface electrode and needle electrode.

Electrodes for recording ECG

Suggested Activity: Discussion and demonstration

Brush up the previous knowledge about surface electrode.

- Demonstration of different types of electrodes and their diagrams used for ECG recording.
- Let them observe and ask them to compare each type of electrodes.
- Diagrams can be drawn in the note book.

Let them to a discussion.

Discussion points

- Metal plate electrode
- Floating type electrode
- Multipoint electrode
- Suction cup electrode
- Adhesive type electrode

Consolidation

From the above mentioned observation and discussion students can identify the different types of surface electrodes used for ECG recording.

Practical: Familiarisation of electrodes used in ECG.

UNIT PLAN

3- TRANSDUCERS AND ELECTRODES

Objectives	Concepts/Ideas	Process skills	Activity	Materials	Evaluation
<ul style="list-style-type: none"> To make an idea about the basic transducer principles 	Conversion of one form of energy into electrical energy	Communication Identification Observation	Discussion Demonstration Experiment	Any type of transducer	Participation in discussion CT, OT, PE
<ul style="list-style-type: none"> To develop an idea about the principle of wheat stone bridge. 	Resistance Resistors Galvanometer Voltage source	Observation Identification	Experiment Diagrammatic representation	Resistors Galvanometer Power Supply	PE
<ul style="list-style-type: none"> To develop an idea about the working principle of different active transducers such as Inductive transducer Piezo electric transducers Thermo electric transducer Photo electric transducer 	Electro magnetic induction Piezo electric effect Thermo electric effect Photo electric effect	Communication Identification Observation	Disucussion Experiment Assignment Seminar	Materials required for experiment	Participation in discussion P.E, C.T, OT
<ul style="list-style-type: none"> To develop an idea about the working principle of passive transducers 	Resistive transducers Inductive transducers Capacitive transducers	Communication Identification Observation	Discussion, Experiment, Diagrammatic representation	Materials for practical Diagrams	P.E, OT CT
<ul style="list-style-type: none"> To understand the applications of biomedical transducers 	Pressure transducer Flow transducer Temperature transducer	Communication Observation Differentiation	Discussion Seminar Assignment Data Collection	Materials for practical Diagrams	Presentation of seminar Assignment Evaluation of Collected data

Objectives	Concepts/Ideas	Process skills	Activity	Materials	Evaluation
<ul style="list-style-type: none"> To understand the principle of electrodes 	Half cell potential Electrode skin interphase	Communication Observation	Discussion Seminar Diagrams	Chart Diagrams	C.T, OT
<ul style="list-style-type: none"> To understand the general classification of electrodes 	Bio potential electrode Bio chemical electrode Medical surface electrode Micro electrode Needle electrode	Communication Observation Identification	Discussion Demonstration Assignment	Electrodes for demonstration Chart Digital support	Evaluation of assignment OT, CT
<ul style="list-style-type: none"> To understand the electrodes used for ECG recording 	Metal plate electrode Suction cup electrode Adhesive type electrode Floating type electrode Multipoint electrode	Communication Observation Identification Distinguishing	Discussion Demonstration	Charts Models IT	Response to questions, CT, PE

BIOLOGICAL AMPLIFIERS

Introduction

In many biomedical applications it may be necessary to have a permanent record of certain bioelectric signals and variables for a detailed review later on. That is the reason why the recording system has become an integral part of most of the biomedical instruments. Basically a recording system includes electrodes or transducers to pick up the signal or variable from the body, a signal processing system to convert the picked up signal to a more utile and handy form and a writing system to produce a permanent record for the signal. In most of the applications the signal picked up by the transducer or electrode will be of the order of microvolt. Moreover the signal is to be picked up from an environment crowded with noise. Hence the amplifier system should be capable of increasing the strength of the signal with out much deterioration in the signal to noise ratio. Students have already learned about the transducers and electrodes in the previous unit. So now the discussion is confined to the basic working principle and various types of amplifiers used in biomedical instrumentaton.

Curriculum Objectives

- To give the students the concept of transistors in CE, CC and CB configurations.
- To introduce the concept of amplification using transistors.
- To introduce the basic principle and working of differential amplifier.
- To introduce the principle and working of isolation amplifier

Syllabus

- Transistor amplifier
- Differential amplifier
- Isolation amplifier

Basic Amplifier configuration

Previous knowledge: Semiconductor, diode, transistor

Suggested Activity - Demonstration, discussion and practical

Teacher can demonstrate transistor configuration (CB, CC & CE) with aid of diagram.

Discussion points

- Common base configuration
- Common collector configuration
- Common emitter configuration

Practical

Teacher can divide the students into groups. Ask each group to

construct CB, CC and CE amplifiers. The teacher can consolidate the above point through demonstration, discussion and practical.

Transistor as an amplifier

Suggested strategy - Demonstration, discussion and practical

After introducing the concept of amplification using transistors through discussion and diagram, give necessary guidance to construct a single stage CE amplifier circuit in a breadboard. Using CRO teacher can demonstrate input and output waveforms or voltages

Teacher can consolidate the points such as concept of amplification, transistor as an amplifier etc.

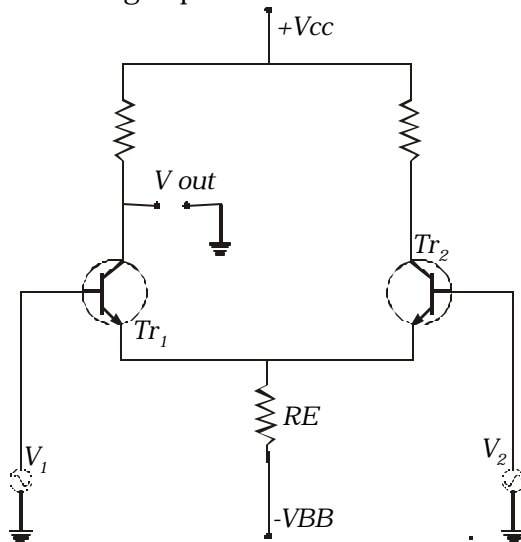
Differential amplifier

Suggested strategy - Demonstration and discussion

Demonstrate the circuit diagram of differential amplifier using two transistors. Lead them to a group discussion.

Discussion points

- Comparison of differential amplifier and single stage amplifier.
- Inverting input.



- Non inverting input
- Common mode gain
- Differential gain
- CMRR
- Application of differential amplifier in biomedical field.

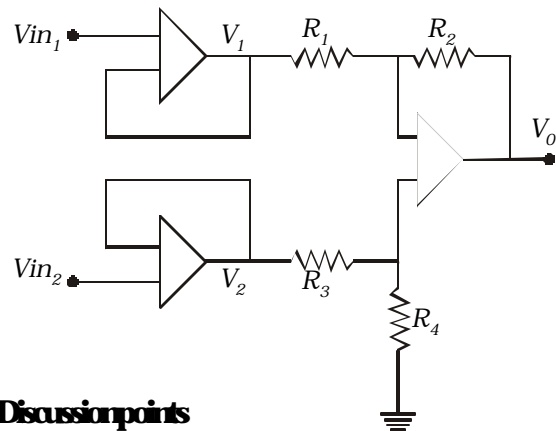
Consolidation

Consolidate the activity to give a clear idea about principles and uses of differential amplifier.

Isolation amplifier

Suggested strategy - Demonstration and discussion

Demonstrate the circuit diagram of an isolation amplifier. Lead them to a discussion.



Discussion points

- What is isolation?
- Need of isolation?
- Advantages of isolation?
- Basic isolation circuit.
- Mention different types of isolation used in electro cardiography.

Consolidation

From the above demonstration and discussion points, teacher can consolidate the use of isolation amplifier in ECG machine.

Practical

- 1 Arrange different - transistor circuit configurations in a bread

- board.
- 2 Arrange the circuit elements of a common emitter amplifier in a bread board and observe the input and output voltage and gain.
 - 3 Arrange the circuit elements of a differential amplifier.
 - 4 Arrange the circuit elements of an isolation amplifier.

UNIT ANALYSIS

4- BIOLOGICAL AMPLIFIERS

Objectives	Concepts/Ideas	Process skills	Activity	Materials	Evaluation
<ul style="list-style-type: none"> To understand the basic amplifier configurations 	Semi conductor PN Junction Transistor as an amplifier CE, CB, CC configuration	Communication Observation Identification	Discussion Demonstration Assignment Diagrams Practicals	Material for demonstration and practical	Participation in discussion Presentation of assignment CT, OT, PE
<ul style="list-style-type: none"> To familiarise with the working of differential amplifier 	Application of differential amplifiers. Circuit arrangement of differential amplifiers using transistor	Observation Identification	Demonstration with diagrams Practical	Transistor Op. amp Diagrams Materials for practical	PE, CT, OT
<ul style="list-style-type: none"> To familiarise with isolation amplifiers 	Types of isolation amplifiers and application	Observation Identification Communication	Discussion Demonstration	Circuit diagram Diagram Isolation amplifiers for demonstration	CT OT

PHYSICS OF SOUND

Introduction

It is impossible to study abnormalities of human hearing without basic understanding of the physics of sound and some of the properties of its perception and measurement. Sound is generated by vibration and is carried through the air around as in the form of pressure waves. It is only when a sound wave strikes the ear that hearing may take place. This unit deals with the study of production and propagation of sound, physical and psychological attributes of sound, properties of sound and types of sound.

Curriculum objectives

- To create an idea about the production of sound and their propagation
- To develop an idea about the physical and psychological attributes of sound such as frequency, intensity, pitch, loudness and timbre
- To understand the properties of sound such as reflection, refraction and diffraction
- To create an idea about the different types of sound

Syllabus

- Detailed study of production and propagation of sound

- Physical and psychological attributes of sound
- Properties of sound – absorption, reflection, refraction, diffraction.
- Types of sound – pure tones, complex tones and types of complex tones

Production of sound

Suggested Activity: - Discussion and experiments

In lower classes the students have already a previous knowledge about this topic. So the teacher can ask some question related to this topic.

- What is sound ?
- How it is produced.

After collecting responses from the students, the teacher can note the points on black board.

Divide the students into groups and asked to perform the following experiments.

Experiment

1. Stretch a thin rubber band around the inner case of a match box. Observe the motion produced when you pull and leave the rubber band. Excite it again and then gently touch it. What do you feel now?
2. Touch your throat with your fingers when you speak. What do you feel?

3. Excite a tuning fork with a rubber hammer. Gently touch the prongs of fork with your finger. What do you feel?

Consolidation

From the above discussion and experiments the teacher can consolidate the following point

- Sound is a form of energy
- Sound is produced due to vibration of material objects
- Some mechanical energy is needed to make a body vibrate and produce sound .

Further activity

Find out the various devices need in our day-to-day life to produce different type of sound

Propagation of sound through different media

Suggested Activities Discussion and experiment

Collect the previous knowledge of the student regarding this topic

Point for discussion

Transmission of sound waves across the solid ,liquid and gas

Experiments

Divide the students in to groups and asked to perform the following experiments

- Bring your ear in contact with one end of the table . Scratch or knock at the other end .What do you feel? Through which media did the sound wave travel to reach your ears.
- Hold one end of a long plastic pipe close to your ear Fix a funnel at the other end. Let your friend talk in a low voice through the funnel. Can your hear his voice.

- Suspend an electric bell inside a bell Jar. Then an Electric current is then passed through the bell.Observe the presence of sound Then remove the air inside the jar using a vacuum pump. Observe the presence of sound. Note the changes in a diary.
- Take water in bucket .Clap two metal spoons continuously under water. Do you hear any sound . What is the medium required for the transmission of sound?

Consolidate

Based on the discussion and experiment the teacher can consolidate the following points

- Sound required a medium for its propagation

Further activity

Prepare a list of media suitable for the propagation of sound waves .

Sound waves in air

Suggested activity: Discussion and demonstration

Divide the students in to group and asked to observe the action of loudspeaker generating simple sounds

Discussion points

- Compression
- Rarefaction
- Direction of propagation.

From the above activities the teacher can consolidate the propagation of sound waves in air

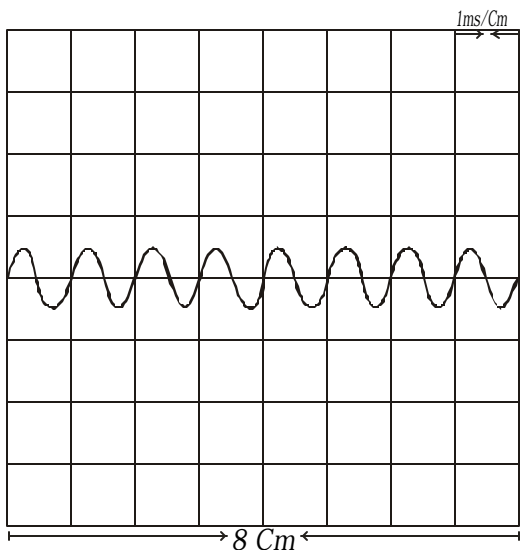
Physical aspect of sound

Suggested activity: Demonstration and discussion

Demonstration:-

A microphone is connected via an amplifier to the input terminals of

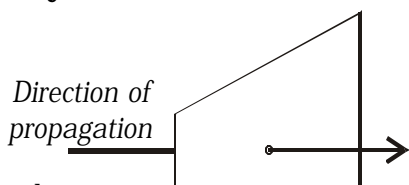
CRO. The waveform of sound reaching the microphone can be displayed on the screen of cathode ray tube.



Suppose the time set is 1ms/Cm. The time required to complete one cycle is 1ms.

Ask the students to calculate the time required to complete 1000 cycles

Suggested activity: Discussion and demonstration



The teacher can explain this point by demonstrating the action of loudspeaker

Points.

- All waves carry energy along with them
- Sound intensity I is the energy passing through a unit area perpendicular to the direction of propagation
- Decibel

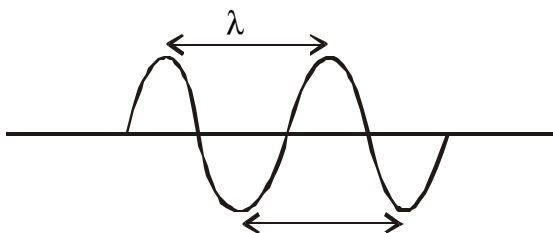
Consolidation:

Based on the above discussion point the teacher can consolidate the concept of intensity

Wavelength

Activity: Discussion and demonstration using diagram

Brush up this previous knowledge about wavelength.



Ask the students to observe the diagram

Discussion point:

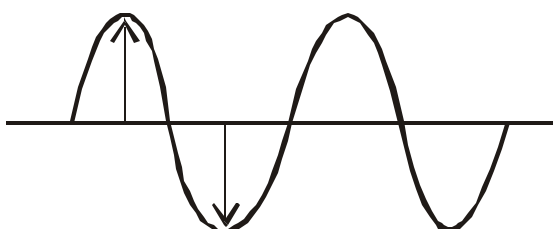
- Distance between two adjacent crests or trough

Consolidation

Based on the discussion points teacher can consolidate the topic

Amplitude

Suggested activity: Demonstration of diagram and discussion



Points for discussion

- Height of the wave
- Unit of amplitude

Consolidation

Through the above-mentioned activity teacher can consolidate the topic

Psychological attribute of sound**Pitch****Activity:** Discussion, experiment and observation**Points**

- Can you differentiate between male and female voices
- Distinguishment between cry of crow and cuckoo
- Which among them is more shrill.

Experiment

Listen to the sounds of two excited tuning forks of different frequencies (356, 512 Hz)

- Which sound is more shrill?
- Which tuning forks produced sound of high pitch?
- Which tuning fork produces sound of low pitch?

Consolidation

Through the above activities the teacher can consolidate the concept of pitch

Loudness**Activity:** Discussion**Points**

Compare the sounds of

- Murmur
- whisper
- Conversation
- Shouting
- Car
- Motor cycle
- Thunder
- Jet planes

Consolidation

Based on the discussion teacher can consolidate the topic

Timbre**Activity:** Discussion**Points**

- Can you identify a person by his voice
- How is this possible
- Listen to the sound of different instrument from an audiocassette
- Write down the names of instruments you hear

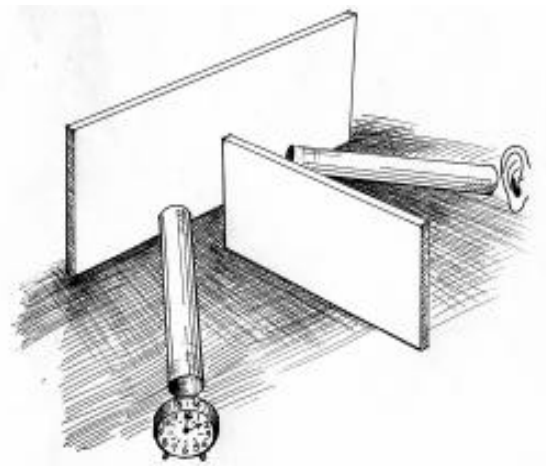
Consolidation

Based on the above discussion the teacher can consolidate the topic as follows

- Timbre is the factor which enable the ear to distinguish one instrument from another

Properties of sound**Suggested activity:** Reflection, refraction, diffraction**Reflection****Suggested activity:** Group discussion and Experiments

Take two pvc pipes having an average length of 50 cm, a glass slide and an alarm. Arrange as shown below

**Discussion points**

Examples of reflection of sound waves in daily life should be examined

- Reflection of waves produced in point
- Working of SONAR
- Production of echo

Reflection

Suggested activity: General discussion

Discussion point

What happens when sound passes through layers of air, from one temperature to another

Diffractions

Suggested activity:

Discussion point

- What happens when low frequency encounter the end of a long vertical structure from a direction perpendicular to the face of a building
- What happens when high frequency sound encounter the end of long vertical structure from a direction perpendicular to the face of a building

From the above discussion points and experiment the teacher can consolidate the concept of properties of sound

Type of sound

Pure tones and complex tones

Suggested activity: General discussion

Points

- Compare the sound generated from a vibrating tuning fork
- Sound produced from a pure tone audiometer
- Human voice

Type of complex tones

Suggested activity: General discussion

Points

- Periodic sound waves
- Fundamental frequency, overtones
- Aperiodic sound waves
- From the above discussion points the teacher can consolidate this topic.

STRUCTURE OF EAR

Introduction

The students have a previous knowledge about the structure and function of ear. This unit deals with a detailed study of external, middle and internal ear and central auditory pathway along with their functions. This unit enables the students to understand the different types of hearing loss.

Curricular Objective

- To understand the structure of outer middle and inner ear through group discussion, demonstration of chart, model, preserved specimen and multimedia.

Syllabus

Detailed study of anatomy of outer, middle inner ear and central auditory pathway.

External ear

Suggested activity: Observation and group discussion

The students have previous knowledge about the structure of external ear.

After recalling the previous knowledge by asking questions, the topic can be introduced using a model. Ask the students to observe the external ear directly or through a chart. Lead them to a discussion.

Points

- Parts of pinna
- External auditory meatus
- Bony part
- Cartilaginous part
- Ceruminous glands and their functions.

Consolidation

The teacher can consolidate the discussion points to get a clear idea about the structure of external ear.

Tympanic Membrane

Suggested activity: Discussion using chart and model

Points for discussion

- Position of tympanic membrane.
- Measurements
- Layers and surfaces of tympanic membrane
- Attachment of malleus.

Consolidation

The teacher can consolidate the discussion points at the end of class.

Middle Ear

Suggested activity: Group discussion using chart and model

After testing the previous knowledge, the teacher can demonstrate the chart and model and lead them to a group discussion.

Points

- Position and shape of middle ear cavity
- Contents of middle ear
- Boundaries of middle ear
- Function of middle ear

Eustachian tube

Activity: Discussion and demonstration of model and chart

Points

- Position of Eustachian tube
- Structure of Eustachian tube
- Function of Eustachian tube

Ear ossicle

Suggested activity: Demonstration, discussion, chart preparation

The teacher can ask the students questions to test their previous knowledge about ear ossicles

Using model and chart the teacher can demonstrate the structure of ear ossicles and then lead them to discussion.

Points

- Can you identify the position of ossicles?
- What about its size and shape?
- Can you explain its articulation and relation?
- What will be the function of ossicles?

Consolidation

Based on the above discussion the teacher can consolidate the concept of ear ossicles?

Middle ear muscles

Suggested activity: Discussion using chart

Points

- Name the muscles of middle ear.
- Attachment of muscles
- Function of muscles

Consolidation

From the above discussion points the teacher can consolidate the topic by giving additional information.

The internal Ear

Activity: Group discussion using models, chart, animal ODS

Divide the students in to five groups and ask them to recollect their previous knowledge about internal ear and present it using proper diagrams

Points

- Cochlea (snail shaped)
- Vestibule
- Semiurcular canal and their function

Using chart and multimedia , teacher can demonstrate the structure of internal ear. Lead them to a general discussion

Discussion points

- Bony labyrinth
- Membranous labyrinth
- Perilymph
- Endolymph

Consolidation

Through the above discussion the teacher can consolidate the position and the structure of internal ear

Membranous labyrinth

Cochlear

Activity: Demonstration and discussion

Using chart, model and animation teacher can demonstrate the structure of cochlea and lead them to a discussion

Points

- Scala tympani
- Scala media

- Scala vestibule
- Basillar membrane
- Reissner's membrane
- Cochlear nerve
- Spiral ganglion

Consolidation

From the above discussion and demonstration using chart and animation the teacher can consolidate the concept of cochlea

Organ of Corti

Activity: Demonstration using animation and chart

Discussion points

- Position of organ of Corti
- Basilar membrane
- Hair cells
- Tunnel of Corti
- Reissner's membrane
- Tectorial membrane
- Stria vascularis
- Function of organ of Corti

Consolidation

Based on the above discussion the teacher can consolidate the structure of organ of Corti

Vestibule and semicircular canal

Activity: Demonstration and discussion using chart

Discussion points

- Utricle
- Saccule

- Cristae and maculae
- Endo lymphatic sac
- Ampulla
- superior, posterior and lateral semicircular canals
- Function of vestibule and semicircular canal
- Vestibular nerve

Consolidation

Based on the above discussion points the teacher can consolidate the concept of vestibule and semicircular canal

Central Auditory pathway

Activity: Discussion using chart

Discussion points

- Auditory nerve
- Dorsal and ventral cochlear nuclei
- Superior olivary nuclei
- Nucleus of lateral lemniscus
- Inferior colliculus
- Medial geniculate body
- Auditory cortex
-

Note

Further activity

Ask the students to prepare a chart explaining the structure of external, middle and internal ear

- Prepare a model of ear using thermocol

PHYSIOLOGY OF HEARING

Introduction

Impaired hearing concentrates the mind wonderfully on ears, which otherwise we all take it for granted. Because the ability to hear well is accepted as normal. Ear perform its function of collecting, modifying, amplifying and analysing sound. This unit deals with the conduction and perception of sound in ear, physiology of balance, theories of hearing, binaural hearing effect and sound localization. Some knowledge of this mechanism is essential, however to understand the various form of hearing impairment.

Curriculum Objectives

- To understand the mechanism of hearing which enable the students to identify the types of hearing loss.
- To develop an idea about the physiology of balance by the vestibule and semicircular canal
- To develop an idea the theories related to hearing
- To understand the binaural hearing effect
- To understand the capacity of ear to locate the direction of a sound source

Syllabus

- Physiology of hearing

- Theory of hearing
- Physiology of balancing
- Binaural hearing effect, localisation.

Physiology of hearing

Mechanism of sound conduction:

a) *Conducting of apparatus:*

Activity: Discussion and demonstration

Brush up their previous knowledge about the topic and lead them to discussion

Points:

- Role of Pinna, auditory meatus, Tympanic membrane, ear ossicles.

Teacher can demonstrate chart and animated CDs related to the topic

Consolidation

From the above discussion and demonstration the teacher can consolidater the topic

b) *Sound perception*

Activity: Discussion and demonstration

Review the previous knowledge of students about the structure of internal ear and central auditory path way

Teacher can demonstrate the chart and animated CDs related to the topic

Discussion point

- Perceiving apparatus
- Function of organ of Corti
- Transmission of impulse across auditory nerve
- Transduction of mechanical energy to electrical energy

Consolidation

Teacher can consolidate the topic by highlighting the discussion points

Theories of hearing

Activity: Discussion and demonstration of chart

Point

- Place theory
- Telephone theory
- Volley theory
- Travelling wave theory

Consolidation

Teacher can consolidate the discussion points by adding additional information

Physiology of balancing

Activity: Demonstration using animates CDS

Brush up the previous knowledge of students about the structure vestibule system

Discussion point

- Labyrinth and other proprioceptors of body.
- Movement of endolymph.
- Information from visual, auditory and somatosensory systems.

Consolidation

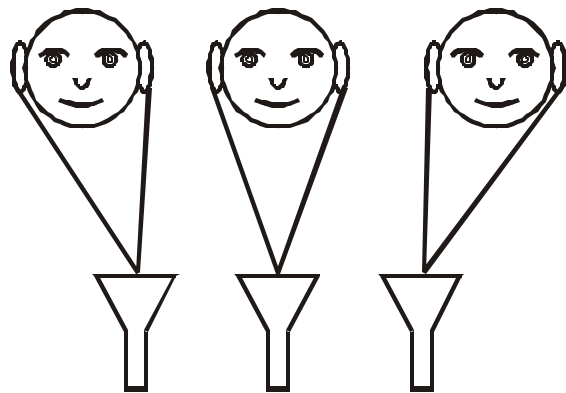
Collect the responds of students and teacher can consolidate the topic by adding additional information

Sound localisation

Activity: Discussion and demonstration

Teacher can introduce a story to explain this topic that is, Ramayana gives a picturesque description of an incidents of utter accurate sound localisation by the king Dashratha, father of Lord Rama leading to accidental killing of the son of a blind holy man.

Then teacher can demonstrate this diagram



Points

- Ask the students to listen and locate the sound source from three direction that is right, left and central position.
- How can you locate the direction of sound source accurately.

Consolidation

By collecting responds from students teacher can consolidate the topic by adding additional information

Binaural hearing effect

Activity: Assignment

Ask the student to prepare an assignment on binaural hearing effect with the help of teacher and proper reference material.

UNIT PLAN

3- Physiology of Hearing

Objectives	Concepts/Ideas	Process skills	Activity	Materials	Evaluation
<ul style="list-style-type: none"> To understand mechanisms of sound conduction 	Conduction of sound through external ear of middle ear	Communication Observation	Discussion Demonstration with chart, animation	References Chart CDS	Participation in discussion CT,OT
<ul style="list-style-type: none"> To understand the mechanism of sound perception 	Sound perception in internal ear	Communication Comparison Observation	Discussion demonstration using chart, CD	References chart, animated CDS	Participation in discussion CT,OT
<ul style="list-style-type: none"> To develop an idea about the theories relate to hearing 	Place theory Telephone theory Volly theory Travelling wave theory	Communication Comparison	Discussion	References, internet	Participation in disc ussion CT,OT
<ul style="list-style-type: none"> To understand the physiology of balancing 	Maintenance of equilibrium by labrynth and other proprioceptors	Communication Observation	Discussion Demonstration using animated CDs Chart preparation	Chart Rference CDS	Participation in discussion Response to Questions
<ul style="list-style-type: none"> To understand the sound localisation 	Identifiation of the direction of sound source	Communication Observation	Discussion demostration	Reference Chart	Participation in discussion, Response to question
<ul style="list-style-type: none"> To develop an idea about binaural hearing efcfect 	Mononaural hearing effect binarral hearing effect	Communication Observation	Discussion Assignment	Reference	Participation in discussion CT, OT

STUDY OF HEARING LOSS

Introduction

Any person trying to help a person with impaired hearing must have accurate information about the type of loss and how it has arisen. This unit deals with the different type of hearing impairment and some of the most common causes. The aim of this unit is to develop an idea about the defect in the auditory organs leading to hearing loss. This will help the students in the assessment of hearing loss.

Curriculum Objectives

- To develop an idea about hearing loss, type and classification of hearing loss.
- To understanding the causes of hearing loss.

Syllabus

- Type – conductive, mixed, sensory neural, congenital, acquired, prilingual, post lingual, functional hearing loss.
- Degree of hearing loss.
- Causes.
- Case history evaluation of deaf people.

Deafness

Activity: Discussion

Points

- Have you interacted with person having hearing loss?

- Can you identify a person with hearing loss?
- How will you communicate with them?
- What is deafness'?

Consolidation

Through the discussion the teacher can explain the term 'deafness'

Classification of deafness based on the area affected

Activity: Discussion

Brush up their previous knowledge about anatomy and physiology of ear.

Points

- Conductive deafness
- Sensory neural deafness
- Mixed deafness
- Psychogenesis deafness.

Consolidation

From the above discussion the main type of deafness can be consolidated. The teacher can supplement additional information.

Conductive Deafness

Suggested activity: Discussion and demonstration using chart

Ask the students to review their previous knowledge about the

conduction across the external and middle ear.

Discussion point

- How the sound is conducted across external and middle ear?
- What happens if there is a defect in the conducting apparatus?
- What are the possible causes, which affect the conduction of sound waves through external and middle ear?

Teacher can demonstrate a chart representing conductive deafness.

Consolidation

After collecting the responses of students teacher can consolidate the topic by adding additional information about the causes of conductive deafness.

Sensory Neural Deafness

Activity: Discussion and demonstration using chart and assignment.

Collect the previous knowledge of students about sound perception and auditory path way.

Discussion points

- How is sound perceived?
- What happens if there is any damage in the sensory neural pathway?
- What are the possible causes which may affect the inner ear leading to sensory neural deafness?

Teacher can demonstrate a chart showing sensory neural deafness.

Ask the students to prepare an assignment on the causes of sensory neural deafness with the help of teacher and proper reference material.

Consolidation

Through the above mentioned activities teacher can consolidate the topic.

Mixed deafness

Activity: Seminar

Ask the students to prepare a seminar paper on this topic with the help of proper reference material.

Psychogenesis deafness

Activity: Assignment

Instruct the students to prepare an assignment on psychogenic deafness using proper reference material and with the help of a teacher.

Classification based on the degree of deafness.

Activity: Discussion

Points

- Mild deafness.
- Moderate deafness.
- Severe deafness.
- Profound deafness.
- Total deafness.

Consolidation

Based on the discussion points teacher can consolidate the degree of deafness.

Prelingual and Post lingual deafness.

Activity: Discussion.

Points

- Deafness acquired before developing spoken language.
- Deafness acquired after developing spoken language.

Consolidation

Teacher can consolidate this topic through discussion points.

Note:

Further Activities

- Ask the students to visit a deaf school and collect data relating to the types of deafness and causes of deafness.
- Collect data relating to diseases which may affect the hearing.
- Prepare a chart explaining the classification and causes of deafness.
- Prepare an assignment on occupational deafness.

UNIT PLAN

4 Study of Hearing Loss

Objectives	Concepts/Ideas	Process skills	Activity	Materials	Evaluation
<ul style="list-style-type: none"> To introduce the term 'deafness' 	Loss of auditory function	Communication Comparison	Discussion	Library books	Response to questions CT
<ul style="list-style-type: none"> To understand the classification of deafness based on the area affected 	Conductive deafness sensoryneural deafness Mixed deafness Psychogenic deafness	Communication Comparison	Discussion	Chart reference book	Response to question Participation in discussion
<ul style="list-style-type: none"> To create an idea about conductive deafness and its causes 	Defect in sound conduction causes in different parts of external and middle ear.	Communication Differentiation	Discussion	References Chart Multimedia	Participation in discussion Responds to question CT.
<ul style="list-style-type: none"> To develop an idea about sensoryneural deafness and its causes 	Defect in the perception of sound which affects cochlea and auditory path way with their causes	Communication Comparison	Discussion Assignment	Reference Chart Animated CDs	Participation in discussion Preparation of assignment CT,OT
<ul style="list-style-type: none"> To understand mixed deafness and its causes 	Defect in both conductive and perceptive part	Communication Presentation	Seminar	Reference IT,Chart	Participation of seminar
<ul style="list-style-type: none"> To develop an idea about psychogenic deafness 	deafness without organic causes	Observation Comparison Communication	Assignment	References	Preparation of assignment, CT,OT
<ul style="list-style-type: none"> To understand the classification of deafness bases on severity 	Mild Moderate Severe Profound Total	Communication Comparison	Discussion	Chart References Internet	Participation in discussion, Response to question

Objectives	Concepts/Ideas	Process skills	Activity	Materials	Evaluation
<ul style="list-style-type: none">To understand prelingual and post lingual deafness	Deafness acquired before developing spoken languages Deafness acquired after developing spoken languages	Communication Comparison	Discussion	References Internet	Participation in discussion, CT,OT

5

INTRODUCTION OF AUDIOMETRY

Introduction

Audiometry is an important investigations for auditory dysfunction It not only gives us an idea about the handicap and degree of deafness that the patient is having but it is in also a valuable method in diagnosing an ear diseases This unit deal with the study of different types and parts of audio meters and their calibration

Curriculum Objectives

- To develop an idea about the different types of audiometer available for various audiological evaluation
- To understand the different parts of audiometers and its function
- To develop an idea about the biological check and subjective calibration of audiometers

Syllabus

- Types and parts of an audiometer, biological check of Audiometer and subjective calibration.

Type of audiometers

Suggested activity: Group discussion and demonstration

Point for discussion

- Audiometer
- Audiometry

- Pure tone audiometry
- Speech audiometry

Parts of audiometer

Suggested activity: Demonstration and discussion

Demonstration:

The teacher can demonstrate the important parts of a pure tone and speech audiometer using a scrapped machine.

Further activity:

Identifying different parts of audiometer with the help of different charts. Familiarising with its different parts.

Calibration of Audiometers

Suggested activity: General discussion

Points

- Why calibrate
- Calibration
- Parameters of calibration
- Basic calibration equipments
- Checking the calibration of pure tone audiometers.

Consolidation:

Based on the above discussion the teacher can consolidate the topic of calibration.

6

ROOM ACOUSTICS

Introduction

Room in which audiometric tests are to be conducted must be reasonably quiet. Testing must be disturbed neither by sound create with in the room nor by intruding from the outside. This unit deals with the study of importance and characters of sound proof in an audiology laboratory

Curriculum Objectives

- To develop an idea about the importance of sound proof rooms used for the routine audiometric procedure

Syllabus

- Room acoustics

Room Acoustics

Suggested activity: General discussion

Points

- Need for sound proof rooms
- Properties
- Reverberation
- Sound treated rooms

Consolidation

By highlighting the above discussion points the teacher can consolidate this topic.



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- 1 Martin F.N (1991) Introduction to audiology. IVED. New Jersey
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- 2 http://depts.washington.edu/learn_cpr/quick.epr.html
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- 5 www.rneens.com
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- 7 www.nobelprice.org
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AUDIOMETRY

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- 2 http://www.bbc.co.uk/science/human_body/body/fact_files/balance/balance_an_f5.swf
- 3 <http://www.med.vwo.ca/physiology/courses/sensesweb>
- 4 <http://www.med.vwo.ca/physiology/courses/sensesweb/L9Auditory/L9Auditory.swf>
- 5 <http://www.med.vwo.ca/physiology/courses/sensesweb/L10balance.swf>
- 6 <http://www.blackwellpublishing.com/matthews/haircell.html>
- 7 http://www.hhmi.org/biointeractive/animations/cochlea/coc_mov2.htm
- 8 http://www.wisc-online.com/objects/index_tj.asp2objid=AP1502
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- 10 http://www.physics_of_sound.com/
- 12 http://highered.mcgraw-hill.com/sites/0072437316/student_view0/chapter46/animations.html

SAMPLE QUESTIONS

1 Complete the table using suitable terms.

Form of energy	Converted form	Type of transducer
Temperature	Electrical	Thermo electric transducer
.....	Electric	Piezoelectric transducer
Light	Electric
Mechanical	Inductive transducer

2 Link column A the appropriate item from B & C

A	B	C
Sound waves	Thoracic cage	Middle ear
Flat bone	Puretones	Endocardium
Nasropharynx	Myocardium	Sternum
Visceral layers	Longitudinal waves	Head phone.
Audiometry	Eustachian tube	compression, rarefaction

3 Choose the correct pair

- | | | |
|--------------------|---------------------|--|
| A Rib | 1 Ultrasound | |
| B Brain | 2 Tidal volume | |
| C Echocardiography | 3 Intercostal space | |
| D Lung | 4 Craneal nerve | |
-
- | | | |
|--------------------|--------------------|--------------------|
| a) ABCD
4 1 2 3 | b) ABCD
3 4 1 2 | c) ABCD
1 2 3 4 |
|--------------------|--------------------|--------------------|

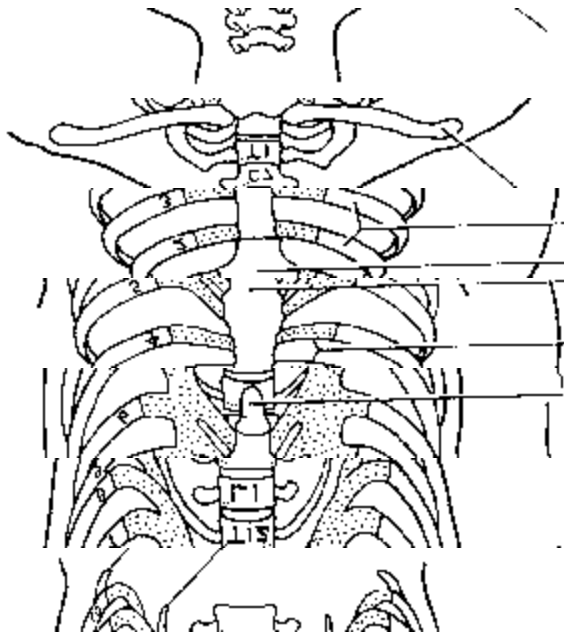
4 Find the odd one out and state the reason.

- | | | | |
|----------------------|----------------------------|--------------------------|--------------------------|
| a) Calomel electrode | b) Adhesive type electrode | c) Suction cup electrode | d) Metal plate electrode |
| a) Sternum | b) Lumbar Vertebrae | c) Inercostal space | d) Ribs |
| a) Supirior venacava | b) Inferior venacava | c) Pulmonary vein | d) Aorta |

- 5 Astronauts while in space can communicate only through a radio. Why?
- 6 Comment on the impulse conduction across heart.
- 7 The old people find it difficult to hear when others speak. Why?
- 8 Applications of ultrasound in medical field.
- 9 The people may experience discomfort in ear while travelling in air craft. Why?
- 10 Classify the transducers listed below based on its working principle. Give its application.
 - Strain gage
 - Thermocouple
 - LVDT
 - Quartz pressure sensors
 - Capacitive transducers
 - Thermistor
 - Photocell

11 What are the factors required for the sensation of hearing?

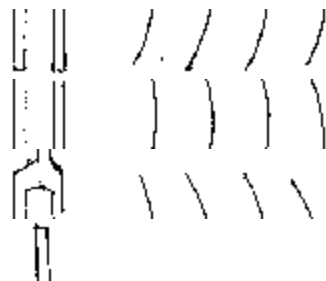
12



Observe the above diagram and write the name of the bones with their relation.

13 Sketch from memory the auditory pathways arising from the cochlea. Label the different way stations.

14

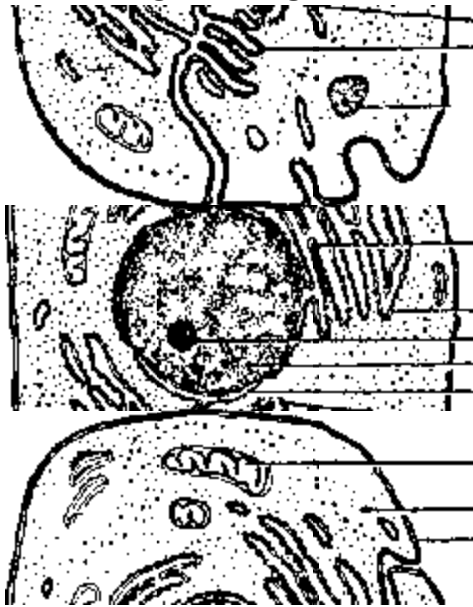


Observe the figure and explain its propagation through air.

15 State whether true or false with justification.

- a Active transducers convert one form of energy to another with the help of an excitation voltage.
- b Differential amplifiers are the type of amplifiers used in ECG recorders.
- c The second rib is attached to manubrium of sternum and form the sternal angle.
- d Atrial depolarisation is indicated on the QRS complex of ECG.

16 Label the given diagram

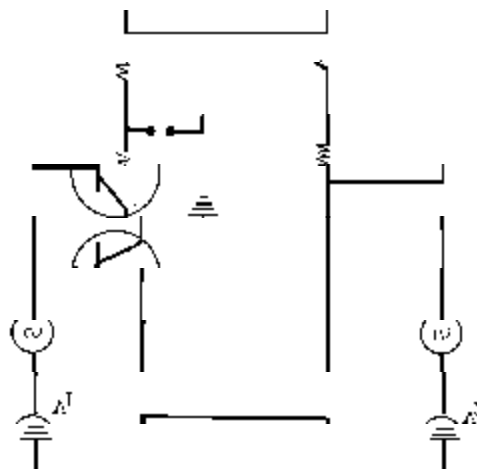


17 The red Indians of America used to hold their ear close to the ground to listen horse steps approaching from a distance. Why?

18 List out some of the possible causes of conductive hearing loss.

19 Comment on the action of ear ossicle in sound condition.

20 Complete the diagram.

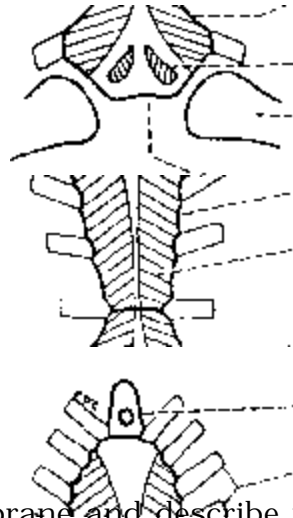


21 Draw the diagram of a ear ossicles with articulation.

22 Can you explain the role of ciliated columnar epithelium in respiratory tract.

23 Name the blood vessels which carry blood towards the heart.

24 Identify the following diagram and explain its articulations.

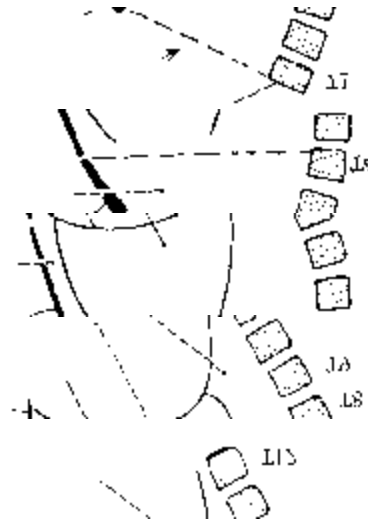


25 Draw the diagram of tympanic membrane and describe various causes of deafness in external ear.

26 Describe the structure and function of labyrinth with diagram?

27 A person come before you saying that he had hearing loss. What preliminary investigations will you do for that person before doing Audiometry.

28 Observe the given diagram and describe its divisions and boundaries?



29 List out the disorders of inner ear.

30 Explain the role of muscles in middle ear.