

**Vocational Higher Secondary
Education (VHSE)**

Second Year

DENTAL TECHNOLOGY

Reference Book - Teachers' Version



Government of Kerala
Department of Education

State Council of Educational Research and Training (SCERT),
KERALA
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Foreword

Dear Teachers

This reference book (**Teachers' Version**) is intended to serve as a transactional aid to facilitate classroom transaction and as a ready reference for teachers of Vocational Higher Secondary Schools. It offers some guidelines for the transaction of the course content and for undertaking the practical work listed in the course content. As the curriculum is activity based, process oriented and rooted in constructivism focusing on the realisation of learning outcomes, it demands higher level proficiency and dedication on the part of teachers for effective transaction.

In the context of the Right- based approach, quality education has to be ensured for all learners. The learner community of Vocational Higher Secondary Education in Kerala should be empowered by providing them with the best education that strengthens their competences to become innovative entrepreneurs who contribute to the knowledge society. The change of course names, modular approach adopted for the organisation of course content, work-based pedagogy and the outcome focused assessment approach paved the way for achieving the vision of Vocational Higher Secondary Education in Kerala. The revised curriculum helps to equip the learners with multiple skills matching technological advancements and to produce skilled workforce for meeting the demands of the emerging industries and service sectors with national and global orientation. The revised curriculum attempts to enhance knowledge, skills and attitudes by giving higher priority and space for the learners to make discussions in small groups, and activities requiring hands-on experience.

The SCERT appreciates the hard work and sincere co-operation of the contributors of this book that includes subject experts, industrialists and the teachers of Vocational Higher Secondary Schools. The development of the teachers' version of reference books has been a joint venture of the State Council of Educational Research and Training (SCERT) and the Directorate of Vocational Higher Secondary Education.

The SCERT welcomes constructive criticism and creative suggestions for the improvement of the book.

With regards,

Dr. J. Prasad
Director
SCERT, Kerala

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ABOUT THE COURSE

Dental Technology is a course which equips the Learner to be

(i) A well trained, knowledgeable Dental Assistant in Dental Clinics and all hospitals.

(ii) A Dental Lab Technician, a Denturist who fabricates and repairs Dental appliances

A Dental assistant is a person who assists the Dental Surgeon in clinical procedures, does sterilization procedures and operates Dental X-rays. A thorough knowledge of anatomy and sterilization procedure is necessary for successful execution of his/ her role.

A Dental technician is also person who acts as a bridge between the Dentist and Patient. He/she converts the expectations of the patient and the specifications of the Dentist to reality. A thorough knowledge of the theory and the practical procedures is essential for the fulfilling the role of Dental Technician successfully

For the realization of these objectives, the Dental Technology course in Vocational Higher Secondary Education is spanned over a period of 2 years. The course is well planned and gives ample time and opportunity for the learner to develop the required skill to fulfil their respective jobs.

Dental Assistant is a person not being a Dentist or Medical practitioner, who assists the Dental Surgeon, in sterilizing and handling of instruments and various Dental materials and medicines as required by the Dental Surgeon. Dental Technicians also called Dental Lab Technicians, work in Laboratories fabricating dental prosthetics such as dentures bridges and crowns.

This two year course of study leads to the Qualifications of VHSE trade Certificate in 'Dental Technology' awarded by the department of VHSE, GOVT. Of Kerala. The course of study consists of all essential elements required in a Dental Laboratory. Special emphasis is given to Dental anatomy and morphology-. The makeup of the human mouth and the development and placement of teeth, Dental Prosthetics -using of metallic and non-metallic materials, Dental ceramics, Orthodontic etc., including all the elements required for a good Dental practicing technician.

The course is designed so that the learner:

- Receives the knowledge and expertise needed for being successful in his/her role
- Is familiar with the latest development in his or her field

Employment potential:

At the end of the course along with 1st year apprenticeship learner will be able to

- Assist dental surgeon in dental clinics and hospitals

- Work in dental laboratories
- Set up a lab of his own
- Works as health educator in companies
- Works in dental equipment manufacturing unit etc.

JOB ROLES

After the apprenticeship of 1 year, the learners will be able to perform the following job roles

Government sector

- Dental lab technician in all dental hospitals and dental colleges
- Lab assistant in VHSE schools
- Dental assistants in govt hospitals

Private sector

- Dental laboratory technician
- Dental assistant in private Dental hospitals
- Dental lab assistant
- Office receptionist in dental hospitals and clinics
- Dental health educator
- Sales and marketing of Dental materials
- Lab technical assistant

Self employment

- Start a dental lab
- Sales and marketing of dental materials

Major Skills

Module 3: FABRICATION OF FIXED PARTIAL DENTURES

After the completion of module 3 the learner will be able to

Major skills

Ability to fabricate fixed partial dentures

Subskills

Identify the different prosthetics

Design the denture with proper design

Assist in preparing anterior tooth for crown

Assist in preparing posterior tooth for crown

Distinguish between different gingival finish lines

Ability to duplicate cast using alginate

Ability to duplicate the cast with reversible hydrocolloid

Ability to assist in preparing an individual die

Ability to choose the ideal die system

Assist to fabricate the die

Fabricate wax pattern on anterior teeth

Fabricate wax pattern on posterior teeth

Fabricate the proper occlusal anatomy of posteriors

Ability to finish margins according to its anatomy

Differentiate different types of pontics

Choose the ideal pontic for a case

Assist in spruing according to principles in single casting

Assist in spruing according the principles in multiple casting

Assist in performing investing procedure according to its principles

Assist in performing burn out procedure

Handle different types of casting machines

Assist in removing the casting without damage to it

Assist in performing the pickling procedure accurately

Assist trimming and finishing the casting approximately

Identify the causes of casting defects and ways to prevent them
Manipulation of ceramic materials assist in the fabrication of ceramic crown
Manipulation of investment materials
Choose ideal alloy for casting
Select materials for cast and die materials
Identify the occurrence of corrosion and ways to prevent them

MODULE 4 Fabrication of orthodontic appliances

Major skill

- ability to fabricate removable Orthodontic Appliances

Sub skills

distinguish between normal and malocclusion
identify the consequence of giving uncontrolled orthodontic treatment
assist in the fabrication of devices like head gear
identify and categorise the different types of orthodontic appliances.
identify and choose armamentarium and materials used in wire bending
fabricate circle, square with different gauges of wire.
identify the different components of fixed orthodontic appliances
suggest the ideal components for the fabrication of removable orthodontic appliances
fabrication of different types of clasps
fabricate different types of bows
fabricate different types of springs
fabricate coffin spring
fabricate removable orthodontic appliances
identify different myofunctional appliances
Fabrication of oral screen
Identify different space maintainers
Fabricate different fixed space maintainers
fabricate removable space maintainers
fabricate different space maintainers
identify habit breaking appliances

fabricate different habit breaking appliances
identify the different typed of retainers
assist in dental lab in fabrication of different removable retainers
identify different types of fixed retainers
assist a dental surgeon in taking dental x rays
manage front office of dental clinic
assist dental surgeon during chairside treatment procedure
differentiate between soldering, welding and brazing
identify the role of flux and antflux
assist in freehand and investment soldering
assist in fabrication of molar bands for patient case

Learning outcomes of the course

After completing the course, the learner will be able to

- Identify the age of the patient
- Communicate information on specific teeth accurately and effectively
- Enhance the retention ,stability and support of dentures
- Assist in manipulation of dental materials
- Handle instruments and equipments in dental lab
- Assist dental surgeon in various dental procedures
- Assist in fabrication of complete dentures and removable partial dentures
- Assist in repair of broken dentures successfully
- Assist in fabrication immediate and overdentures
- Fabricate wax patterns for jacket crowns and fixed partial dentures
- Assist in casting procedures
- Assist in fabrication of various orthodontic appliances

Course structure

The course will consist of 4 modules

Such as:-

Module.1	Introduction and Basics of Dental Technology and dental assistance part 1
Module.2	Dental Mechanics.1 Fabrication of complete and removable partial Denture
Module.3	Dental Mechanics-2 Fabrication of Fixed Partial Dentures
Module.4	Fabrication of Orthodontic- Appliances, Dental Assistance part 2

Syllabus

(Module3 and 4)(With number of periods)

MODULE 3 DENTAL MECHANICS 2

FABRICATION OF FIXED PARTIAL DENTURES

UNIT 3.1 Steps in casting (5 periods)

3.1.1 Introduction to prosthodontics

3.1.2 Steps in casting

UNIT 3.2 Tooth preparation (5 periods)

3.2.1. Principles of tooth preparation

3.2.2 Tooth preparation in anteriors

3.2.3 Tooth preparation in posteriors

3.2.4 Gingival finish lines

UNIT 3.3 Cast duplication (20 periods)

3.3.1 objectives of cast duplication

3.3.2 cast duplication with alginate

3.3.3 Cast duplication with reversible hydrocolloid

3.3.4 Electroforming of die

UNIT 3.4 Die preparation (20 periods)

3.4.1 Solid cast with individual system

3.4.2 pindex system

3.4.3 di-lok and DVA system

UNIT 3.5 Wax pattern fabrication (90 periods)

3.5.1 wax pattern fabrication on anterior teeth

3.5.2 wax pattern fabrication on posterior teeth

3.5.3 waxing up of occlusal aspect

3.5.4 finishing of margins

UNIT 3.6 Pontics (10 periods)

3.6.1 Classification of pontics

3.6.2 Pontics design

3.6.3 Types of pontic

UNIT 3.7 Investing (20 periods)

3.7.1 Sprue

3.7.2 Spruing procedure for single casting

3.7.3 Spruing procedure for multiple casting

3.7.4 Casting ring and liner

3.7.5 Investing

UNIT 3.8 Burn out (10 periods)

3.8.1 Alloy solidification shrinkage

3.8.2 Burn out procedure

UNIT 3.9 Casting (30 periods)

3.9.1 casting machines

3.9.2 melting of alloy

3.9.3 casting of metal

UNIT 3.10 Devesting and finishing (20 periods)

3.10.1 Devesting

3.10.2 Pickling

3.10.3 Finishing and polishing

UNIT 3.11 Casting defects (20 periods)

- 3.11.1 Consequence of casting defect
- 3.11.2 Distortion of casting
- 3.11.3 Surface roughness and irregularities
- 3.11.4 Porosity
- 3.11.5 Incomplete casting with missing details

UNIT 3.12 Fabrication of ceramic crowns (10 periods)

- 3.12.1 Dental ceramic
- 3.12.2 classification of dental ceramic
- 3.12.3 Steps in fabrication of ceramic crown and bridge

UNIT 3.13 Materials used in casting (60 periods)

- 3.13.1 Investment material
- 3.13.2 Alloys used in casting procedures
- 3.13.3 Model, cast and die materials
- 3.13.4 Finishing and polishing materials in casting

UNIT 3.14 Tarnish and corrosion

- 3.14.1 Tarnish and corrosion
- 3.14.2 Types of corrosion

Module 4

ORTHODONTICS

UNIT 4.1 Introduction to orthodontics (15 periods)

- 4.1.1 Basics of orthodontics
- 4.1.2 tooth movements in orthodontics
- 4.1.3 anchorage
- 4.1.4 orthodontic appliances
- 4.1.5 instruments used for wire bending

UNIT 4.2 Fixed orthodontic appliances (20 periods)

- 4.2.1 Components of fixed orthodontic appliances

UNIT 4.3 Removable orthodontic appliances (130 periods)

4.3.1 components of removable orthodontic appliances

4.3.2 clasps

4.3.3 bows

4.3.4 springs

4.3.5 expansion components

4.3.6 fabrication of appliance

UNIT 4.4. Myofunctional appliances (20 periods)

4.4.1 introduction to myofunctional appliances

4.4.2 myofunctional appliances

UNIT 4.5 Space maintainers (10 periods)

4.5.1 introduction to space maintainers

4.5.2 Fixed space maintainers

4.5.3 removable space maintainers

UNIT 4.6 Habit breaking appliances (25 periods)

4.6.1 introduction to habit breaking appliances

4.6.2 habit breaking appliances

UNIT 4.7 Retainers (20 periods)

4.7.1 retention

4.7.2 removable retainers

4.7.3 fixed retainers

UNIT 4.8 Dental assistance part 2 (50 periods)

4.8.1 dental x rays

4.8.2 front office management

4.8.3 chair side management

UNIT 4.9 Soldering and Welding (50 periods)

4.9.1 introduction to soldering and welding

4.9.2 flux ,antiflux

4.9.3 procedure for soldering

LIST OF PRACTICALS

Unit 3.1 Designing FPD-suggest number of unit

 Identification of various components of fixed partial dentures

Unit 3.2 Identification of different types of finish lines on the cast

Unit 3.3 Identification of materials used in cast duplication

Unit 3.4 Identification of materials used in die preparation

Unit 3.5 Fabrication of wax pattern for jacket crown on central incisor

 Fabrication of wax pattern for jacket crown on canine

 Fabrication of wax pattern for jacket crown on 1st molar

Unit 3.6 identification of different types of pontic

Unit 3.7 identification of different types of materials used in investment

 Fabrication of sprue on wax pattern

Unit 3.8 identification of materials used on wax pattern

Unit 3.9 identification of different types of casting machines

Unit 3.10 identification of materials used in divesting and finishing

Unit 3.11 identification of different types of casting defects

Unit 3.12 identification of materials used in ceramic crown preparation

Unit 3.13 identification of various types of investment materials, alloys, die materials, finishing and polishing material

Unit 3.14 identification of castings undergoing tarnish and corrosion

Learning outcomes of the units (module wise)

After the completion of module 3 and 4 the learner will be able to attain the following skills

MODULE 3

UNIT 3.1 Steps in casting

3.1.1 .identify different types of prosthesis

3.1.2assist in various stages of casting procedures

UNIT 3.2 Tooth preparation

- i. Design the denture with proper retention while preserving the tooth structure
- ii. Assist in tooth preparation for FPD
- iii. Identify the gingival finish line for each type of tooth crown

UNIT 3. Cast duplication

- 3.3.2 Assist in duplicating cast using alginate
- 3.3.3 Assist in duplicating cast using reversible hydrocolloid
- 3.3.4 Recognise the importance of electroforming of dies

UNIT 3.4 Die preparation

- 3.4.1 Assist in preparation of individual die
- 3.4.2 Assist in preparation of removable die using pindex system
- 3.4.3 Assist in die preparation using di-lok and dva system

UNIT 3.5 Wax pattern fabrication

- 3.5.1 fabricate wax pattern for anterior jacket crowns
- 3.5.2 Do waxing up of posterior teeth for jacket crowns
- 3.5.3 Fabricate wax pattern on posterior teeth with proper occlusal anatomy
- 3.5.4 Perform finishing of margins accurately

UNIT 3.6 Pontics

- 3.6.1 Choose an ideal pontic for each edentulous region
- 3.6.2 Assist in designing the pontic according to the principles
- 3.6.3 Design of pontic ideal for the particular region

UNIT 3.7 Investing

- 3.7.1 Identify the role of a sprue in casting procedure
- 3.7.2 Assist in spruing on single casting
- 3.7.3 Assist in spruing in multiple casting
- 3.7.4 Identify the role of casting ring and liner in investing
- 3.7.5 Assist in investing of wax pattern accurately

UNIT 3.8 Burn out

- 3.8.1 Assist in taking steps to compensate for alloys solidification shrinkage
- 3.8.2 Assist in performing burn out procedure accurately

UNIT 3.9 Casting

- 3.9.1 Identify different types of casting machines
- 3.9.2 Assist in melting the alloy using correct procedure

3.9.3 Assist in dental lab during casting procedure

UNIT 3.10 Devesting and finishing

3.10.1 Assist in performing devesting procedures

3.10.2 Assist in performing pickling procedure

3.10.3 Assist in trimming and polishing of casting accurately

UNIT 3.11 Casting defects

3.11.1 Identify the importance of preventing casting defects

3.11.2 Assist in prevention of distortion of casting

3.11.3 Assist in taking steps to prevent surface roughness and irregularity

3.11.4 Assisst in taking steps to prevent porosity

3.11.5 Assist in taking steps to prevent incomplete casting

UNIT 3.12 Fabrication of ceramic crown

3.12.1 Manipulate the material accurately

3.12.2 Choose the ideal material for fabrication of crown

3.12.3 Assist in fabrication of ceramic crown

UNIT 3.13 Materials used in casting procedures

3.13.1 Manipulate investment materials correctly

3.13.2 Choose the ideal material for jacket crown

3.13.3 Manipulate the materials accurately

3.13.4 Choose the materials ideal for polishing according to the type of crown

UNIT 3.14 Tarnish and corrosion

3.14.1 Identify the ideal metal alloy that can resist corrosion

3.14.2 Identify the conditions that causes corrosion and takes steps to prevent corrosion

MODULE 4

Unit 4.1 Introduction to orthodontics

4.1.1 Distinguish between normal and malocclusion

4.1.2 Identify the consequence of giving uncontrolled orthodontic treatment

4.1.3 assist in the fabrication of devices like head gear

4.1.4 Identify and categorise the different types of orthodontic appliances.

4.1.5 Identify and choose armamentarium and materials used in wire bending

4.1.6 Fabricate circle, square with different gauges of wire.

Unit 4.2 Fixed orthodontic Appliances

4.2.1 Identify the different components of fixed orthodontic appliances

Unit 4.3 Removable Orthodontic Appliances

4.3.1 Suggest the ideal components for the fabrication of removable orthodontic appliances

4.3.2 Fabrication of different types of clasps

4.3.3 Fabricate different types of bows

4.3.4 Fabricate different types of springs

4.3.5 Fabricate coffin spring

4.3.6 Fabricate removable orthodontic appliances

Unit 4.4 Myofunctional appliances

4.4.1 Identify different myofunctional appliances

4.4.2 Fabrication of oral screen

Unit 4.5 Space maintainers

4.5.1 Identify different space maintainers

4.5.2 Fabricate different fixed space maintainers

4.5.3 Fabricate removable space maintainers

4.5.4 Fabricate different space maintainers

Unit 4.6 Habit breaking appliance

4.6.1 Identify habit breaking appliances

4.6.2 Fabricate different habit breaking appliances

Unit 4.7 Retainers

4.7.1 Identify the different typed of retainers

4.7.2 Assist in dental lab in fabrication of different removable retainers

4.7.3 Identify different types of fixed retainers

Unit 4.8 Dental Assistance part 2

4.8.1 Assist a dental surgeon in taking dental x rays

4.8.2 Manage front office of dental clinic

4.8.3 Assist dental surgeon during chairside treatment procedure

Unit 4.9 Soldering and welding

4.9.1 Differentiate between soldering, welding and brazing

4.9.2 Identify the role of flux and antflux

4.9.3 Assist in freehand and investment soldering

4.9.4 Assist in fabrication of molar bands for patient case

Scheme of work

MONTH	NAME OF UNIT	TOTAL
JUNE	STEPS IN CASTING	5
JUNE	TOOTH PREPARATION	<u>5</u>
JUNE	CAST DUPLICATION	20
<u>JUNE</u>	DIE PREPARATION	<u>20</u>
JUNE/JULY	WAX PATTERN FABRICATION	90
JULY	PONTICS	10
JULY	INVESTING	20
AUGUST	BURN OUT	20
AUG/SEP	CASTING	30
SEP	DEVESTING AND FINISHING	20
SEP	CASTING DEFECTS	20
OCT	MATERIALS AND EQUIPMENTS IN CASTING	60
OCT	TARNISH AND CORROSION	20
OCT	INTRODUCTION TO ORTHODONTICS	15
OCT	FIXED ORTHODONTIC APPLIANCES	20
NOV	REMOVABLE ORTHODONTICS APPLIANCES	130
NOV	MYOFUNCTIONAL APPLIANCES	10
DEC	SPACEMAINAINERS	20
DEC	HABIT BREAKING APPLIANCES	25
JAN	RETAINERS	30
JAN	DENTAL ASSISTANCE-PART 2	50
FEB	SOLDERING AND WELDING	30

Structure of module 3

DENTAL MECHANICS-2

Fabrication Of Fixed Partial Dentures

340 periods

UNIT NO:	NAME OF UNIT	PERIODS
3.1	Steps in casting	5
3.2	Tooth preparation	5
3.3	Cast duplication and electroforming of dies	20
3.4	Die preparation	20
3.5	Wax pattern fabrication	90
3.6	Pontics	10
3.7	Investing	20
3.8	Burn out	10
3.9	Casting	30
3.10	Devesting and finishing	20
3.11	Casting Defects	20
3.12	Fabrication of ceramic crowns	10
3.13	Materials used in casting	60
3.14	Tarnish and corrosion	20

30%theory 70%practical

Structure of module 4

Orthodontic Appliances

340 periods

Unit no:	Name of unit	Periods
4.1	Introduction to orthodontics	15
4.2	Fixed Orthodontics Appliance	20
4.3	Removable Orthodontic Appliances	130
4.4	Myofunctional appliances	20
4.5	Space maintainers	10
4.6	Habit breaking appliances	25
4.7	Retainers	20
4.8	Dental Assistance-part 2	50
4.9	Soldering and welding.	50

30%theory 70%practicals

CLASSROOM ACTIVITIES

- Discussion
- Practical procedures
- Notes preparation
- Chart/ poster preparation
- Demonstrations
- Seminars
- Exhibitions
- Quiz
- Questionnaire
- Debate
- Class test
- Visual presentation
- Report presentation

PRACTICAL ACTIVITIES

- Case studies
- Practical Procedures in each unit
- Fabrication of Dentures
- Fabrication of Orthodontic appliances
- Field study
- Survey.
- OJT

MODULE 3

OVERVIEW

Module 3-dental mechanics 2 takes the learners through the procedures of crowns as well as fixed partial denture fabrication. It educates the learners on the casting defects that can occur in the dental lab during the process of fabrication which will compromise the quality of the denture and also the methods of prevention of these defects. The learner will also get knowledge about the materials and equipment used in casting. The learner will get an idea about the importance of tarnish and corrosion in dentistry.

At the end of the module the learner will be able to

- assist in the dental lab during casting procedures
- recognise the various casting defects.
- will be able to prevent the occurrence of casting defects.
- will be able to fabricate wax pattern on required tooth.
- will be able to identify the instruments and materials used in casting
- will be able to recognise tarnish and take steps to prevent corrosion
- will be able to select biocompatible metal or metal alloys that can resistance

UNIT 3.1 STEPS IN CASTING.

Overview

In this unit we review the terms used in prosthodontics .We also take the learners through the basic steps of casting giving an idea of the procedures involved in casting. Basically casting procedures involve the creation of a mould in the shape of the object to be fabricated and then filling the mould with metal.

Unit Grid

IDEAS/CONCEPTS/SKILLS	LEARNING OUTCOMES	SUGGESTED ACTIVITIES	ASSESSMENT
Introduction to prosthodontics Skills: identification of different prosthetics	-the learners will be able to identify different prosthetics	-demo of different FPD, metal crowns, ceramic crowns etc -chart preparation -Designing of	Quiz with regard to demo Report presentation of demo -chart assessment -assessment of

		FPD	design
Basic steps in casting Skills : Ability to understand the importance of steps in casting	-the learner will be able to enumerate the steps in casting. -understand the importance of each step in casting procedures.	-chart preparation depicting the steps in casting procedures. -notes preparation	-evaluation of chart -evaluation of notes -general quiz

Additional Information:

- Cantilever bridge is a type of fixed restoration which has abutment only on one side.
- Spring cantilever bridge is a type of fixed restoration where the pontic is connected to the teeth by a bar. Implant supported fixed partial denture is the type of FPD that has an implant as the abutment.
- Precision attachment
- Pier abutment

List of items in portfolio

- chart depicting different stages of casting procedures
- notes made by students on casting procedures
- report on the demo of various types of FPD
- Questionnaire based on stages of casting

UNIT 3.2: TOOTH PREPARATION.

Overview

This unit deals with the procedure of preparing the tooth to receive a crown or fixed partial denture. The accurate preparation of tooth and its impression is important for the success of a crown or fixed denture. The learner will be able to identify the different gingival finish lines.

Unit Grid

IDEAS/CONCEPTS/SKILL	LEARNING OUTCOMES	SUGGESTED ACTIVITIES	ASSESSMENT
Objectives of tooth	The learner	-Notes	-Notes

preparation Skills: -ability to understand the importance of retainer support. -ability to design the denture with proper design	will be able to design the denture with proper retention, and while preserving the tooth structure	preparation General discussion on identification of role of tooth preparation in obtaining retention	evaluation Discussion report
Tooth preparation in anterior. Skills : -ability to assist in preparing anterior tooth for crown	The learner will be able to -assist in preparation of tooth	-preparation of anterior teeth in cast. -video presentation of tooth preparation. -visit to dental clinic for demo of tooth preparation	-evaluation of the work -report on video presentation. -report of visit
Tooth preparation in posteriors Skills : -ability to assist in preparing posterior tooth for crown	The learner will be able to --assist in the preparation of posterior tooth	-preparation of posterior teeth in cast. -video presentation -Visit to dental clinic fir demo of tooth preparation	-evaluation of the work. -quiz based on video presentation. -report of visit
Gingival finish lines. Skills : -ability to distinguish between different gingival finish lines	The learner will be able to -recognise the gingival finish lines for each type of crown	-preparation of gingival finish lines on cast -Demo of different types of gingival finish lines. -Chart preparation of gingival finish lines	-evaluation of work. Quiz based on demo. -chart presentation

Additional information

- Factors that enhance the retention form of FPD
 - -rest (additional support of FPD)
 - -occlusal convergence/taper is adjusted to 5 -10 degrees.
 - -Slots can be given on tooth .

- Ideally gingival finish lines are placed supra gingival (above the gingival margin). This is to facilitate oral hygiene. But in anterior region the finish line is placed subgingival due to aesthetic considerations.
- The labial depth orientation grooves are cut in two sets: one set parallel to the gingival half of labial surface and the other set parallel to the incisal half. These grooves are 1.2 mm for metal ceramic crowns. The incisal grooves are 2mm deep for the same.
- Over shortening of lingual surface leads to loss of retention.

List of items in portfolio

Cast of prepared tooth with all four gingival finish lines

Chart of steps and diagrams of tooth preparation in anteriors and posteriors.

Cast of prepared tooth

Report on field visit

UNIT NO: 3.3 CAST DUPLICATION .

Overview

Cast duplication is the method of fabricating an extra pair of casts in the laboratory. This unit explains the need for cast duplication and the different methods by which it is done. The unit also deals with the electroforming of dies-the objective and method of electroforming of dies.

Unit Grid

IDEAS/CONCEPTS/SKILLS	LEARNING OUTCOME	SUGGESTED ACTIVITIES	ASSESSMENT
Objectives of cast duplication Skills : ability to understand the need for cast duplication	The learner will be able to -identify the need for cast duplication	Notes preparation General discussion on the need for cast duplication	Notes evaluation Report presentation on the discussion
Cast duplication with alginate. The procedure is explained in detail Skills: Ability assist in duplicating cast using alginate	The learner will be able to -duplicate casts using alginate.	Demo of the procedure. Video presentation of procedure. Duplication of model/cast in lab	General quiz based on demo. Report on presentation Practical evaluation

		Notes	Notes evaluation
Cast duplication with reversible hydrocolloid material. Skills Ability to assist in duplicating casts using hydrocolloid material	The learner will be able to Assist in duplicating casts using reversible hydrocolloid	Video presentation of procedure Demo of procedure Duplication done in lab	Report on presentation Questionnaire based on demo Practical evaluation
Electroforming of dies The objective and procedure of electroforming is explained Skills: Ability understand the need for electroform od dies	The learner will be able to Understand the need for electroformin g of dies. Advice	Video presentation. Demo of procedure	Questionnaire based on video presentation and demo

Additional information: Hydrocolloid materials are difficult to electroplate. Polysulfide materials are relatively easier.

List of items in portfolio: Seminar on different duplicating procedures

Report based on discussion on topic "which material is best for cast duplication"

Questionnaire based on video presentation

UNIT NO: 3.4 DIE PREPARATION.

Overview

An accurate die is mandatory for a successful prosthesis .A Die should reproduce all he fine details of both prepared and unprepared surfaces of tooth exactly. This unit exposes the learner to different types of die systems. The learner will be able to choose the ideal system for the case. The procedure of die preparation is dealt with in detail.

Unit Grid

IDEAS/CONCEPTS/SKILLS	LEARNING OUTCOME	SUGGESTED ACTIVITIES	ASSESSMENT
Solid cast with individual die system. The procedure and materials needed are explained, advantages and disadvantages Skills :	The learner will be able to -choose the ideal die system. -assist in preparation of	Demo of die preparation in lab Video presentation	quiz Questionnaire based on demo and video presentation

Ability to assist in preparing an individual die Ability to choose the ideal die system .	an individual die	Visit to dental lab	
Pindex system The procedure ,advantages and disadvantages Skills: Ability -to choose the ideal die system -assist to fabricate the die	The learner will be able to -assist in preparation of die for casting procedures	Die preparation in lab Demo of procedure Video presentation. Notes	Practical evaluation Questionnaire based on demo and video presentation Notes evaluation
Di-lok and DVA system Skills : Ability to understand the types of die systems	The learner will be able to -assist in die preparation	Notes ,scribbling pad Seminar Chart preparation	Notes evaluation scribbling pad evaluation

Assessment activities: Questionnaire based on demo and video presentation

Notes evaluation

scribbling pad evaluation

List of items in Portfolio: questionnaire based on video presentation

Scribbling pad

UNIT 3.5 WAX PATTERN FABRICATION

Overview

Wax pattern fabrication is done on the die of the tooth to be replicated. Following the steps for preparation of wax pattern is necessary for achieving the accurate anatomy of tooth as well as minimising casting defects. A finished wax pattern resembles the shape of a final restoration and contributes to the aesthetics and proper functioning of tooth.

This unit deals with the steps of wax pattern fabrication on the die. Proper adherence to the steps is necessary to fabricate an ideal wax pattern.

Unit Grid

IDEAS/CONCEPTS/SKILLS	LEARNING OUTCOMES	SUGGESTED ACTIVITIES	ASSESSMENT
Wax pattern fabrication of anterior teeth Skills :	The learner will be able to	Fabrication of wax pattern on	Practical evaluation

Ability to fabricate wax pattern on anterior teeth	-fabricate wax pattern on anterior teeth	die Demo of procedure Video presentation of procedure	Quiz based on demo Report presentation on video
Wax pattern fabrication on posterior teeth Skills : Ability to fabricate wax pattern on posterior teeth	The learner will be able to -fabricate wax pattern on posterior teeth	Fabrication of wax pattern on die in the lab Demo of procedure	Practical evaluation Quiz/questionnaire/discussion on demo of procedure
Waxing up of occlusal surface Skills : Ability to fabricate the proper occlusal anatomy on posteriors	The learner will be able to -fabricate a wax pattern with proper occlusal anatomy	Fabrication of occlusal surface on posterior teeth Demo/video presentation of procedure	Practical evaluation Report based on video presentation Quiz/questionnaire/discussion
Finishing up of margins Skill: Ability to finish margins according to anatomy	The learner will be able to -finish margins according to anatomy	Fabrication of wax pattern Discussion of importance of proper finishing margin and occlusal anatomy	Practical evaluation Discussion report

Additional information:

Investing of wax pattern should be done immediately as the wax has memory and has a tendency to go back to its original shape (elastic property) thus causing wax distortion.

There are 4 basic steps for producing wax replicas on the die
 -one is to create a wax mass and then carve the anatomy on the wax
 -building up the restoration step by step using wax cones, triangles etc
 -fabrication of wax pattern directly intra orally
 -depending on a preoperative anatomic core

Occlusal schemes: Adults exhibiting class 1 occlusion normally have cusp marginal ridge scheme. Adults exhibiting class 2 occlusion have cusp fossa scheme

The functional cusps in maxillary are the lingual cusps and in mandibular the functional cusps are the buccal cusps

List of items in portfolio: Wax pattern fabricated on the die

Report on the video presentation/demo

Questionnaire based on video presentation

Discussion report on the importance of occlusal

schemes

UNIT 3.6 PONTICS

Overview

Pontic are artificial replacement of missing tooth. It is the suspended member of the fixed partial denture. This unit deals with classification and types of pontic. The learner will be able to choose the pontic design according to the position of missing tooth.

Unit grid

IDEAS/CONCEPTS/SKILLS	LEARNING OUTCOMES	SUGGESTED ACTIVITIES	ASSESSMENT
Classification of pontics Skills : Ability to differentiate different types of pontics.	The learner will be able to -Differentiate between types of pontics -will be able to choose ideal pontic	Chart preparation of different types of pontic Album preparation Seminar	Chart evaluation Album evaluation Seminar report
Pontic design Skills: Ability to understand the factors to be considered in the selection of pontic	The learner will be able to Understand the principles involved in designing a pontic	Seminar Notes	Seminar evaluation General Quiz Notes evaluation
Types of pontic Skills: Ability to choose the ideal pontic for a case.	The learner will be able to -design a pontic with regard to the position of	Chart /album preparation Group discussion	Chart/Album evaluation Report presentation

	missing tooth	Diagrammatic representation	
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Additional information: Special situations in which requirements for a pontic cannot be fulfilled

1. Excessively resorbed residual ridge
2. Patient having excess calculus in lower anterior region
3. Shallow muco buccal folds adjacent to bicuspid and molar pontic
4. Cleft palate

Parts of a pontic: facing

Solder joint

Backing

List of items in portfolio: chart/album depicting type of pontics

Seminar report on selection of pontic

Discussion report on factors involved in selection of pontic

UNIT 3.7 INVESTING

overview

Investing is the procedure of creating a mould in the shape of the object to be casted. Proper adherence to the investing procedure is important to get a defect free casting. The chapter deals with the procedure of casting of dental crowns and partial dentures. The 1st step in investing is sprue attachment. The wax pattern with sprue is then invested in the casting ring.

Unit Grid

IDEAS/CONCEPTS/SKILLS	LEARNING OUTCOMES	SUGGESTED ACTIVITIES	ASSESSMENT
Sprue Skills: Ability to understand the principles of spruing -Ability to understand the role of sprue	The learner will be able to -understand the role of sprue	Video presentation of spruing Notes General discussion on importance of spruing	Quiz/Questionnaire/Test Notes evaluation Presentation of discussion report.
Spruing procedure for single casting Skills: Ability to assist in spruing	The learner will be able to -assist in	Chart /album preparation showing spruing	Chart/Album evaluation

according to principles in single casting.	spruing on single casting	procedure. Video presentation on spruing. Notes Visit to dental lab	Report presentation on video Notes evaluation Report on visit
Spruing procedure for multiple casting Skills: Ability to assist in spruing according to principles in multiple casting	The learner will be able to -assist in spruing in multiple casting	Chart/album preparation showing spruing procedure. Video presentation on spruing Notes Visit to dental lab	Chart/Album evaluation Report presentation. Notes evaluation Report on visit.
Casting ring and Liner Skills: Ability to understand the role of casting ring and liner	The learner will be able to -understand the role of casting ring and liner in investing	Notes Visit to dental lab	Notes evaluation Report on visit
Procedure for Investing Skills: Ability assist in performing investing procedure according to principles.	The learner will be able to -assist in Investing the wax pattern accurately.	Video presentation Notes Visit to dental lab	Report presentation Notes evaluation Report on visit.

Additional information: A split casting ring or rubber casting ring can also be used to provide space for expansion of investment material.

If more expansion is to be accommodated, 2 layers of liner is used.

There is more expansion of investment material along the length of the ring. This can be reduced by cutting the liner a little shorter than the length of the ring so that the the investment material comes in contact with the ring at both open ends .

Venting-small auxillary sprues are fixed for allowing the gases to escape. This will improve the casting.

The phosphate bonded investment has very poor wetting property. So, air bubble formation is higher. Therefore vacuum investing is done while using this investment.

Sprue: Long and thin sprue cause localized shrinkage porosity. If a long and thin sprue is used metal will freeze in the sprue before it freezes in the mould. This is overcome by using a reservoir or larger sprue.

The length of the sprue former is adjusted such that the pattern is approximately 3 to 6 mm from the open end of the ring.

If a greater thickness of investment is present back pressure porosity may result. When the investment is too bulky air in the mould cannot escape and gold is prevented from filling the mould completely

- List of items in portfolio:
- chart /album showing spruing procedure
 - Report on video presentation of procedures
 - Discussion report on importance of spruing

UNIT 3.8 BURN OUT

overview

Burn out is the process of heating the casting ring so as to melt the wax and create a mould. Following the correct procedure is essential to eliminate the wax totally and to create the perfect mould. This unit also deals with alloy shrinkage and methods to compensate for it.

Unit grid

IDEAS/CONCEPTS/SKILLS	LEARNING OUTCOMES	SUGGESTED ACTIVITIES	ASSESSMENT
Alloy solidification shrinkage Skills Ability to take steps to compensate for the shrinkage	The learner will be able to - Take steps to compensate for alloy solidification shrinkage	General discussion on alloys and properties of alloys. Notes preparation	Discussion report Quiz/questionnaire Notes evaluation
Burn out procedure Skills Ability to assist in performing burnout procedure	The learner will be able to -assist in performing burn out	Video presentation Group discussion on	Report on video presentation Quiz/questionnaire/test

	procedure adequately	importance of burn out procedure	Report on discussion
		Visit to dental lab	Report on dental lab

Additional information: The ring is heated to such a degree so as to minimise sudden drop in temperature of the casting ring on removal from the oven. This sudden drop can cause incomplete casting.

Best results are obtained if the investment is allowed to cure overnight before proceeding with burnout

Assessment activities: group/general discussion

Quiz/questionnaire

List of items in Portfolio: discussion report

Questionnaire

Report on visit to dental lab

UNIT 3.9 CASTING

overview

The procedure of melting the alloy and injecting it into the mould is called casting. The unit deals with the procedure of casting and different kinds of casting machines

Unit Grid

IDEAS/CONCEPTS/SKILLS	LEARNING OUTCOMES	SUGGESTED ACTIVITIES	ASSESSMENT
Casting machines Skills Ability to handle different types of casting machines	The learner will be able to -identify different types of casting machines accurately	Visit to dental lab Notes Scribbling pad	Report
Melting the alloy Skills	The learner will be able to	Video presentation	Quiz/questionnaire

Ability to use the right temperature in melting the alloy	-assist in melting the alloy using the correct procedure	General discussion on the zones of flame Notes	Participation in discussion Notes evaluation
Casting procedures Skills Ability to inject metal into the mould appropriately	The learner will be able to -assist in dental lab during casting procedures	Video presentation Visit to dental lab	Report on video presentation Quiz/open book exam Report on visit

Additional information: Induction casting machine: It is a modern method of melting the alloy esp high fusing alloys like metal ceramic and base metal alloys. It works on the principle of electromagnetic induction leading to heating of alloy.

List of items in portfolio: report on video presentation /visit to dental lab

Discussion report on zones of flame

UNIT 3.10 DIVESTING AND FINISHING

Overview

Divesting is the procedure of recovering the casting from the casting ring after casting procedures have been completed. This unit deals with the procedure of removal of casting from the investment safely. Another important procedure dealt with in the chapter is pickling. The unit also deals with the finishing procedures mainly trimming and polishing of casting.

Unit grid

IDEAS/CONCEPTS/SKILLS	LEARNING OUTCOMES	SUGGESTED ACTIVITIES	ASSESSMENT
Divesting Skills Ability to assist in removing the casting without damage to it	The learner will be able to -assist in performing divesting procedures adequately	Video presentation Visit to dental lab Group discussion	Report Quiz General questions Report on visit
Pickling Skills Ability to assist in performing the pickling procedures accurately	The learner will be able to -assist in performing the pickling procedures accurately	Video presentation of procedure Notes	Report/quiz Notes evaluation
Finishing and polishing Skills Ability to assist in trimming	The learner will be able to -assist in	Video presentation Demo of	Report /quiz based on presentation

and finishing the casting appropriately	trimming and polishing the finished casting appropriately	procedure Visit to dental lab	Report of visit
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Additional information: Only gold castings may be cleaned by pickling. Because of the health and environmental hazards associated with pickling solutions, air abrasion with small- particle-size abrasives is the preferable means of cleaning castings. Do not pickle base metal castings.

In case of gold castings, quenching is done after the casting has been cooled for 5 mts for achieving the best grain structure . If done before cooling, the casting will be weaker. If the casting is allowed to cool completely before quenching the grain structure will be larger. The additional benefit of quenching is the disintegration of investment when it contacts the cold water.

List of items in portfolio: report on visit to dental lab

Quiz based on video presentation

Discussion report

UNIT 3.11: CASTING DEFECTS

Overview

Defects or mistakes that occur during casting procedures are called casting defects. Casting defects compromise the casting aesthetically as well as functionally. As most of the casting defects occur due to the ignorance or negligence of the dental technician, knowledge of the same is essential for him to fabricate a successful casting. This unit deals with the different types of casting defects, their causes and prevention.

Unit grid

IDEAS/CONCEPTS/SKILLS	LEARNING OUTCOMES	SUGGESTED ACTIVITIES	ASSESSMENT
Consequences of casting defects Skills	The learner will be able to -understand the	Group discussion	Report/quiz based on discussion,

Ability to understand the importance of prevention of casting defect	importance of preventing casting defect and thus take appropriate steps	Seminar Charts depicting casting defects Notes	participation in discussion Presentation Charts/album evaluation
Distortion of casting Skills Ability to understand the causes of distortion of casting Ability to prevent the defect	The learner will be able to -prevent distortion of casting	Presentation of pictures showing distortion General discussion on consequence of distortion Seminar Notes	Quiz, tests Discussion report presentation Notes evaluation
Surface roughness and irregularities Skills Ability to understand the causes and thus prevent this defect	The learner will be able to Take steps to prevent surface roughness and irregularities	Seminar General/group discussion on causes and consequences of this defect Notes	Quiz open book tests viva notes evaluation
Porosity Skills Ability to understand and thus prevent porosity	The learner will be able to Prevent porosity	Seminar/group or general discussion Presentation of pictures showing porosity Notes	Quiz, Tests Chart evaluation Album evaluation Note evaluation
Incomplete casting with missing details Skills Ability to understand and thus prevent this defect	The learner will be able to -take adequate steps to prevent this defect	Seminar on casting defects Video showing casting defects Discussion on casting defect Review	Quiz Tests Open book exams Chart evaluation

Additional information :Contamination of casting can be due to

Oxidation and presence of sulfur compounds formed by break down of investment when the ring is overheated (black casting).

Assessment activities:1. presentation of chart/album depicting pictures of casting defect

2. collection of castings with different types of casting defects

3. quizzes and tests based on causes and prevention of porosities. The learners can be divided into groups for the quiz session. Each comes prepared with a set of questionnaire.

4. open discussion on casting defects

List of items in portfolio: chart/album showing pictures of defects

Castings with the casting defects

Quiz/questionnaire about casting defects

UNIT 3.12 FABRICATION OF CERAMIC CROWN

overview

Ceramic or porcelain crown is the most popular of all artificial crowns as they are superior in aesthetics to metal and acrylic crowns. Ceramic and porcelain crown are used synonymously as porcelain is a material that belongs to the ceramic family. Translucency, light transmission and biocompatibility gives dental ceramics highly desirable aesthetic properties. Dental porcelain are essentially glassy, non-metallic material which are used for making denture teeth and fixed partial dentures. This unit deals with the procedure of fabrication of porcelain/ceramic crown .It also explains the composition and properties of ceramic material and the ideal method of manipulation.

Unit grid

IDEAS/CONCEPTS/SKILLS	LEARNING OUTCOMES	SUGGESTED ACTIVITIES	ASSESSMENT
Dental ceramic Skills: Ability to use ceramic material adequately	The learner will be able to -manipulate the material accurately	Group discussion on ceramic material Chart preparation depicting properties of materials Seminar Notes	Quiz Tests Report presentation Seminar presentation

Classification of dental ceramic Skills Ability to identify different types of material	The learner will be able to - identify different types of material -choose the ideal material	Group discussion Seminar Chart preparation Notes	Quiz Tests Report presentation Seminar
Steps in fabrication of ceramic crown and bridge Skills Ability to go thru the procedure accurately	The learner will be able to -assist in fabrication of dental ceramic crown	Video presentation Seminar Visit to dental lab notes	General quiz Test Note evaluation Assessment basd on visit

Additional information: Methods of strengthening porcelain

1. Thermal tempering
2. Ion exchange method
3. Using particle stabilised zirconia

Glazing is considered more effective compared to conventional polishing. Two types of glazes:

Over glaze-

Self-glaze

High fusing porcelains are mainly used for construction of denture teeth.

Tooth preparation of in-ceram restoration should provide a minimum overall reduction of 1 mm. But on facial 1.5-2.0 mm reduction is preferred. All line and point angles should be rounded.

Assessment Activities

Group discussion

Chart preparation

Seminar

List of items in portfolio :

Report on group discussion

Chart evaluation

Seminar presentation

UNIT 3.13 MATERIALS USED IN CASTING PROCEDURES.

Overview

This unit deals with the materials used during casting procedures. The composition, properties and manipulation of the materials is discussed in detail. Knowledge of the properties and composition of the material will help the learner to make use of the material adequately

Unit grid

IDEAS/CONCEPTS/SKILLS	LEARNING OUTCOME	SUGGESTED ACTIVITIES	ASSESSMENT
Investment materials Skills Ability to manipulate investment material during investment procedures	The learner will be able to -manipulate investment materials adequately -choose the investment material according to the type of casting	Chart preparation on classification of investment materials Seminar on different investment materials Notes	Chart evaluation Seminar presentation Quiz Tests Notes preparation
Alloys used in casting procedures Skills Ability to choose the ideal alloy for casting	The learner will be able to -choose the ideal alloy for casting	Case study showing failures of metal crown Seminar presentation Group discussion	Presentation of case study and discussion reports
Model, cast, die materials Skills Ability to select materials for cast and die preparation	The learner will be able to -choose and manipulate the material adequately	Video presentation Demonstration	Report presentation Quiz Questionnaire
Abrasives and polishing material Skills Ability to choose and use material properly	The learner will be able to -choose and use materials adequately	Chart preparation Demonstration Group discussion Seminar	Report presentation Quiz questionnaire

Additional information: Divestment-combination of die stone and investment used for investing low fusing gold alloys. The use of divestment minimises any errors that may occur during pattern removal and investing

Diamonds are the hardest of all abrasives. They should be reserved for use on hard and brittle substance like enamel or porcelain. When used on softer substances it tends to get clogged.

Other common abrasives are : silicon carbide, emery, aluminium oxide, garnet ,sand ,cuttle ,Tripoli, rouge. Tin oxide etc. These materials are mixed with binder and pressed in the shape of stones, discs. The commonly used forms are:

Separating discs—used for removing sprues from casting,

Moore's disc—flexible paper discs. Used for contouring and smoothing large areas.

Heatless stone—for extremely coarse bulk removal of metal

Busch silent stones: fine grained stones for reducing broad areas of porcelain

Green stones: shaping metal and porcelain

Pink stones : made of porcelain bonded aluminium oxide.it is used for finishing areas of metal copings to which porcelain is fired

White stones: smoothening rough areas left by green stones and adapting gold margins intraorally

Rubber wheels and points: used for polishing metals and ceramics

Die materials

Gypsum materials are compatible with almost all impression materials

Electroplated silver are compatible with polysulfide ,addition silicone and polyether rubber base

Electro plated copper are compatible with impression compound and all types of rubber base materials

Epoxy resin is compatible with polysulfide and polyether rubber base materials.

As resin is prone to trap air centrifuge technique is used for construction of dies

Items in portfolio:Chart prepared on classification of abrasives

Seminar on

UNIT 3.14 TARNISH AND CORROSION.

Overview

This unit deals with tarnish and corrosion, definition, and types of corrosion.

Unit grid

IDEAS/CONCEPTS/SKILLS	LEARNING OUTCOMES	SUGGESTED ACTIVITIES	ASSESSMENT
Tarnish and corrosion – types and definition Skills Ability to -Identify the chances of	The learner will be able to -identify the ideal metal alloy that can resist	Data collection Analyse and categorise the different dental prosthesis made	Quiz based on data collection Report on group discussion Notes evaluation

occurrence of corrosion -prevent corrosion	corrosion -identify conditions that cause various types of corrosion	of alloys Group discussion notes	
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Additional information: Protection against corrosion :

-Passivation: formation of an oxide layer on surface of a metal which protects it against any further corrosion

-Increase in noble metal content

-Polishing

-Avoiding dissimilar metal restoration

Assessment activities: Data collection on different types of corrosion

Analyse and categorise the different dental prosthesis made of alloys

Group discussion factors affecting corrosion in dentistry

Notes evaluation

List of items in portfolio: Data on different types of corrosion

Report on the discussion of factors affecting in dentistry

Analysis of dental prosthesis made of different alloys

EXTENDED ACTIVITIES:

Posting of learners to dental laboratories on weekend basis. A report on the procedures they have witnessed is assessed.

The learners can participate in dental camps organised by IDA. Getting involved in the organisation of the camps will give them an insight to the administrative side. They will also witness different patient cases.

Visit dental laboratories and compile a report on the casting defects and the methods of prevention. This exposes the learner to various practical methods adopted by the laboratories in preventing casting defect. The learners are divided into groups and asked to go on house visits .A study on the common dental problems in a particular

area can be assessed. The learners can also motivate the public to treat the dental problem

MODULE-4

Overview

Module 4 consist of some important attractive units, that covers Orthodontics, lab procedures, including soldering, welding, spot welding and Dental Assistance Part II which includes awareness of dental X-ray & front office management and Chair side management of dental clinics. Orthodontics is a dynamic field as the changes are occurring very rapidly. Dental assistant when working in a dental clinic has to perform his duties at the front line of dental practice, has to help a dental surgeon while doing treatment and taking x-rays. The learner has to gain a strong foundation about the concepts of the syllabus. To accomplish our learning objectives, the learner has to be provided with learning experiences that will correlate with basic and Clinical / laboratory skills.

UNIT 4.1 INTRODUCTION TO ORTHODONTICS

OVERVIEW

Orthodontics is considered as the oldest speciality of Dentistry. Evidences suggest that the attempts were made to treat malocclusion as early as 1000BC .Dr.EdwardBartley Angle is known to be the father of modern orthodontics. It is essential that a dental technician must know the concept of tooth movements and mechanism of action of different orthodontic appliances etc. In this unit the learner get introduced to the orthodontics-especially about occlusion, classification of malocclusion causes and sequelae of malocclusion etc. The learner must get an idea about the aims, objectives and needs of orthodontic treatment. The attachment apparatus or the supporting structure of tooth is called as periodontium, which consist of gingiva, periodontal fibres, cementum and alveolar bone. When a force is applied on the tooth there will be histological changes in the periodontium. For effective tooth movement, force and anchorage unit are important. For effecting tooth movement orthodontic appliances are needed. During fabrication of orthodontic appliance wire bending has to be done very carefully .The efficiency of wire components directly influences the success of the appliance.

UNIT GRID

Ideas/concepts/skill	Learning outcome	Suggested activities	Assessment
Basics of orthodontics Skills Ability to <ul style="list-style-type: none"> • Distinguish between normal occlusion and malocclusion • Classify and 	The learner will be able to <ul style="list-style-type: none"> • Identify different malocclusion • Distinguish normal and malocclusion • Identify the cause and 	Collection of models/cast/photographs of patients showing all the Angle's types of malocclusion Chart preparation Making posters showing the cause of and sequelae of malocclusion	Assessment of samples collected Evaluation of charts/posters Album

identify different types	sequalae of malocclusion	Album preparation	
<p>Tooth movements in Orthodontics</p> <p>Skill</p> <p>Ability to identify tooth movements, biomechanics behind orthodontic treatment</p>	<p>The learner will be able to</p> <ul style="list-style-type: none"> Identify various tooth movements that occur in orthodontic treatment Identify the consequences of giving uncontrolled orthodontic treatment 	<p>Chart showing different tooth movements</p> <p>Diagrammatic representation of biomechanics</p> <p>Preparation of notes</p>	<p>Evaluation of charts and Notes</p> <p>Questionnaire</p>
<p>Anchorage</p> <p>Skill</p> <p>Ability to</p> <ul style="list-style-type: none"> Identify the anchorage units Assist in the fabrication of devices like a head gear. 	<p>The learner will be able to</p> <ul style="list-style-type: none"> Assist in the fabrication of devices like head gear. 	<p>Classroom discussion</p> <p>Demonstration of models, chart preparation.</p>	<p>Questionnaire</p> <p>Evaluation of charts</p>
<p>Orthodontic appliances</p> <p>Skill</p> <p>Ability to</p> <ul style="list-style-type: none"> Identify and categorise the different types of orthodontic appliances. 	<p>The learner will be able to</p> <ul style="list-style-type: none"> Identify and categorise the different types of orthodontic appliances 	<p>Conduct debate, discussion.</p> <p>Demonstration of various types of appliances</p>	<p>Evaluation of discussion report, debate.</p>
<p>Instruments used in wire bending</p> <p>Skill</p> <p>Ability to</p> <ul style="list-style-type: none"> Identify and choose the armamentarium and materials used in wire bending. 	<p>The learner will be able to</p> <ul style="list-style-type: none"> Identify and choose the armamentarium and materials used in wire bending. 	<p>Demonstration of instruments used in wire bending</p>	<p>Questionnaire</p>

Principles of wire bending Skill Ability to <ul style="list-style-type: none"> Handle the instruments properly Fabricate circle square, straightening of wires Fabricate orthodontic cast and study models 	The learner will be able to <ul style="list-style-type: none"> Handle the instruments properly Fabricate circle, square Wire straightening. Fabricate orthodontic cast and study models 	Demonstration of wire bending Discussion, Album preparation Practical activity Demonstration of orthodontic cast preparation Preparation of orthodontic study models	Questionnaire Evaluation of discussion reports and album preparation. Practical evaluation. Practical evaluation.
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Detailing of Practical

1. Preparation of Orthodontic Cast
2. Straightening of wire
3. Making of Square
4. Making of Triangle
5. Making of Semi circle
6. Making of Circle
7. Making of 'U'Loops
8. Making of 'V'Loops
9. Making of U-V Loops

Additional Information

1. Genetic factors in Orthodontics.

Many of the family trace like open bite, Micrognathia, Macrognathia, Retarded eruption of teeth. Abnormal number arrangement of teeth, Missing teeth, Bimaxillary protrusion, etc. Can readily be attributed to hereditary inheritance.

2. Ankylosed tooth are directly fixed to the alveolar bone and hence lack periodontal ligament. Orthodontic movement of such teeth are not possible and they can therefore act as excellent anchors when ever possible

Assessment Activities

Practical evaluation of prepared square, rectangles, v, u loops etc..

Different pliers are given for identification

Diagrams showing the molar relation of different classes of malocclusion are given for identification.

Chart depicting different orthodontic appliances.

Appliances are given for identifying the anchorage unit

List of items in portfolio

1. Orthodontic cast
1. Triangle preparation
2. Rectangle preparation
3. 'U' Loop preparation
4. 'V' loop preparation

4.2 FIXED ORTHODONTIC APPLIANCES

Overview

They are orthodontic appliances that are fixed on the teeth of bands or cementing materials, which cannot be removed by patient at will are called fixed appliance. The tooth movement that are possible are tipping, bodily movement, torquing , up righting, rotation, extrusion and intrusion.

UNIT GRID

Ideas/concept/skill	Learning Outcome	Suggested Activities	Assessment
<p>Components of fixed orthodontic appliances.</p> <p>Skill ability to Identify the components of Fixed orthodontic appliances.</p> <p>.Ability to suggest the orthodontic appliance depending on Identify the advantages and disadvantages of fixed orthodontic appliances</p>	<p>Able to identify the different components of fixed orthodontic appliances – suggest the ideal orthodontic treatment</p> <p>. Identify the advantages and disadvantages of fixed orthodontic appliances</p>	<p>Seminars</p> <p>Debate</p> <p>Collection of photographs of patients before and After treatments</p>	<p>Evaluation of seminars, debate, albums Questionnaire</p>

Detailing of practical

- 1) Spotters identification

Additional information

1. The straight wire technique is a recent modification of edgewise appliance. It enables good finishing of cases
2. Ceramic brackets are used for beauty conscious patients.
3. Pierre Fauchard in 1728 devised the first orthodontic appliance and it was used to expand the dental arch.

Assessment activities

1. Components of FixedOrthodonticAppliances are kept for identification
2. Conduct seminar/debate on the topic comparison of Fixed orthodontic treatment and removable orthodontic treatment

List of items in portfolio

Seminar report, prepared molar bands

4.3REMOVABLE ORTHODONTIC APPLIANCES

OVERVIEW

They are mechanical orthodontic appliances that can be inserted and removed from the oral cavity by the patient. The main components are retentive components, Active component and baseplate

UNIT GRID

Ideas/concept/skill	Learning Outcome	SuggestedActivities	Assessment
4.3.1. Components of removable orthodontic appliance Skill Ability to identify the components	Able to identify the components Suggest the ideal components for the fabrication of removable orthodontic	Chart preparation, Seminar presentation, group discussion,Scrap book	Evaluation of Charts, seminars and discussion reports

<p>Suggest the ideal components for the fabrication of removable orthodontic appliances</p> <p>4.3.2. Different types of clasps Skill Ability to identify the different types of clasps, fabricate clasps, suggest ideal clasp</p> <p>4.3.3 Different types of bows Skill Ability to identify the different types of bows, fabricate bows, suggest ideal bows</p> <p>4.3.4 Different types of springs Skill Ability to identify the different types of springs, fabricate springs, suggest ideal springs</p> <p>4.3.5 Different types of expansion components Skill Ability to identify expansion screws, coffin spring Able to fabricate coffin spring</p> <p>4.3.6 Construction of different orthodontic appliances Skill Ability to identify the different removable</p>	<p>appliances</p> <p>Able to identify the different types of clasps, fabricate clasps, suggest ideal clasp</p> <p>Able to identify the different types of bows, fabricate bows, suggest ideal bows</p> <p>Able to identify the different types of springs, fabricate springs, suggest ideal springs</p> <p>Able to identify expansion screws, coffin spring Able to fabricate coffin spring</p> <p>Able to identify the different removable orthodontic appliances and its Indication</p> <p>IIIINDIuses,suggest and fabricate removable orthodontic appliances</p>	<p>Chart preparation, Album preparation of prepaid clasp,seminars,</p> <p>Collection of samples group discussion,seminar</p> <p>Collection of models recommended for springs of different patients</p> <p>Collection of models recommended for expansion components of different patients Chart preparation, Album preparation case study</p> <p>Charts preparation videos presentation given patient model for recommendation of ideal appliances group discussion</p>	<p>Evaluation of charts, albums seminars</p> <p>Evaluation of sample collected, discussionreports</p> <p>Evaluation of suggestion of appliance,discussion reports</p> <p>Evaluation of sample collected,discussion reports</p> <p>Evaluation of charts and recommendation of appliances, discussion reports,questionnaire</p>
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orthodontic appliances and its uses, suggest and fabricate removable orthodontic appliances			
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Detailing of practicals

1. Identification of active and retentive components in the given removable orthodontic appliance.

2. Fabrication of

Adams clasp

C clasp

Z Spring

Finger spring

Coffin Spring

Labial bow (Long and short)

3 Fabrication of appliances in different cases.

Additional Information

Aligners -They are invisible transparent removable aligners made out of a thin class plastic. Splint used to realign the patients teeth as an attraction to wires and brackets like regular dental braces.

Fan type RME – Indicated of more anterior expansion is desired than posterior

Rapid lower expander – for lower expansion wire the lower arch is severely constricted

Pendulum appliances with TMA – Appliance of choice to drive upper molar distally.

Assessment Activities

Seminar presentation on the topic Components of Removable Orthodontic Appliance, Advantages and Disadvantages of Removable Orthodontic Appliance fabrication of different removable orthodontic appliances. Puzzles, Quiz. Charts Showing Diagrammatic representation of different appliances and its indication.

List of items in portfolio

1. Seminar report
2. Charts

3. Appliances fabricated

4.

4.4. MYOFUNCTIONAL APPLIANCES

OVERVIEW

Myofunctional appliances /functional appliances are passive appliances which harness the natural forces of the orofacial musculature that are transmitted to the teeth and alveolar bone through the medium of the appliance. They do not cause tooth movement by directly applying force. They guide the growth of jaws there by intercepting and treating malocclusions. Functional appliances work on two principles. Force application and force elimination.

Unit grid

Ideas/concept/skill	Learning Outcome	Suggested Activities	Assessment
4.4.1 Myofunctional appliances Skill-Ability to identify advantages, disadvantages, identify different myofunctional appliances and classify myofunctional appliances	Able to identify advantages, disadvantages, identify different myofunctional appliances and classify myofunctional appliances	Debate, Scrapbook, model preparation, album preparation	Evaluation of questionnaire, model, album, scrap book
4.4.2 Bite planes, oral screen, activator, lip bumper, Frankel's appliances, bionator Skill able to identify the different functional appliances, assist in the fabrication of the appliances. able to fabricate oral screen	Able to identify the different functional appliances, assist in the fabrication of the appliances. able to fabricate oral screen	Chart preparation. Group discussion, sample collection of patients models and appliances	Evaluation of charts discussion reports, collected samples and questionnaire

Detailing of practicals

1) Identification of different myofunctional appliances

2) Fabrication of oral screen

Additional Information

Herbst Appliance fixed functional appliance of choice in non-cooperating patient's

Twin block - Used for definite anterior placement of mandible.

Assessment Activities

Charts showing diagrams of functional appliance and its uses, puzzle, quiz, collection of photos of patient use in functional appliance, showing before and after treatment results, seminar presentation

List of Item in Portfolio

Album, case study, chart made

4.5.SPACE MAINTAINERS

Overview

Deciduous teeth are meant to exfoliate and space created by loss is taken up by the replacing permanent tooth. But the early loss of the deciduous tooth can cause some undirected consequences such as derangement of occlusion, T.M.J pain, reduction of arch length mesial and distal migration of teeth etc. To counter these consequences space maintainers are suggested.

Unit grid

Ideas/concept/skill	Learning outcomes	Suggested activity	Assessment
<p>4.5.1 Indications of space maintainers have to be identified. Types and classifications of different appliances are explained. Skill Ability to suggest the space maintainers in different cases. -choose the ideal appliances.</p>	<p>The learner will be able to -Identify the different space maintainers. -choose the types of appliances.</p>	<p>-Demo preparation -video presentation of Preparation of appliances.</p>	<p>-Questionnaire -practical evaluation.</p>
<p>4.5.2 Fixed space maintainers Different types of fixed appliances are explained. Skill Ability to identify different fixed space maintainers.</p>	<p>The learner will be able to Identify the different fixed space maintainers.</p>	<p>Demo preparation Preparation of appliances.</p>	<p>Questionnaire Practical evaluation</p>
<p>4.5.3 Removable space maintainers Removable space maintainers are explained.</p>	<p>The learner will be able to Identify and fabricate</p>	<p>Video presentation. Demonstration of hands on</p>	<p>Quiz</p>

Its fabrication in suggested conditions. Skill Ability to identify removable space maintainers. 4.5.4 Space regainers The different types of space regainers are explained. Skill Ability to identify different types of space regainers.	removable space maintainers. The learner will be able to Identify the different space regainers.	preparation. Video presentation of Preparation of appliances	Practical evaluation Questionnaire Evaluation of practicals
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Detailing of practicals

Identification of appliances

Can assist in dental labs in the fabrication

Additional informations

Serial extraction is done to prevent chances of occurrence of malocclusion. The surest way to hold a space is to bridge that space with an appliances that is cemented to the adjusted teeth

Transpalatal arch is indicated when one side of the arch is intact and several primary teeth on the other side are missing.

Assessment activities

Seminar presentation, quiz,

4.6 HABIT BREAKING APPLIANCES

Overview

Oral habits can cause changes in the oro-facial structure. So it is very much concerned to a dental surgeon .The different oral habits that can cause many undesired intraoral and extra oral manifestation are thumb/digital sucking, tonguethrusting, lipbiting, bruxism, mouth breathing, nail biting etc.

Unit Grid

Ideas/concepts/skill	Learning objectives	Suggested Activities	Assessment
4.6.1 Habits definition and types	The learner will be able to	Album preparation -collection of	Album evaluation

<p>Skill Ability to identify habit breaking appliances 4.6.2 Different appliances used in various condition Skill Ability to fabricate habit breaking appliances used in the case of digital sucking, mouth breathing, tongue thrusting</p>	<p>Identify the habit breaking appliances The learner will be able to fabricate different habit breaking appliances.</p>	<p>pictures of patients with different oral habits and their models. Chart preparation Group discussion collection of samples for different dental clinics. -models of pictures of patients.</p>	<p>Picture evaluation Chart presentation Discussion reports practical evaluation -Model evaluation</p>
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Detailing of practicals

Identification of different habit breaking appliances.

Fabrication of oral screen.

Fabrication of tongue guard appliance

Additional information

Silensor -sl

A new appliances has launched by reputed dental labs claiming for a perfect solution of snoring while sleeping and patients with Sleep Apnea.

Assessment activities

Open book assessment

Fabrication of oral screen

Fabrication of Hawley's appliance with palatal cribs

Demonstration of procedure

Spotters

Case study

List of items in portfolio

Report of case study

Appliances fabricated

4.7 Retainers

Overview

Retention is defined as maintaining newly moved teeth in position, long enough to aid in stabilizing their correction.

Retainers are needed because teeth after orthodontic treatment have the tendency to revert back to the previous oral positions. To prevent this, retainers are used.

UNIT GRID

Ideas/Concepts/Skill	Learning Objectives	Suggested Activity	Assessment
<p>4.7.1</p> <p>Retention, Types of retention Uses and Types Skill Ability to identify the different types of retainers.</p>	<p>The learner will be able to Identify different types of retainers assist the dental surgeon.</p>	<p>Diagrammatic representation Collection of models showing relapse. Visit dental clinic</p>	<p>Evaluation of diagrams made. Collection of models. Visit report</p>
<p>4.7.2</p> <p>Removable retainers Types and indication Skill Ability to identify and suggest ideal removable retainers. Able to fabricate Hawley's retention appliances.</p>	<p>The learner will be able to identify different removable retainers. able to assist in dental lab.</p>	<p>Collection of patient's cast after orthodontic treatment. Group discussion Collection of photos from dental journals. Fabrication of retainers In the lab.</p>	<p>Evaluation of collected sample. Discussion reports -Album preparation practical evaluation Visit report</p>
<p>4.7.3 Fixed retainers</p> <p>Skill Able to identify</p>	<p>The learner will be able to Identify different types of fixed retainers.</p>	<p>Visit to dental clinics Video presentation Scrap book</p>	<p>Questionnaire Evaluation of scrap book.</p>

Identify different types of fixed retainers.			
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Detailing of Practicals

Fabrication of Hawley’s retention appliances

Spotters

Identification of different types of retention appliances

Additional information

The use of Head gears of Functional Appliances to maintain the Class-II correction is indicated; if the active treatment is completed at an early age at continued growth is expected following the active phase of treatment

Wrap around retainer is used instabilizing periodontally weak dentition.

Assessment activities

Open book assessment

Fabrication of Hawley’s retention appliance

Seminar presentation

Collection of datas from clinics

Case study

List of items in portfolio

Report of case study

Hawley’s retention appliances fabrication

Seminar report

Report of data collection

4.8 DENTAL ASSISTANCE PART-2

Over view

This units deals with perhaps the most sensitive area indental practice –The front office/Reception. The learner is taken through the administrative aspects and patient management in the reception .The learners are also exposed to the chair side procedures So that they will be able to assist in

- 1 .Patient preparation before dental procedures

2. Dental surgical as well as non-surgical procedures.
3. Taking dental X-rays etc.

Unit grid

Ideas/concepts/skill	Learning outcomes	Suggested activity	Assessment
<p>4.8.1</p> <p>Ability to assist a dental surgeons in taking dental X-rays such as Periapical, bite wing, occlusal etc.</p> <p>Ability to assist a dental surgeon in taking protection measures during X-ray taking.</p> <p>Ability to manage front office of dental clinic.</p> <p>Ability to assist a dental surgeon during chair-side treatment procedure</p>	<p>The learner will be able to assist a dental surgeons in taking dental X-rays such as Periapical, bite wing, occlusal etc.</p> <p>The learner will be able to assist a dental surgeon in taking protective measures during X-ray taking.</p> <p>The learner will be able to manage front office of dental clinic.</p> <p>The learner will be able to assist a dental surgeon during chair-side treatment procedure</p>	<p>Visit dental clinics,</p> <p>Assist Dental Surgeons, group discussion,</p> <p>Assist dental receptionist.</p>	<p>Report of clinic visit, discussion reports, questionnaire.</p>

Detailing of Practicals.

Role Play.

Identification of instruments used in dental clinic.

Identification of different dental x-rays.

Additional Information

Advances in radiological techniques –xero radiography, zeugmatography, radiovisiography, stereography, thermagraphy

Assessment activities

Clinic visit

Role play

Group discussion

Debate, Seminar.

List of items in portfolio

Seminar report, report of dental clinic visit

4.9 SOLDERING AND WELDING

Overview

Soldering and welding procedures are important in dentistry as they are used frequently in fabrication and repair of prosthodontic and orthodontic appliances. Spot welding is also included because it is very much needed during fixed orthodontic treatment.

UNIT GRID

Ideas/concepts/skill	Learning outcomes	Suggested activity	Assessment
<p>4.9.1 Introduction of soldering/welding/brazing etc Skill Ability to differentiate soldering, welding, brazing etc. -to identify dental solders and its requirements. to familiarise the technique of application of dental solder</p>	<p>The learner will be able to differentiate between soldering, welding brazing.</p>	<p>Video showing seminar presentation. Spotters. Group discussion.</p>	<p>Notes preparation -seminar report Questionnaire Evaluation on discussion reports.</p>
<p>4.9.2 Flux, antflux Skill. Able to identify the need of flux and antflux and their requirements to familiarise the technique of application of flux and antflux.</p>	<p>The learner will be able to need of flux and antflux application of flux and antflux.</p>	<p>Identification of instruments Visit to dental labs. Notes preparation</p>	<p>Questionnaire Report presentation Class test</p>
<p>4.9.3 Procedure for soldering Skill Ability to identify the principles of soldering. assist in freehand and investment soldering. to select the ideal soldering technique.</p>	<p>-assist in freehand and The learner will be able to investment soldering -select ideal solder for soldering procedure.</p>	<p>-Group discussion - Visit to dental labs</p>	<p>-Quiz -Report on visit</p>
<p>4.9.4 Welding, spot welding. Skill Ability to identify the technique of welding and</p>			<p>-Video report</p>

spot welding Ability to perform spot welding	The learner will be able to -identify the technique of welding and spot welding. -Assist in fabrication of molar bands for patient case.	-multimedia presentation. -visit to dental clinics and labs. Fabrication of molar bands Seminar	-Report on visit -Evaluation of molar bands made.
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Detailing of practicals

Identification of items such as Flux, anti-flux, Dentalsolders, spot welder

Fabrication of molar bands using spot welders

Additional information

There are certain factors to be considered during soldering.

1. Use the reducing flame of the soldering torch.
2. Use wet cotton and asbestos to limit the spread of heat.
3. The soldered joint should not be polished, as it weakens the joint.
4. Anti-flux should be used to prevent excessive spread of solder.

Assessment activities

Spotters

Fabrication of molar bands

Seminar presentation

Quiz

List of items in portfolio

Molar bands

Seminar reports

Extended activities

1. Conduct dental camps in schools and other residential areas in collaboration with local dental association branches. Learners can participate in organizing and observe camp activities.

2. The learners can be given postings in the licensed and established dental clinics for observation in various departments in holy days.
3. Can conduct home visits and communicate the details of advanced dental treatments with public.

ON THE JOB TRAINING

“On the Job Training programme” plays an important and irreplaceable role in Vocational Higher Secondary Education. It enables the Learner to experience personally the environment in a real work place -the Dental Laboratory and Dental clinic. He/she witness the problematic situations arising in the workplace and their solutions.

On the Job Training Programme in Dental Technology course can be held in 2 sectors. One spell of 14 days in first year and the 14 days in second year studies. This programme will be successfully held at various famous Dental hospitals, Govt. Dental colleges and Dental Laboratories etc.

Dental Clinic/Govt: Dental Hospital

- The learner to get a basic knowledge and smooth functioning of the front office in a multi-specialty dental hospital.
- The Learner to achieve a basic knowledge about Human dentition in connection with their sex and age group.
- The Learner will get a deep knowledge of the identification skill develop in the proper use of instruments and equipments.
- Able to assist in infection control and sterilization procedure in a Dental clinic.
- The learners will be in close proximity to the Dental chair side procedures like taking impression ,Jaw relation of the patient to different age sex , personality (SPA factor)
- A deeply knowledge about the identifying capacity of individual teeth, collection of patients, cast and edentulous models from a Dental clinic.
- The learner will be able to closely watch the jaw relation, Jaw relation, Jaw bones its structures and complete knowledge of primary and permanent dentition.

Dental Laboratory

The learner will be able to

- use Gypsum products successfully- Working time and setting time
- To understand lot of different types of Dental Waxes and Denture base materials used in a Dental lab
- Various types of trimming and polishing works
- The learner will witness a lot of fabrication and repair procedures.

- The learner will be able to closely watch the fabrication procedures of dental prosthesis such as bridge, denture, dental implant etc.
- The learner will be able to closely observe the ceramic furnace, casting furnace and its working functions.
- The learner will be able to closely observe all essential elements required in dental laboratory.
- The learner will be able to attain the various handling skill required in a dental laboratory.
- The learner will be able to observe the proper use of welding and soldering machines

LIST OF TOOLS, EQUIPMENTS AND MATERIALS

TOOLS

1. Universal plier
2. Adams plier
3. Wire cutter
4. Colouring pencil
5. Glass slab
6. Waxing instruments
7. Soft brush
8. Bunsen burner
9. Casting ring
10. Crucible former
11. Ceramic crucible
12. Casting tongs
13. Ring liner
14. Protective goggles
15. Polishing Instruments

EQUIPMENTS

16. Spot welder
17. Model trimmer
18. Dental lathe
19. Impression trays
20. Vibrator
21. Dental Flask

MATERIALS

22. Stainless steel wires

23. Dental stone
24. Die stone
25. Plaster of Paris
26. Investment materials
27. Dental alloys
28. Die materials
29. Flux and antflux
30. Dental amalgam
31. Dental porcelain
32. Acrylic resin
33. Cold mould seal
34. Vaseline
35. Impression materials
36. Inlay wax
37. Die spacer
38. Cotton cloth
39. Sprue wax with reservoir
40. Polishing materials

FIXED ORTHODONTIC APPLIANCES

41. Bands
42. Brackets
43. Buccal tubes
44. Lingual attachments
45. Lock pins
46. Ligature wire
47. Elastics
48. Separators
49. Expansion screws

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