

**VOCATIONAL HIGHER SECONDARY
TEACHER'S SOURCEBOOK**

DENTAL TECHNOLOGY

Second Year



**GOVERNMENT OF KERALA
GENERAL EDUCATION DEPARTMENT**

STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING (SCERT)
Poojappura, Thiruvananthapuram

TEACHER'S SOURCEBOOK

VHSE - Dental Technology

Course Second Year

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Dear Teacher,

In this 21st century, it becomes imperative to make significant changes in the method of teaching and in the learning process as well as in the evaluation system for its successful implementation. In Kerala the learner centered, activity based and process oriented education system was introduced to the VHSE during the last academic year.

The design and content of this source book will facilitate the learning activity and will provide basic information required in Dental Technology. The vision, knowledge and experiences of teacher should be used for proper application of source book.

More over I earnestly request the teaching community to forward their comments and suggestions if any for improving this book

With regards

Dr E Valsala Kumar

*Director
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CONTENTS

Part - I

- 1 General approach
- 2 Subject approach
- 3 Learning strategies
- 4 Curriculum objectives
- 5 Syllabus
- 6 Planning
- 7 Evaluation

Part – II

- 1 Unit 1 - Dental Mechanics
- 2 Unit 2 - Dental Materials
- 3 Unit 3 - Dental Metallurgy
- 4 Unit 4 - Hospital / Clinic Visit

Part - 1

Significance of vocational education

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 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 utilize 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 need for meaningful linkages between the world of work and world of education is well recognized. The essence of the recommendations made by various commissions and committees is that the vocationalisation should be the main feature of the future system of education at the higher secondary stage, it can be extended to school level also.

Vocational education is system of education which intends to prepare students for identified occupations, spanning several areas of activities.

The Vocational Higher Secondary course 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 unemployment. This education system, which ensures a job along with higher education stands aloof from other systems of education.

This education imparts the life skills required by the youth to enter the world of work and assuming the responsibilities of adulthood. As per the expert meeting report (2001) of UNESCO, the life skills are grouped under 4 categories. They are

1. skills for personal fulfillment
2. skills for living in society

3. skills for dealing with changing economics
4. skills for dealing with changing work patterns.

Vocational Education ensures fulfilment of manpower requirement or national development and for social security for the citizens through self-employment. It also helps to reduce the migration of rural youth to urban areas and thus helps in rural development.

The learners of Vocational Education get an opportunity to avail one year apprenticeship training in industries to improve their practical skill. During the course of study, on the job training (OJT) for 10 days in a year is arranged to improve the skill and efficiency of the learner. This education system motivates the attitude towards self –employment through Production Cum Service Training Centres. (PSTC)

Objectives of Vocational Education

The National policy on education has accorded very high priority to the programme of vocationalisation of education, considering the following objectives.

1. To fulfil national goals of development and the removal of unemployment and poverty.
2. To impart education relevant to increased production and productivity, economic development and individual prosperity.
3. To make available skilled work force at all levels to alleviate the rural unemployment and for the development of nation.
4. To develop environmental awareness to ensure sustainable development.
5. To develop vocational aptitude, work culture, values and attitudes of the learners so as to enrich the productivity of the nation.
6. To develop entrepreneurial competencies and skills of learners for self reliance and to undertake gainful self employment.
7. To facilitate the expansion of higher education and explore future opportunities through innovative guidance and programmes.
8. To develop vocational competencies, creative thinking in the related areas and facilitate training.
9. To create awareness on mental, physical and social health.
10. To acquire awareness about different job areas and to provide backgrounds for acquiring higher level training in subjects concerned.

LEARNING

Learning is construction of knowledge through a continuous mental process. It is an advancement through adding and correcting in the light of comparing the new issue with the previously learned concepts. It is an intellectual process rather than the mere memorisation of facts. It is a conglomeration of a variety of activities like problem solving, finding out co-relations, prediction, arriving at conclusions, rational as well as critical thinking, finding 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 conscious programme of action to develop nationality, humanness and love against the encroachment of sectarianism of caste and religion. The learner should become cognisant of the implications of privatisation, liberalisation, globalisation etc.

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 is 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 recognized 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 existential, intrapersonal and interpersonal intelligence.

The basis of new approaches on curriculum and teaching- learning process are derived from the developments tookplace 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 that they have

- Great curiosity
- Good imagination
- Numerous other qualities and interests
- Independent individuality
- Interest in free thinking and working in a fearless atmosphere.
- 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.

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 analyze the collected ideas and proofs and come to a conclusion is called *process skills*. Some important ***process skills*** are

- To observe
- To collect data and record
- To classify
- To measure and prepare charts
- To experiment
- To predict
- To recognize and control the variables

- To raise questions
- To generalize
- To form a hypothesis and check.
- To conclude
- To communicate
- To predict and infer
- To use tools.

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

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

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 branch 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 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 concepts.

Learning is a live mental process. Rather than the ability for memorization of facts cognitive process has to be given emphasis. The process of problem analysis, elucidation, critical thinking, rational thinking, finding out correlation, 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 the learner regarding the learning process.

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

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

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 cautious 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 there 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, peers and elders. Even though some of them can fulfill the learning activity by themselves there is the possibility of a higher excellence. If appropriate help is provided 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 - An active mental process

Learning being a cognitive process, the teacher needs to know cognitive processes to facilitate the creation of learning opportunities. Learning can be made effective by providing learning experiences involving mental processes like

- Retrieves/recollects/retells information
- Readily makes connections to new information based on past experiences and formulates initial ideas /concepts.
- Detects similarities and differences
- Classifies/categorises/organises information approximately.
- Translates/transfers knowledge or understanding and applies them in a new situation.
- Establishes cause-effect relationships
- Makes connections/relates prior knowledge to new information/applies reasoning and draw inferences
- Communicates knowledge/understanding through different media.

- Imagines/fantasies/designs/predicts based on received information
- Judges /appraises/evaluates the merits or demerits of an idea/develops own solutions to a problem.

9. Intrinsic Motivation

Intrinsic motivation is given more importance than extrinsic motivation. The teacher has to arouse the internal motivation of the learner. A person internally motivated alone can immerse in learning and own its responsibility.

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 documents 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 to effective 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, explaining things, sequential and arithmetical calculations etc. are capable of developing this area of intelligence.

3. Visual/spatial Intelligence

In those who are able to visualize 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 hear and enjoy songs.

Playing musical instruments, imitating 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 or 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.

EMOTIONAL QUOTIENT

The concept of emotional intelligence put forward by Daniel Golman is 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.
- Imagining 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 solution 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 : skills required for-success in life.

- Self awareness
- Empathy
- Inter personal relations
- Communication
- Critical thinking
- Creative thinking
- Decision making
- Problem solving
- Coping with emotion
- Coping 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.

Role of a Teacher

In the earlier approach the teacher was mainly depending on the lecture method for teaching. But in the new method of education the student centered approach is given more importance than the teacher centered approach. Under this changed **scenario** the teacher has to perform the following roles in the classroom.

The teacher should be

- A facilitator of learning
- A guide to the overall development of the student
- A good observer and motivator
- Able to consider the activities, needs, special features and age group of students at higher secondary level.
- Able to understand the limitations of learner and their learning problems.
- An instructional material developer
- A good communicator
- An innovator
- Able to raise leadership qualities and self confidence of the learner
- An authoritarian in the concerned subject
- Able to arrest and sustain the attention of the learner
- Able to bring out and encourage the inborn talents.
- A resource manager to ensure the optimum utilisation of resources.
- A systematic record keeper
- A controller to issue guidance to the students
- A person with high level of practical competency
- Able to correlate area of study with familiar environmental situations
- A self evaluator and good listener
- Able to create awareness in social problems
- A person with democratic and humanitarian approach
- A professionalist as well as philosopher
- A good evaluator

- A good organisor and a friend.
- A co-learner as well as co-researcher
- Able to give assistance and advice in placement needs and self employment by giving moral and technical support
- Able to keep moral values
- A person equipped with skill for using new techniques of learning
- Optimistic and impartial

Child friendly Class Room Atmosphere

Learning can be effective and enjoyable only when the class atmosphere is according to the new conception of learning and the characteristics of higher secondary teacher.

- Class and seating are arranged in an attractive way
- Democratic nature is upheld
- Always active
- Students interact with teachers without fear
- Opportunity for a variety of activities
- Students allowed to involve interesting group activities
- Learning speed, learning style and different levels of attitudes are considered. Help is extended whenever needed.
- Sufficient instructional materials are available
- There is freedom of expression, students share their ideas and experiences
- Students are given acceptance and encouragement
- Healthy atmosphere
- Needs of each student is given consideration. Happy and energetic atmosphere
- Teachers work considering the rights of students
- Problems handled in a patient way
- Teachers look at all events from the students view point

There will be students of various ability levels in any class because learning style, learning speed, varying exposure to language experiences, physical and psychological problems and varying socio-cultural background.

The learning experiences provided must help to bring the low activities to an expected level and extended the breadth and depth of the skills of the high activities.

By repeating experiences, introducing variations in a learning experience to suit different levels and if needed, formulating additional experiences the problem of varying ability levels can be tackled.

Role of Learner

The learner in second year has undergone a learner centered and process oriented learning experience up to first year. The learner at this age is in awakening stage and he is enthusiastic about environment. He needs recognition and encouragement from environment and also recognise as a grown up man. He is adequately competent to select vocational subjects according to his aptitude and interact and to acquire higher education and profession as he wishes. The aspirations about future life is framed in this particular age for seeing national and international job opportunities. Some of the peculiarities of learner at this stage are

- Physical, intellectual and emotional plans have intensive changes during the 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
- Imaging for social recognition

Needs of Learner

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

Role of learner

- Active participant in the learning process
- Act as a researcher
- Sharer of information
- Sharer of responsibilities

- Collect information
- Takes leadership
- Involves in group work
- Act as a co-participant
- Observes his environment
- Experiments and realises
- Make interpretations and draw inferences
- Mould himself in to an active contributor for the welfare of the society

Evaluation

In vocational higher secondary education, a new approach to education and evaluation should be made. Evaluation must be a systematic and continuous process. As the curriculum is based on vocational stream, capacity building is a most important part and it should be evaluated accordingly. The technical skills, interest in the particular field, communication skill, analysis organizing and presentation skills etc have to be evaluated. The personal and social qualities also have to be evaluated. Therefore, evaluation should be transparent, continuous and comprehensive.

Supporting System

In learner centered vocational education, a learning methodology has to be organised and a proper learning atmosphere is to be provided. Many organizations can support the learning activity. They are:-

1. School Resource Group (SRG)

Comprising all teachers (vocational and non vocational) instructors, and lab assistants with academic head as the group leader.

2. School Support Group (SSG)

Comprising PTA president, members of local bodies, members of social clubs, subject experts etc who can contribute guidance /technology /infrastructure /financial assistance etc.

3. Parent Teacher Association (PTA)

Can provide adequate funds for field trips, production cum training centers (PCTC), exhibition, On the Job training (OJT) etc.

4. Local bodies

Grama Panchayat, District Panchayat and Block Panchayat can provide infrastructure ie, class rooms, laboratory, library, seminar hall, audiovisual equipments etc.

5. Subject club

All vocational teachers handling same vocational subjects should form a subject club at regional level or district level. This will help to share the knowledge and practical facilities, production and marketing of materials, services etc.

6.

Based on excellency, district wise nodal schools may be selected to provide facilities like central library, museums, video conferencing etc.

7. Institution Industry Interaction Project (III P)

This should be implemented in every institution to update knowledge this also helps for OJT , PCTC and field visit.

Monitoring system

Education is a sort of journey from darkness to light satisfying the needs and the wants of the individual and the society. The modernization of education through activity oriented system enhances free thinking and working in a fearless atmosphere. It is a qualitative process not a quantitative one. This necessitates a proper monitoring system. The system of monitoring should have the following features.

- It must be transparent.
- It must enrich the ideas of the facilitator through innovative process.
- It must be time bound and rational.
- It must motivate the facilitator to adopt new strategies.
- It must be recordable and ensure effective feedback for the effective monitoring of the system, three levels of the mechanism should be set up.
 1. School level monitoring group.
 2. Regional level monitoring group.
 3. State level monitoring group

Moreover a social auditing system is advisable to achieve the objective effectively.

FEATURES OF LEARNING PROCESS IN THE NEW SYSTEM OF EDUCATION

In the new system of education the learning process should be modified in such a way as to enable the learner to construct the knowledge of his own through observation, co-operation, problem solving, social interaction etc. The learning process should consider

the nature ability, social setup, inborn talents and subject selected by the learner. Therefore the learning process should be:

- A continuous mental process
- Simple learner must feel that he is able to undertake the task
- Enable the learner to attain the curriculum objective
- Interesting
- Suitable to the age and attitude of the learner
- Future possibilities
- Enable group activity
- Challenging
- Time bound
- Constructive and curiosity developing
- Possibilities for evaluation
- Capacity to generate independent thinking
- Ability to enquire discover and establish cause effect relationship between phenomena.

Learning Aids

To make the teaching and learning process simple and effective , certain learning aids and necessary use of such aids for transacting a complex idea make the class room live and students get more and more involved. The advances in science and technology may be effectively utilised for this purpose. Some of the learning aids listed below.

- Multimedia
- Over Head Projector
- Computer
- Internet
- Liquid Crystal display Projector
- TV, VCD, DVD and tape recorders
- Working models
- Charts
- Slides
- Video Conferencing facility

- Library
- Text book
- Source book

Society

The new educational policy uplifts the social commitment of the learner. Therefore the society can also give some valuable contributions in this changing situation. The new system also ensures that the learner can perform certain useful services for the betterment of society. The social obligations can be illustrated as follows.

- To enrich social values, aptitude and ability in learner
- To develop entrepreneurial aptitude and ability which helps social welfare and self employment
- New system of education adopts OJT, PSTC etc is a part of vocational curriculum which helps to make close contact with the society.
- The resources available from our society can be positively utilised to convene seminars, interview etc.
- Social organisations can help learners to make their education socially committed.
- The social clubs like NSS, Tourism Club, Eco Club, Energy Club etc functioning in schools can make direct link with the society.

Subject Associated Approach Paper

Introduction

Dental Technology is one of the practical courses in vocational higher secondary education system. This ensures the learner a job to work as a dental technician along with higher education.

Dentistry has a tremendous growth now a days and the role of a dental technician is very much important and very much equivalent to dental surgeons. The main part of learning activity should be hands on training programmer, discussions practical, study models, clinic visit and training and not merely mugging up of notes and attending theory exams. The curriculum includes mainly techniques of fabrication of cast restorations and orthodontic appliances. In dentistry lot of materials have been used for different purposes. This includes gypsum products, dental alloys, impression materials die materials etc.

LEARNING STRATEGIES

In the modern era of globalization the introduction of new technologies ensure only the survival of the fittest. So it becomes a necessity to equip the leanness to face the growing challenges in the competitive world. Hence the traditional approach to learning is no more relevant in the present context. The teacher should use instructional techniques that motivate the students to construct his own knowledge. Now the learners are not passive listeners, but they are the active participants in the construction of knowledge. Here the teacher – student interaction should be given much importance.

In the new instructional strategy while selecting the methods of teaching, the social and psychological aspects of the learner is to be taken into consideration. The given activities for learning are only suggested ones. It can be altered according to the discretion of the teacher.

To obtain the objectives, the new system of education is introduced in the Vocational Higher Secondary Education for attaining the objectives of the courses in this system, we can adopt the following strategies.

I. Assignment

Assignment is some specific work assigned to the students as a part of their academic enrichment. There are learning activities undertaken as a continuation of class room activities to realize the curriculum objectives to a broader extent . They should be completed in time bound manner. They help to lead learner to higher level of learning from the present status. Challenging assignment can motivate the students to involve in group dynamics and achieve fruitful results. The teachers may act as a guide.

Assignment may be given on individuals or group basis. Assignment includes preparation of notes, preparation of charts, models, collection of materials from institutions etc. Assignments develop skills of reference, observation, enquiry reporting etc. It ensures the effective utilization of leisure time of the students.

II. Seminar

Seminar is a learning strategy involving an in-depth analysis of specific topic, preparation of a paper and presentation . The paper is presented by either one student or a group of students. After the presentation, there will be a discussion/ interaction in which all the students can participate . The students get an opportunity to clear their doubts and make clarification. Seminar helps to develop communication skill and overcome stage fright.

Stages

1. *Selection of Topic:* The topic of seminar should be relevant to the subject of study
2. *Assignment of topic to individual student or team:* The topic may be assigned to one student on sub topics may be given to a group of students.
3. *Collection of relevant information:* Information required for seminar can be collected from various sources namely books, magazines, internet, institutions, place and persons.
4. *Preparation of draft paper:* Based on the information collected the student may prepare a draft paper and submit it to the teachers for comments. Revise the draft paper based on the comments of the teachers. The required draft is submitted for approval.
5. *Program scheduling:* The date, time and venue of the seminar is fixed. A seminar leader may be selected from the students
6. *Seminar paper presentation:* The student/ students shall present the paper in the seminar. The teacher may function as the moderator during the initial stages.
7. *Discussion / Interaction:* A number of respondents from the students make comments on the topic. This will be followed by a general discussion. All the group members should actively participate in discussion.
8. *Summing up deliberation:* The moderator sums up the deliberation
9. *Evaluation / Feed back:* Both teachers and students evaluate the programme.
10. *Preparation of final report:* A final seminar report is prepared covering all the additional points discussed and consolidated.

III. Panel Discussion

It is a learning strategy in which a panel of experts are allowed to discuss a specific subject under the control and direction of a moderator. Subjects can be divided according to the number of panel members. Number of panel members are fixed according to subdivision of points in the subject. Relevant materials and handout may be given in advance to the learners. The monitor or moderator introduces the subject of discussion and invites a panel member to start the discussion. Each panel member is invited for discussion afterwards. After briefing by the panel members the questions are raised from the audience and the panel members give suitable answer to them. A report should be submitted by each learner to the moderator.

IV. Project

Project is a self-learning strategy which can exert great influence on the overall development of the learner. Project as a learning strategy is to be selected where a problem arises in any part of the curriculum. The students may be divided into groups and assigned different aspects of the

problem. Each group works independently .Specific aspects of the problem such as data collection, classification, analysis, report preparation and presentation is to be undertaken by each of the members. Even though the work is divided among the members, it must be ensured that the execution of each and every activity is done with the active participation of all. After analysing data collected from different sources, the learner arrives at a conclusion that can help to solve the problem. Thereby learner learns the topic through his own activity. The other advantage of this learning activities is that it helps the learner to scientifically handle any problematic situation. It helps in the development of scientific thinking and thereby builds up the students aptitude for the subject.

Stages of the project

1. Selection of a topic

The project selected should be related to the curriculum and it should not be a project for project sake. The topic or problem should arise from the curriculum.

2. Planning of the Project

- (a) Hypothesising: Hypothesising means making assumptions based on the available primary information.
- (b) Methods and Technique : The methods and Technique should be based on the aim and hypotheses of the Project. The nature of the project, suitability of the tools, and the methods of learning should be related to each other.

3. Collection and Tabulation of Data

The data may be primary, secondary or tertiary. Either census or sampling method can be used based on the objective of the project. Suitable questionnaires are to be prepared for the collection of primary data.

The collected data is to be classified and tabulated so as to make it easily understandable.

4. Analysis of data and formulation of conclusion

By analysing the data, the reliability of the hypothesis can be examined. Preparation of graphs and diagrams and maps will positively help the analysis. The similarities, relations and differences gathered from the analysed information would tell whether the hypothesis should be accepted or rejected.

5. Preparation of Report

The cover page should have the title of the project, the period of study, name (s) of investigator/ group, and the address of the school. The report should be structured in the following order.

- 1. Title
- 2. Preface

3. Hypothesis and aim
4. Methodology
5. Sources of data
6. Analysis and conclusion
7. Suggestions (if any)
8. References
9. Appendices (Questionnaire, Observation schedule, check list Etc.)

6. Presentation of the Project

When the project is presented, the learner is being evaluated and accepted. It is through this presentation that ideas are shared with others in the class and society.

The project method promotes scientific self learning and makes him capable of solving the problem arising in real life situations.

V. 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 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 ideal to write down the topic of the debate and displayed in advance. There should also a person to control debate.

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

Stages of Debate

1. Topic Selection
2. Selection of panels keeping in balance with intelligence, gender etc.
3. Selection of moderator
4. Collection of information guided by the teacher
5. Conducting the debate under the control of moderator by avoiding any sort of personal conflicts
6. Conclusion by the moderator expressing his final version or verdict.

VI. Case Study

A case may be a person, institution or a community. Case study is an in-depth analysis of an actual event or situation. It presents real pictures of situation with facts, objective information or data. Learners analyses the case to interpret, predict and revolve issues associated with it. The case study provides the learner an opportunity to analyse and apply concepts, data and theory taught from the class. Learners can work individually or in groups.

By studying realistic cases in the classroom, students develop new insights into the solution of specific on – the – job problem and also acquire knowledge of the latest concepts and principles used in problem solving.

Case may be presented by the teacher or may be provided in print form.

A simple case study may have the following steps

- Collection of data
- Conversion of data into information
- Analysis of the case in groups
- Presentation of the finding by each group leader.
- Evaluation

In addition to the above mentioned learning strategy there are many other learning strategies which can be used in appropriate situations to enrich learning process such as problem solving, role play, brain storming, debate etc.

VII. Brain Storming

This is the best method for solving creative problems. It facilitates generation of ideas quickly. Rules for conducting Brain storming.

- No response is wrong. So welcome every response.
- Welcome as many responses as possible
- No criticism is allowed
- Allow to work on others idea

Steps in Brain storming

- Presentation of the problem
- Provide relevant information
- Record the ideas put forth by the participants
- Combine similar ideas

- Evaluate each idea / solution
- Selection of the best solution

If brainstorming is used as an instruction strategy, the last step is not essential

VIII. Discussion

Discussion is essential for the student to share new findings, ideas and conclusions at each stage of learning with fellow students and teachers. In general discussion the teachers should guide the discussion through questioning and summarising. The major steps involved are

1. Introduction initiated by the teacher
2. Development of discussion by giving lead points and follow up interactions
3. Transition stage in which the key points are reviewed by the teacher
4. Summarizing stage in which teacher provides additional support materials to ensure the achievement of the objectives

IX. Group Discussion

Group discussion is an ideal method to develop co-operation, democratic attitude, friendliness and compromising attitude which are the ultimate aims of education. During group discussion the teacher may observe each group and if needed help them to channel the discussion towards the common objectives. All students may be given opportunity to take part and express their ideas within a time limit. The conclusion reached may be entered by each student. A group representative must present this during consolidation in which the teacher may correct or add informations to ensure that all the relevant ideas have been covered

X. Collection

Collection is a continuous learning activity, which ensures complete participation of students. The collected item may be materials, pictures, charts, ideas, datas etc. Collection provides direct experience to learners. An exhibition of collected materials will help to strengthen the concept.

XI. Practical works

Experimentation contains the process skill in an integrated way. In the new approach of curriculum the student forms idea and comes to conclusion through process. The term 'Practical' when associated with a science subject usually means an experiment. The objective of doing an experiment is to explore new ideas through investigation only. Its main purpose is to verify some principles associated with theory. The relevance of practical in the traditional science subjects end here. But this is not the case with 'Vocational Practical'

The ultimate goal of a Vocational Education is to generate skill through continuous practice along with investigation and invention. Continuous practice transforms the unskilled to the skilled. This is the significance and importance of practical in the Vocational stream. Hence it is very crucial

that Vocational teachers as well as instructors should understand the importance of vocational practical and act accordingly.

XII. Quiz

Quiz programmes can be used as an interesting class room tool for transaction of curriculum objectives as well as to evaluate the effectiveness of transaction and achievement of learners.

For conducting a quiz programme a topic should be selected based on the above objective

The students are asked to prepare questions based on the topic individually. The next day / next hour the students are grouped into 3-4 groups randomly. A question is raised by a particular team and the other teams try to answer them. If they can answer the question they get points for that. If all other teams fail to answer the question raised by the 1st team the 1st team answer the question and explain the background if necessary. All the teams get equal number of chances to ask the question. Time limit is also prescribed for the conduction of the programme. The team who scores maximum points wins

All the participants can make notes on the questions asked answers and their explanations which help them in learning

XIII. Models

Models are used in learning process. It enhances the learning experience. This is based on ‘seeing is believing’. It helps the learner a chance to see and feel the model presented. Still models and working models help the students to understand the structure, working principles, actual operation etc.

Several steps are involved

1. Locating the problem
2. The teacher should plan the type of model according to co's
3. Grouping the students
4. Briefing the tasks
 - Aim
 - Need
 - Material required
 - Source of Materials
 - Cost of materials
 - Division of Labour
 - Guidance
 - Fixing of a time limit

5. Presentation by each group about
 - How the models were prepared
 - Details of
 - Expenses
 - Working and principles
 - Finally documentation of the process
6. Evaluation
 - By other groups

Later a consolidation by teachers are to be done.

XIV. Games

Class rooms can be made attractive by introducing different types of games. Games should be interesting as well as informative. Some of suitable games are

- Odd man out
- Cross word puzzles
- Match the following
- Aswamedham
- Link game – Answer using clues.

XV. Survey

This strategy involves collection of data from the group under study (books, persons, materials etc.) It develops the social interaction and communication ability of the learner. It also provides a scope for discovery learning.

Step involved in survey

- Objective of survey
- Selection of area for survey/sampling frame
- Selection of survey method
 - Direct method
 - With help of questionnaire/schedule
- Tabulation and analysis
- Consolidation and Presentation

XVI. Exhibition

It is a learning strategy by which the learner can get a chance to show the skill developed. It provides the intrinsic motivation and exposure.

Exhibition item can be conducted either individually or as a group task. It can be conducted at school / Regional/State/National level. Necessary publicity and other arrangements can be provided. Presentation, documentation, participation and innovative skills of the learner can be evaluated.

XVII. Interview

Interview is one of the important learning strategy taking the help of a resource person. Interview is an inner view. It provides opinion and information about a topic.

An interview is conducted by the following steps

- How to introduce a problem?
- Invite a resource person
- Decide the questions by learners
- Decide the time, place etc.
- How to discuss?
- How many students to participate?
- Implementation of the interview
- Conclusion (Facilitator)

Items required

- Interview Schedule
- List of questions prepared by learners, Selection of students, selected names, sequence of question

XVIII. Field Visit

Field visit is an inevitable vocational tool to be implemented in vocational Higher Secondary Education. This helps the students to familiarise with the modern technologies and new situation in a different atmosphere. It provides learning through viewing. It is based on the principle that seeing is better than having. It enables the learning to retain the learned information longer and to make the subject more interesting. It motivates and give more confidence in his/her particular vocation.

The facilitator should identify suitable centre/ institution/site. Get prior permission from the authorities before conducting the field visit. Give instructions to the learners for collection datas/

informations/materials/specimens. Teacher may assign different duties to learners by working them different groups.

Each learner should take utmost care and interest during the visit. He/She should observe and interact at the centre/ institution where the field visit is conducted

After the visit, learner should acquire the ability to apply the ideas/concepts in his future carrier. Each learner should submit a detailed report about the field visit.

XIX. Demonstration

Though demonstration we can present an item/product and emphasis its features very effectively.

Eg:- To understand the functioning of a computer

Requirement for conducting demonstration

- Materials/Items/Process
- Demonstrator (expert)
- Venue
- Additional requirements depending upon the nature of the item

Demonstration Process

- Introduction about the item/Material
- Principles – Working
- Operation
- Components
- Merits of the item

XX. Chart display

It is also one of the important teaching aid. It can be used in every activities of a learning process.

Chart display is a written or pictorial representation of idea or concept. It is abbreviate, brief and clear. It is prepared by students.

Benefits

- A learner gets clear idea about the concept
- The learner can retain the ideas in his mind for longer periods
- A complicated idea can be simplified through a chart
- Cheap method of teaching aid.

UNIT-1

Dental Mechanics

1. To involve the students in the fabrication of cast restoration through discussion and lab works
2. To understand the students the various casting defects that can occur during the casting procedure through discussion and lab work
3. To familiarize and understand the students the working principles of casting machines through demonstration, discussions and practical
4. To understand the students the term bio mechanics, through discussions, diagrams and seminars
5. To understand the students the fabrication of various removable orthodontic appliances through discussions, demonstration and lab work / practical work
6. To understand the students the fabrication of fixed orthodontic appliances through discussions, demonstrations and practical work
7. To know the technique of soldering and welding through discussion and practical work
8. To understand the students technique of spot welding through demonstration and practicals

UNIT-2

Dental Materials

- 1 To understand the students the composition properties, uses, advantages, disadvantages and manipulation of various materials used in dentistry through discussions, seminars and lab work

UNIT-3

Dental Metallurgy

- 1 To understand the students the general properties of metals used in dentistry through discussions and seminars
- 2 To familiarize the students the terms tarnish and corrosion through discussion sample collections

UNIT-4

Hospital / clinic visit

- 1 To familiarize the students both lab and clinical works in identify through Hospital visits, dental lab visit etc.
- 2 To understand the students the role of a dental technician in a Dental hospital or dental clinic by assisting dental surgeons in both clinical and lab works.

UNIT 1**Dental Mechanics (II) Theory**

- ❖ Casting procedure for dental alloy-cast restoration
- ❖ Preparation of die
- ❖ Wax pattern fabrication
- ❖ Spruce former
- ❖ Casting ring
- ❖ Investment material
- ❖ Wax elimination
- ❖ Heating and casting of dental alloys
- ❖ Casting mechanics
- ❖ Recovery of casting
- ❖ Pickling
- ❖ Polishing
- ❖ Casting defects
- ❖ Aims and objectives of orthodontic treatment
- ❖ Un favorable sequelae of malocclusion
- ❖ Classification of malocclusion
- ❖ Mechanical principles of orthodontic appliances
- ❖ Tooth movements
- ❖ Force tissue changes
- ❖ Anchorage and types of anchorage
- ❖ Various types of orthodontic appliances
 - Removable appliances
 - Fixed appliances
 - Semi fixed appliances
 - Functional appliances
- ❖ Advantages and disadvantages of removable orthodontic appliances

PRACTICALS

- ❖ Casting procedures of Dental alloys – Die preparation wax pattern fabrication, investing, casting and polishing of metal alloys
- ❖ Preparation of clasp, springs, arch wire for orthodontic appliances, retention appliances, activators

- ❖ Construction of fixed orthodontic appliances, bands, tutus
- ❖ Soldering and spot welding
- ❖ Types of panties in FPD should be carved in wax

UNIT 2-DENTAL MATERIALS

- ❖ Gypsum products
 - Classification
 - Uses
 - Composition
 - Properties
 - Advantages
 - Disadvantages and manipulation technique
- ❖ All the impression materials used in dentistry
 - Classification
 - Uses
 - Composition
 - Properties
 - Advantages
 - Disadvantages and
 - Manipulation technique
- ❖ Dental base resin
 - Uses
 - Composition
 - Properties
 - Advantages
 - Disadvantages and
 - Manipulation technique of heat cure resin and cold cure resin
- ❖ Dental ceramics / Dental porcelain
 - Types
 - Composition
 - Uses
 - Properties
 - Advantages
 - Disadvantages and
 - Manipulation

PRACTICALS

- ❖ Electrolytic deposition of copper by electrolysis of copper sulphate solution
- ❖ Heat treatment of alloys
- ❖ Casting of metal ceramic alloys and fabrication of metal ceramic crown

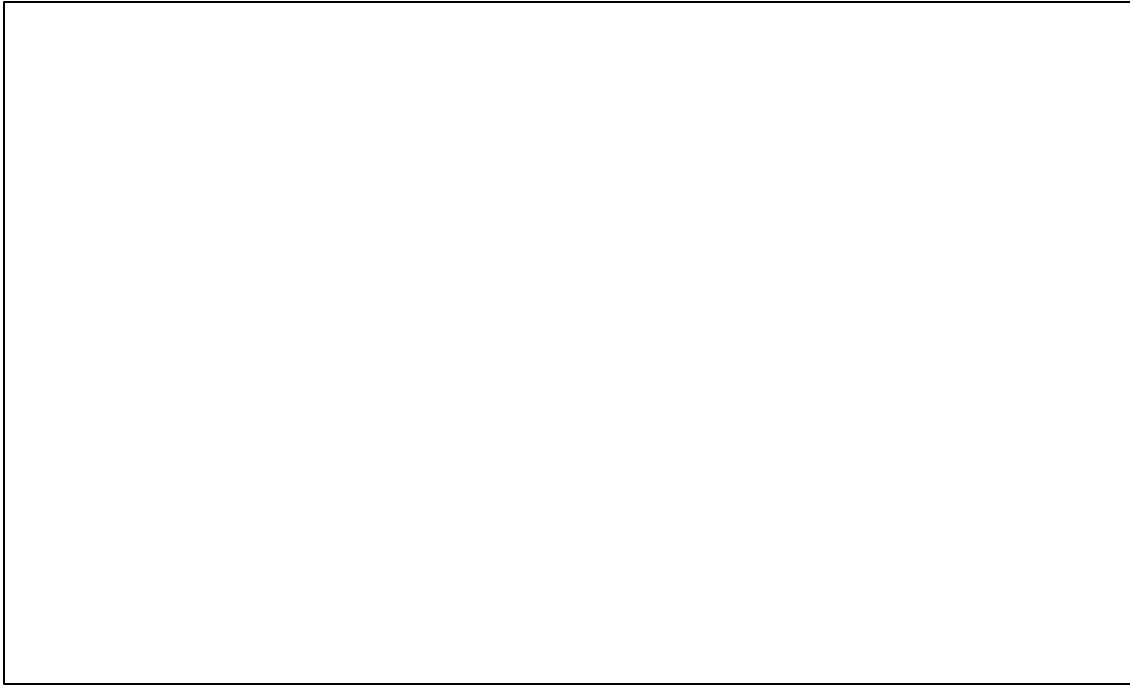
UNIT 3 - DENTAL METALLURGY

- ❖ General properties of metals
- ❖ Metals and metal alloys used in dentistry
- ❖ Heat treatments-softening and hardening heat treatments
- ❖ Tarnish and corrosion
- ❖ Electric deposition

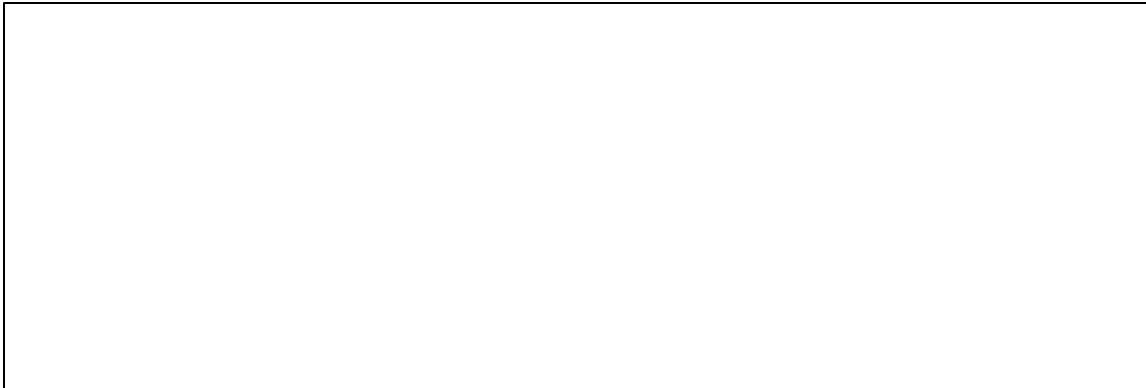
PRACTICAL

- ❖ Electrolytic deposition of metals
- ❖ Heat treatments of alloys
- ❖ Fabrication of metal ceramic crown

ANNUAL PLAN



UNIT PLAN



DAILY PLAN



Evaluation is a systematic process of collecting, analysing, synthesising and interpreting evidences of students' progress and achievements both in cognitive and non-cognitive areas of learning. Evaluation has to play significant role in making the learning process more effective. It provides diverse experience to the learners, keeping in view the skill to be attained continuously by them.

As the curriculum is based on a particular vocation the selected stream is the most important part and it should be evaluated accordingly. Technical skills, interest and devotion in the field, communication skills, organisational and presentation skills are to be evaluated. Evaluation of the personal and social qualities also should be done. So the evaluation should be continuous and comprehensive.

Terminal or Term End Evaluation (TE)

It is the written form of evaluation aimed at evaluating the facts, concepts and ideas gained by the learner. The test should not be aimed to evaluate the memory alone. Questions are framed in such a way that the learners are able to apply different mental process while answering. The Terminal Evaluation questions give more emphasis on application, analysis and synthesis level.

The maximum scores for TE is 80 and the minimum is 24 (30%). The questions should be formulated taking into consideration the time required to read, think, understand and write answers. These aspects should be considered while fixing the scores also. To avoid blind guessing, multiple choice and application level questions may be mixed. The total number of questions may vary from time to time. All the questions should be based on the curricular objectives. Open ended questions may be included. Choice questions, if included also should be based on the same curricular objectives.

Continuous and Comprehensive Evaluation (CCE)

Our traditional evaluation methods measure only the memory and recollection capacity of the learner. To eliminate/ overcome the limitation the evaluation should be done on multi dimensional ways by measuring multiple intellectual capacities of the learner. So it is better to evaluate the learner in a continuous and comprehensive manner. CCE helps the learner to understand and develop his own progress and to develop adequate strategies for further improvement.

Merits

- Assess the allround development of the learner on a continuous basis through a variety of activities.
- Effective feed back is possible
- Remedial diagnostic teaching is possible
- Process as well as products are assessed.

A series of learning activities are grouped into five major thrust areas as follows

Investigative activities

Activities which create a spirit of enquiry, investigation and a mind for research in the learner belong to this group.

For example.

- Study project
- Case study
- Field study

Interactive activities

Activities which improve the communication skill, activities of sharing ideas, etc.

For example

- Seminar
- Panel discussion
- Debate
- Group discussion

Assigned task

Activities assigned to the learners to enrich/ strengthen the concepts and ideas.

For example

- Assignment
- Collections

Performance task (Tests)

Activities related to the achievements of the learner.

For example

- Class test (oral/ written/ performance test)
- Quiz
- Open book examination
- Interview
- Group testing

Practical based activities

For example

- Preparation of working model
- Album
- Improvisation

From the above five group of activities, the teacher has the freedom to choose any four areas for evaluation purpose.

1. Investigative activity

a) Study Project

Sl.No.	Stages	Criteria	Score	Total Scores
1.	Planning	Relevance of the study, Identification of problem, Ability to select appropriate tools, ability to select suitable earing method.	4/3/2/1	
2.	Data collection	Ability to collect sufficient and relevant data. Ability to classify and arrange data for analysis. Reliability and authenticity of the data collected.	4/3/2/1	
3.	Analysis and inference	Ability to analyses the data, Systematic arrangements. Ability to draw inferences based on analysis. Ability to give suggestions based on inference.	4/3/2/1	
4.	Report Presentation	Ability to present in logical and sequential order, authenticity of report, time bound comparison.	4/3/2/1	
5.	Viva-Voice	Knowledge of content and process. Ability to analyse data. Ability to justify inference. Ability to explain strategies and methods adopted.	4/3/2/1	
			Total	20

2. Case Study

Sl.No	Criteria	Score	Total Scores
1.	Identifying the problem	4/3/2/1	
2.	Approach to the problem	4/3/2/1	
3.	Time bound Action	4/3/2/1	
4.	Analysis of the problem	4/3/2/1	
5.	Problem solving / Reporting	4/3/2/1	

3. Field study

Sl.No	Criteria	Score	Total Scores
1.	Attitude and readiness towards the task	4/3/2/1	
2.	Capacity for Observation	4/3/2/1	
3.	Data collection	4/3/2/1	
4.	Application of ideas	4/3/2/1	
5.	Documentation / Recording	4/3/2/1	

4. Assignment

Sl.No	Criteria	Score	Total Scores
1.	Awareness of the content	4/3/2/1	
2.	Comprehensiveness of the content	4/3/2/1	
3.	Systematic and sequential arrangement	4/3/2/1	
4.	Observation/suggestion/views/judgment/evaluation	4/3/2/1	
5.	Timely Submission	4/3/2/1	

5. Seminar

Sl.No	Criteria	Score	Total Score
1.	Planning and Organization	4/3/2/1	
2.	Collection of data / content	4/3/2/1	
3.	Observation / appraisal and clarity	4/3/2/1	
4.	Content knowledge	4/3/2/1	
5.	Presentation	4/3/2/1	

6. Debate

Sl.No	Criteria	Score	Total Score
1.	Readiness to participate	4/3/2/1	
2.	Depth of subject knowledge	4/3/2/1	
3.	Communication skill	4/3/2/1	
4.	Ability to justify the stand in a democratic way	4/3/2/1	
5.	Presentation	4/3/2/1	

7. Group Discussion

Sl.No	Criteria	Score	Total Score
1.	Readiness to participate	4/3/2/1	
2.	Depth of subject knowledge	4/3/2/1	
3.	Communication skill	4/3/2/1	
4.	Ability to justify in a democratic way	4/3/2/1	
5.	Leadership quality	4/3/2/1	

8. Interview

Sl.No	Criteria	Score	Total Score
1.	Planning	4/3/2/1	
2.	Preparation of Questions	4/3/2/1	
3.	Communication skill	4/3/2/1	
4.	Participation	4/3/2/1	
5.	Report preparation and presentation	4/3/2/1	

Practical Evaluation (PE)

The goal of vocational Education is to generate skills through continuous practices along with investigation and innovations. Continuous and comprehensive practice transforms the unskilled learner to a skilled one. This is the importance and significance of vocational practicals.

PE is done to evaluate the practical skills achieved by the learner in the concerned vocational subject Total Scores for PE is 150 and minimum is 60 score ie 40%. Practical Examination is conducted for a batch of 8 learners having 6 hours duration.

Practical evaluation should be done taking into account the whole practicals included in the curriculum since learning of practical skills is a continuous process through out the period of study.

Vocational Competency Evaluation (VCE)

Vocational Competency Evaluation is to evaluate the vocational skill and aptitude developed by the students during the learning process. This is a system to judiciously evaluate the required value addition and consequent capacity building in the concerned vocational curriculum. The vocational education is aimed at developing interest, skills and devotion in specific vocational fields. As other evaluation components like CE, PE and TE cannot assess the vocational competencies and professional skills, acquired by the students an internship evaluation (IE) components has been introduced to meet this requirement.

Internship evaluation should be done based on the following components like regularity and punctuality, value addition and capacity building.

1. Regularity and punctuality

Regularity and punctuality has vital role in vocational education. Learning is a continuous process, the regular presence of the learner is must for attaining maximum efficiency.

2. Value Addition

Value addition is the qualitative measure of the learner's interest, devotion perseverance and efficiency. Value addition can be evaluated through conducting field visits/ vocational survey. The experiences gained through field visit / vocational survey increases the level of intrinsic motivation and positive attitude towards the vocational field and thereby increase his value as a semiprofessional.

3. Capacity Building

It gives a quantitative measure of the student's skill in graded area exposure. Capacity building can be evaluated through conducting the following activities.

- OJT / Simulated experiment
- Performance – camp/exhibition/clinic
- Performance – PCT/Service cum Training center.

These components help the learner to practise the acquired skills in the real situation and thereby increasing self-confidence and promoting self reliance.

Vocational Competency Evaluation Indicators

No	Items	Scores
1.	Regularity and punctuality	10
2.	Field visit / survey (anyone) vocational project	20
3.	OJT/Simulated experiment performance – Camp/exhibition/clinic Performance – PSCTC (anyone)/Practical skills	20
	Total	50

1. Regularity and punctuality can be assessed by using attendance of the learner and time bound completion of tasks. It is evaluated by using 5 point grading system.

Rating scale

Sl.No.	Item	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

CE Items	Evaluation Indicators	Scores	Score
Regularity and punctuality			

Item	Evaluation indicators	Scores	Score
Value addition	Field visit		20
	1. Attitude and readiness towards the task	4/3/2/1	
	2. Capacity for observation	4/3/2/1	
	3. Data collection	4/3/2/1	
	4. Application of ideas	4/3/2/1	
	5. Documentation/recording	4/3/2/1	
	Or		
	Survey		
	1. Planning	4/3/2/1	
	2. Data collection	4/3/2/1	
Capacity Building	OJT/Simulated experiment		20
	1. Involvement/participation	4/3/2/1	
	2. Skills in doing work/ communication skills	4/3/2/1	
	3. Time bound action	4/3/2/1	
	4. Capacity for observation, analysis and innovation	4/3/2/1	
	5. Documentation, recording and display	4/3/2/1	
	Or		
	Performance in camp/exhibition/clinic		
	1. Ability for planning and organizing	4/3/2/1	
	2. Mastery of subject	4/3/2/1	
3. Ability for communication	4/3/2/1		

4. Innovation	4/3/2/1
5. Involvement/social commitment	4/3/2/1
Or	
<i>Performance in camp/exhibitory clinic</i>	
1. Ability for planning and organisms	4/3/2/1
2. Mastery of subject	4/3/2/1
3. Ability for communication	4/3/2/1
4. Innovation	4/3/2/1
5. Involvement / social committment	4/3/2/1
<i>Performance in production/service cum training center (PSCTC)</i>	
1. Mastery of vocational skills	4/3/2/1
2. Managerial capacity	4/3/2/1
3. Promoting self confidence	4/3/2/1
4. Innovation approach	4/3/2/1
5. Promoting self reliance	4/3/2/1

CRITERIA FOR PROMOTION

A minimum of 80% attendance is required to register for the public examination. Those who are having at least 65% can apply for condonation from higher authorities. Those who have shortage of attendance below 65% should repeat the second year.

The students should obtain minimum 30% score in all subjects separately in TE. In first year if the student failed to obtain 30% minimum score in any subject he will be promoted and will be given chance for improvement.

The students should obtain a minimum of 40% score in the vocational practical Evaluation (PE) that is 60 out 150 score. If a student fails to attain the minimum required score for TE and secure minimum score for pass in TE, he need not re appear for practical examination and vice versa.

UNIT - 1

DENTAL MECHANICS

UNIT AT A GLANCE

Curriculum objection	Content	Activity / Experiments	Materials	Outcome / product	Evaluation	Reference
* To understand the students the fabrication of cast restorations each as crown of bridges through discussions seminar an practical works * To understand the students the fabrication of various orthodontic appliances through demonstrations, discussions of practical work * To understand the students the technique of soldering of welding	Casting procedure Orthodontic appliances Soldering and welding	Preparation of wax pattern Fabrication of cast restorations Preparation of orthodontic appliances Preparation of clasps Demonstration of casting machines Discussion Seminars Sample collections Projects	Dental wax Investment arterial Slaintrsted wire, pliers casting machines	Orthodontic appliances Cast restorations Repairing of appliances spot welding	Ability to handle the instruments Perfection of the appliance made Participation in discussions	Design and Construction of removable orthodontic appliances Philip.C.Adan Synapses of orthodontics M.S Rani Science of Dental materials skinner

INTRODUCTION

This chapter deals with most attractive topics of dental technology course. In this we have already seen the fabrication of complete dentures and partial dentures in the 1st year. And now it is left to us the main topics such as orthodontics and casting procedures

Curriculum Objectives

- ❖ To understand the fabrication of various orthodontic appliances through demonstration, discussion practical work and seminars
- ❖ To understand the students the fabrication of cast restorations through discussions demonstration, practical work, seminar and diagram.

- ❖ To understand the students the technique of soldering and welding through discussions and practical work

Syllabus

- ❖ Casting procedure for dental alloy cast restoration
- ❖ Preparation of die
- ❖ Wax pattern fabrication
- ❖ Spree former
- ❖ Casting ring
- ❖ Investment materials
- ❖ Wax elimination
- ❖ Heating of dental alloy /casting alloy
- ❖ Casting machines
- ❖ Recovery of casting
- ❖ Pickling
- ❖ Polishing
- ❖ Casting defects
- ❖ Aims and objectives of orthodontic treatment
- ❖ Un favorable sequelae of malocclusion
- ❖ Classification of malocclusion
- ❖ Mechanical principles of orthodontic appliances
- ❖ Tooth movements
- ❖ Force tissue changes
- ❖ Anchorage and types of anchorage
- ❖ Various types of orthodontic appliances
- ❖ Components and constructions of fixed, removable and functional appliances
- ❖ Soldering and welding : difference between soldering and welding
- ❖ Uses of soldering and welding
- ❖ Dental solders - Types and properties
- ❖ Fluxes - Types and properties
- ❖ Ant fluxes - Types and properties
- ❖ Principles of soldering
- ❖ Techniques of soldering - investment and free hand
- ❖ Spot welding

Activities

Discussion, demonstration, practicals, charts models, experiments, field visits
reference books or journal

Experiments / practicals

- 1 Casting procedures for Dental alloy
- 2 Wax pattern fabrication
 - a) Crown
 - b) F.P.D
- 3 Designing of wax pattern of fabrication of FPD on various edentulous models
- 4 Familiarize the structure of casting ring
- 5 Familiarize the working of casting machines

- 6 Preparation of wax pattern for all tooth students are advised to submit at least 3 perfectly made wax pattern of different types
- 7 Investing of wax pattern
- 8 Casting and polishing

Preparation of crown and bridges

- 9 Cantilever bridge
- 10 3 unit bridge
- 11 4 unit bridge
- 12 Crown for incisor, canine and molars
- 13 Orthodontic cast preparation. By doing the above exercise the students get the knowledge of making ideal model for both working as well as diagnostic purpose. Training of basis should also be given importance
- 14 Straightening of stainless Steel wire of different gauges
- 15 Making circles with stainless Steel wire of different gauges
- 16 Making squares with stainless Steel wire of different gauges
- 17 Making rectangles with stainless Steel wire of different gauges
By doing the above practicals the students will get an idea wire bending
- 18 Presentation different types of clasps
Eg:-Triangular clasps, adams clasps, C-clasps, students are advised to submit any three perfectly made clasps of different types.
- 19 Presentation of springs
Eg:- finger spring, Z spring, canine retractors etc. students are advised to submit three perfectly made springs of different types
- 20 Preparation of labial bows
Short labial bows
Long labial bows
Split labial bows
Students are advised to submit 3 perfectly made labial bows in each type
- 21 Collection of different types of screws
- 22 Preparation of Hawley's retention plate
- 23 Preparation of Hawley's retraction plate
- 24 Construction of different removable orthodontic appliance with springs for the correction various mal positioned teeth Students are advised to make at least three different types of such appliances
- 25 Construction of area expansion appliances students are advised to make and submit at least two perfectly made arch expansion appliances
- 26 Construction of functional appliances
- 27 Constructions of triangles appliances activator orthodontic appliances
- 28 Finishing and polishing of different removable orthodontic appliances
- 29 Constructions of fixed orthodontic appliances
- 30 Repairing of orthodontic appliances
- 31 Soldering and welding of different parts of appliances
- 32 Constructions of bands and tube with the help of spot welders
- 33 Students are advised to practice investment soldering and free hand soldering

Materials

Notes, reference books, internet study models, Daedal waxes, investment wetland casting machines, pliers, arsines, stainless steel wire, spot welders, metal alloys, casting ray etc.

Consolidation

Various steps in the construction of cast restoration such as inlay's, crown and bridges

- ❖ Various steps the construction of orthodontic appliances
- ❖ Techniques of soldering and welding

Evaluation

To evaluate the curriculum objectives & the fabrication of orthodontic Appliances

CE (Continuous evaluation)

- 1 Project
- 2 Seminar
- 3 Assignment
- 4 Class test

Project:- Eg:-Fabrication of a Hawley's retention appliances

Subject: Dental Technology Item : project							
Sl No	Name	Grading indicators					Score
		I (4)	II (4)	III (4)	IV (4)	V (4)	
1.	Manchu	2	3	4	4	4	17
2	Sindhu	3	3	3	4	3	16

CE Score – Dental Technology (Consolidated statement)

Sl No	Name	CE items				Total (80)	Total CE out of 20
		1 Project (20)	2 Assignment (20)	3 Seminar (20)	4 Class test (20)		
1	Manchu	17	18	17	16	68	18
2	Sindhu	16	17	18	17	68	18

TE

It is a written form of evaluation aimed at evaluating the facts concepts and ideas gained by the learner

Eg:- A patient has come to you with the complaint of midline diastema Suggest a removable orthodontic appliance for the correction of this defect

Abnormality Practical evaluation (PE)

PE Indicators are

- 1 Identification of tools / spotters / materials
- 2 Record
- 3 Experiments/ work done/demonstration
- 4 Viva

CO:

Presentation of cast restoration – Time 6 hours

PE abdicators chosen here are

- 1 Identification of materials used
- 2 Record
- 3 Work done
- 4 Viva

Sl No	Name	PE indicators					Score
		Identif-ication	Uses	Record	Work done	viva	
1	Maya	20	15	15	75	25	150
2	Shibu	10	7	8	50	15	91
3	Anand	15	8	7	55	10	95
4							
5							
6							
7							
8							

Vocational competency evaluation

Example:

CO: To understand the students the techniques of soldering and welding

Sl No	Name	Regularity 5	Puneluality 5	Total score 10
1	Shibu	4	4	8
2	Anand	3	3	6

Field visit

Sl No	Name	PE indicators					Total score 20
		I (4)	II (4)	III (4)	IV (4)	V (4)	
1	Shibu	3	3	4	3	4	17
2	Anand	4	3	4	4	3	18

OJT

Sl No	Name	Regularity and paeluality 10	Field visit (20)	OJT (20)	Total score 50
1	Shibu	8	17	18	43
2	Anand	6	18	17	41

Sample Questions

- 1 Dr.E.H.Angle classified malocclusion as class I, class II & class III. Differentiate each group with help of diagram
- 2 Midline diastema can be corrected with removable orthodontic appliance. Give you suggestions
- 3 Porosity of casting can be prevented How?

Reference books:

- Dental Materials – by Skanners & Philips
- Modern Orthodontics – Dr. S. Balaji
- Orthodontics – Dr. Hraber

Unit – 2

DENTAL MATERIALS

UNIT AT A GLANCE

Curriculum objectives	Concepts	Activity and experiment	Materials	Outcome/product	Evaluation	Reference
To understand the students composition, properties uses, advantages and disadvantages and manipulation techniques of gypsum products investment materials, all impression materials denture base Dental waxes Dental concepts and die materials	Gypsum product Dental cements Impression materials Dental cements Dental waxes Resins Dental perception	Construction of plaster cubes, rectangles, pyramids Mixing of dental cements Relining, rebasing of a complete denture Construction of wax pattern for casting books Seminars Discussion	Dental stone Plaster of paris Modeling wax Dental cements Cold case and neatness seism	Complete denture constructions Removable partial denture Repair of denture	Ability to handle the instruments Ability to make suitable appliances	Science of dental materials skinner Design and constructio no of fixed partial dentures by shilling buy

INTRODUCTION

In dentistry various materials have been used for different purposes. This includes gypsum products, impression materials, dental semis, dental porcelain or dental and ceramics, dental waxes, dental cements die materials, separating medias etc. Here we discuss the composition properties uses, advantages, disadvantages and manipulation technique of the dental materials used in dentistry.

CURRICULUM OBJECTIVES

- 1 To understand the students the composition properties uses advantages, disadvantages, manipulation of various materials used in dentistry.

SYLLABUS

- ❖ Gypsum products
 - Classification
 - Uses
 - Composition
 - Properties
 - Advantages and disadvantages
 - Manipulation techniques
- ❖ All the impression materials used in dentistry

- Classification
- Uses
- Composition
- Properties
- Advantages and disadvantages
- Manipulation techniques
- ❖ Denture base resins
 - Classification
 - Uses
 - Composition
 - Properties
 - Advantages and disadvantages
 - Manipulation of heat cure and cold cure regions
- ❖ Dental ceramics / dental porcelain
 - Types
 - Classification
 - Uses
 - Composition
 - Properties
 - Advantages and disadvantages
 - Manipulation techniques
- ❖ Types of teeth materials and its composition
 - Resin teeth
 - Ceramic / porcelain teeth
- ❖ Dental waxes
- ❖ Dental cements
- ❖ Die materials
- ❖ Separating medias

ACTIVITIES

- | | |
|---|---|
| 1 | Construction of plaster cubes, rectangles, pyramids and construction of maxillary and mandibular cast |
| 2 | Mixing of dental cements |
| 3 | Mixing of investment materials |
| 4 | Acrylization of denture. Relining and re basing of denture |
| 5 | Mixing and manipulation of various impression materials |

MATERIALS

- ❖ Notes
- ❖ Reference books
- ❖ Sample collection
- ❖ Internet
- ❖ Models
- ❖ Charts, impression materials, gypsum products, dental cements, and ceramics

CONSOLIDATION

- ❖ 1. Importance of gypsum products in modern dentistry
- ❖ 2. manipulation of investment materials
- ❖ 3. Synthetic resins in dentistry
- ❖ 4. dental cements
- ❖ uses and manipulation of dental waxes

EVALUATION

CE-Stems Chosen here are

- 1 project
- 2 seminar
- 3 assignment
- 4 class test

Assignment: importance impression materials in dentistry

Sub : Dental technology		Item: Assignment					Score
Sl No	Name	Grading indicators					
		I (4)	II (4)	III (4)	IV (4)	V (4)	
1	Shibu	3	3	4	4	4	18
2	Anand	3	4	2	4	4	17

CE Score; Dental Technology (consolidated students)

Sl No	Name	CE Items					Total 80	Total CE out of 20
		1 project 20	2 assignment 20	3 seminar 20	4 class test 20			
1	Shibu	17	18	17	16	68	18	
2	Anand	16	17	18	17	68	18	

TE:

It is a written form of evaluation compare impression material and suggest an accurate secondary impression material

Practical Evaluation PE

Reba sing a faulty complementary

Sl No	Name	PE indicators					Total score 150
		Identification 20	Uses 15	Record 15	Work done 75	Viva 25	
1	Shibu	10	7	8	50	15	90
2	Anand	15	8	7	55	10	90

Vocational competency evaluation

To understand the students the manipulation of various impression materials

Sl. No	Name	Regularity 5	Partiality 5	Total score 10
1	Shibu	4	4	8
2	Anand	4	5	9

Field visit

Sl No	Name	Grading indicators					Total score 20
		I (4)	II (4)	III (4)	IV (4)	V (4)	
1	Shibu	3	3	4	3	4	17
2	Anand	3	3	4	4	3	18

OJT

Sl No	Name	Grading indicators					Total score 20
		I	II	III	IV	V	
1	Shibu	3	4	4	4	3	18
2	Anand	3	3	4	4	3	17

VCE

Sl. No	Name	Regulation and Partiality (10)	Field visit 20	OJT 20	Total score 50
1	Shibu	8	17	18	43
2	Anand	9	18	17	44

Sample Questions

- 1 Care should be taken to preserve an impression taken with alginate why?
- 2 Compare Alginate, Agar Ajar and ZOE and suggest which is the most suitable secondary impression material

Reference books

- 1 Science of Dental materials skinner
- 2 Design and construction of fixed partial dentures-schilling burg

Unit - 3

Dental Metallurgy

UNIT AT A GLANCE

Curriculum objectives	Content	Activity/ experiments	Materials	Outcome / products	Evaluation	Reference
To understand the students the general properties of metals used in dentistry through discussion and seminar	Metallurgical terms general proper ties of metals metal and metal alloys used in dentistry, heat treatments	Electrolytic deposition of copper Heat treatments of alloys casting of metal ceramic alloys	Electrolytic cell casting machine dental casting alloys, dental waxes, models	Fabrication of crown and bridges Prevention corrosion of metals by electro plating	Ability to handle the instruments Perfection of crown and bridges made. Participatio n in discussions	Science of dental materials skinner Design and constructi ons of fixed partial denture skilling burg
To familiarize the students the terms tarnish and corrosion through discussion, sample collection and experiments	Tarnish and corrosion electric deposition					

INTRODUCTION

This chapter mainly deals with the general properties of metal used in dentistry. In dentistry metals are used in many cases. Most of the dental structures placed in mouth are made of casting alloys stainless steel wire are used in orthodontics appliances. Claps in partial denture are made by metal casting many of the accessory dental materials and instruments are fabricated from cast metal. Most metallic dental restoration such as inlays, crowns, FPD's are cast metals

CURRICULUM OBJECTIVES

- ❖ To familiarize the students the general properties of metal used in dentistry through discussions and seminar
- ❖ To familiarize the students terms tarnish and correction and its ructions through discussions and sample collection and experiments

SYLLABUS

General properties of metals
Metals and metal alloys used in dentistry
Heat treatments-softening and hardening heat treatments
Tarnish and corrosion
Electric deposition

Practical:- Electrolytic deposition of metals

Heat treatments of alloys

Fabrication of metal ceramic crown

ACTIVITIES

Discussions, demonstrations, practical, charts, models, exponents field visits, essence books and journals

EXPERIMENTS / PRACTICALS

Casting of model for the preparation of crown and bridges etc.
Electrolytic deposition

MATERIALS

Notes, reference books, sample collection coddle, casting machines, dental waxes, deal casting alloy

CONSOLIDATION

- ❖ General properties of metals
- ❖ Dental casting alloys-uses and properties
- ❖ Tarnish and corrosion – causes, types and prevention

CE-ITEMS CHOSEN HERE ARE

- | | |
|---|------------|
| 1 | Project |
| 2 | Assignment |
| 3 | Seminar |
| 4 | Class test |

Project : Fabrication of a 3 unit bridge (FPD)

Sub : Dental technology		Item: Assignment					Score
Sl No	Name	Grading indicators					
		I (4)	II (4)	III (4)	IV (4)	V (4)	
1	Shibu	3	3	4	4	4	18
2	Anand	3	4	2	4	4	17

CE Score Dental Technology (consolidated students)

Sl No	Name	CE Items					Total CE out of 20
		1 project 20	2 assignment 20	3 seminar 20	4 class test 20	Total 80	
1	Shibu	17	18	17	16	68	18
2	Anand	16	17	18	17	68	18

TE:

It is a written form of evaluation

Eg:: correction of metals can be prevent give you suggestions

Practical Evaluation PE

Fabrication of a caulilever bridge time blus

Sl No	Name	PE indicators					Total score 150
		Identification 20	Uses 15	Record 15	Work done 75	Viva 25	
1	Shibu	10	12	11	60	20	113
2	Anand	15	11	11	62	21	120
3							
4							
5							
6							
7							
8							

Vocational competency evaluation
Construction of wax pattern

Sl. No	Name	Regularity 5	Partiality 5	Total score 10
1	Shibu	4	4	8
2	Anand	4	5	9

Field visit

Sl No	Name	Grading indicators					Total score 20
		I (4)	II (4)	III (4)	IV (4)	V (4)	
1	Shibu	3	3	4	3	4	17
2	Anand	3	3	4	4	3	18

OJT

Sl No	Name	Grading indicators					Total score 20
		I	II	III	IV	V	

1	Shibu	3	4	4	4	3	18
2	Anand	3	3	4	4	3	17

VCE

Sl. No	Name	Regulation and Partiality (10)	Field visit 20	OJT 20	Total score 50
1	Shibu	8	17	18	43
2	Anand	9	18	17	44

SAMPLE QUESTION

- 1 Metals can be protected from corrosion give your suggestion
- 2 Distinguish base metal alloys and noble metals on the basis of properties and used.

Reference: Science of dental materials-skinner

Design and construction of fixed partial denture – shilling burg

Unit – 4

Hospital / Clinic visit

CURRICULUM OBJECTIVES

- 1 To familiarize the students both lab and clinical works in dentistry through hospital visit, dental lab visits etc.
- 2 To understand the students the role of a dental technician in a dental hospital or dental clinic by assisting dental surgeon in both clinical and lab works

ACTIVITIES

- 1 Identify various instruments used in dental clinic and understand its uses
- 2 Need of sterilization and various methods of sterilization used in dental clinic
- 3 Various machines used in dental office and its uses
- 4 Implementation of dental laboratory procedures in patient (Demonstration only)
- 5 Demonstration of various clinical procedures

Reference books

- 1 Design and construction of removable orthodontic appliance
Philip.C.Adams
- 2 Synopsis of orthodontic M.S.Rani
- 3 Text book of orthodontic Graber
- 4 Science of dental materials Skinner
- 5 Design construction of fixed partial dentures schilling bug