Excel Dentistry

A complete question bank for 2nd year BDS students

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Dedicated to

Our Parents

Head of the Department

Co - PGs

Aspiring Students

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Resist negativity by stopping overthinking,

Retain consistency by working hard.

Tahmina

PREFACE

This edition of Excel Dentistry has been updated with recent advancements, hope the readers will find the book more informative and updated.

The material in the book is introductory for a beginner in dentistry.

Although there are many books in the market, but the speciality of this book is that we have solved 85+ question papers from the 10 years question papers of Rajiv Gandhi university of health and sciences, every topic has been discussed in detail keeping in mind the information required.

While updating this Edition of Excel dentistry, suggestions and corrections which were received from the students and colleagues have been taken into deeply grateful consideration.

We are intensely grateful to all those friends & family members who were involved in getting this book ready.

We are immensely thankful to so many colleagues as well as to the readers of the previous editions.

Hopefully, the book provokes both positive and negative reactions. Despite many efforts, we accept imperfection in this book if any.

We genuinely welcome all the readers for any kind of suggestions or any mistakes and We'll look forward to further improvement which will be deeply cherished.

Finally, we extend our heartfelt thanks and acknowledge the pleasure of working with the EXCEL BDS TEAM.

Dr Syed Ahmed Khadri

Dr Junaid ur Rahman Syed

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We are deeply grateful to my faculty and would like to owe a special note of thanks.

Under Almighty's guidance and blessings, it's a matter of pleasure to introduce Latest Edition of "Excel Dentistry"

We are so thankful to our parents, siblings, and well-wishers whose co-operation, encouragement and support which helped us during the complete preparation of this book.

We are thankful to the staff of EXCEL BDS, for their patience and continuous support.

Last but not least, we'd like to thank our parents for their continuous support.

Lastly, we acknowledge every person who helped us in some or the other ways has inspired us and has worked hard towards making the quality of this book.

Dr Syed Ahmed Khadri
Dr Junaid ur Rahman Syed

NOVEMBER 2021

LONG ESSAY (1 x 10 = 10 Marks)

1. Classify Local Anesthetics. (Dec 2019) Discuss the mechanism of action, adverse reactions and Therapeutic uses of Lignocaine. (July 2019)
2. Classify Anti-Hypertensive drugs. Discuss the mechanism of action, adverse reactions and Therapeutic uses of ACE inhibitors. (Dec 2018)

SHORT ESSAYS (3 x 5 = 15 Marks)

3. Rifampicin. (Dec 2018)
4. Biotransformation.
5. Compare and Contrast Heparin and warfarin. (June 2011)
6. Insulin preparations.
7. Uses and Adverse effects of Atropine. (July 2019)
8. Anti-caries drugs.
9. Phenytoin. (July 2015)
10. Common properties of Aminoglycosides. (June 2012)

SHORT ANSWERS (5 x 2 = 10 Marks)

11. Sublingual route. (July 2015) (Routes of drug administration)
12. Neostigmine. (Dec 2018)
13. Rationale for combining Levodopa and carbidopa.
14. Mention the adverse effects of Beta Blockers. (Dec 2019)
15. Mention uses of Alpha Blockers.

ANSWERS

Q1. Classify Local Anesthetics. (Dec 2019) Discuss the mechanism of action, adverse reactions and Therapeutic uses of Lignocaine. (July 2019)

Ans:

Lignocaine which is also called lidocaine has been seen to have number of therapeutic uses such as:

i. Local anesthetic agent: Lignocaine is one of the most commonly used local anaesthetics in dentistry. It can be used as a nerve block or infiltration, depending on the type of treatment.

- It can also be used as eye drops for short ophthalmic procedures.

ii. Cardiac arrhythmia:

- Lidocaine is also the most important class-1b antiarrhythmic drug.
- It is used intravenously for the treatment of ventricular arrhythmias.

iii. Surface anaesthesia: While performing endoscopies, before intubations, etc.

iv. Before root canal treatment:

v. Gingivectomy

vi. Draining abscess

Q2. Classify Anti-Hypertensive drugs. Discuss the mechanism of action, adverse reactions and Therapeutic uses of ACE inhibitors. (Dec 2018)

Q3. Rifampicin. (Dec 2018)

Q4. Biotransformation.

Ans:

When a chemical alteration of the drug occurs in the body it is called as biotransformation.

- When the lipid soluble compounds are made to lipid insoluble compounds so that excreted and nor reabsorbed. It is seen in drugs such as hydrophilic drugs neostigmine or decamethonium.

The pathways of drug metabolism can be divided into:

- **phase I:** The functional group metabolite may be active or inactive.

Prodrug	Active form
Dipivefrine	Epinephrine
Levodopa	Dopamine
Enalapril	Enalaprilat
Proguanil	Cycloguanil
Bacampicillin	Ampicillin
Sulfasalazine	5-Aminosalicylic acid
Acyclovir	Acyclovir triphosphate

- **Phase II:** Endogenous antioxidants, which are products of the body's metabolism, are conjugated to the drug.

➢ **Sites:** Liver is the main site for drug metabolism; other sites are GI tract, kidney, lungs, blood and skin.

Nonsynthetic reactions:

a. Oxidation: Adding up of oxygen or its removal of hydrogen is called oxidation. Eg: Phenytoin, phenobarbitone, pentobarbitone.

b. Reduction: Removal of oxygen and/or addition of hydrogen is called as reduction. Eg: Chloramphenicol, methadone.

c. Hydrolysis: The breaking down of compound by adding up of water is known as hydrolysis. Eg: Amides—lignocaine, procainamide.

Synthetic reactions

➢ It is the conjugation of the drug with an endogenous substrate.

➢ To make a polar highly ionized organic acid It is made from carbohydrate or amino acid that is excreted through urine or bile.

a. Glucuronide conjugation

b. Acetylation

c. Methylation

d. Sulfate conjugation

e. Glycine conjugation

f. Glutathione conjugation

g. Ribonucleoside/nucleotide synthesis

Drug-Metabolizing Enzymes:

- Classically both microsomal and nonmicrosomal enzymes are missing in the newborn because of which they are very much prone to many drugs.
- They are broadly divided into two groups—microsomal and nonmicrosomal enzyme systems.

1. Microsomal enzymes:

- **Site:** Endoplasmic reticulum of the cells and it comprises of cytochrome P 450, glucuronyl transferase, etc.
- They catalyze most of the phase I reactions and phase II glucuronide conjugating reaction.
- Microsomal enzymes can be induced.

2. Nonmicrosomal enzymes:

- **Site:** Cytoplasm, mitochondria of liver cells and in plasma.
- They catalyze all phase II reactions excluding glucuronide conjugation.
- The reduction and hydrolytic reactions are also taken out by nonmicrosomal enzymes.
- Nonmicrosomal enzymes are not inducible.

Hofmann elimination:

- In the body fluids when the drug is inactivated by spontaneous molecular rearrangement without the agency of any enzyme such as atracurium.

Q5. Compare and Contrast Heparin and warfarin. (June 2011)

Q6. Insulin preparations.

Ans:

Earlier insulins: They were made from pork and beef pancreas.

- Such insulins had antigenic content which created problems related to hypersensitivity.
- The soluble insulin or unmodified insulin is a buffered solution that had to be injected s.c. 3-4 times daily. The results were not satisfying.
- Zinc with or without protamine preparation

was made to slow down the absorption.

Human insulin: These are made by recombinant DNA technology

- This insulin also had the same amino acid composition which was made by the human pancreas.
- This type of insulin is commonly preferred.
- It created few rates of hypersensitivity reaction, lipodystrophy at the injection site.

Insulin analogues:

- The insulin analogues of human insulin are having modified pharmacokinetics after they have been injected subcutaneously.
- They stable up to a greater extent.
- The actions of insulin are consistent throughout the duration of injection.
- Rapid insulin preparation are insulin lispro, insulin aspart and insulin glulisine with shorter duration of action.
- Slow action insulin are insulin glargine and insulin detemir.
- The slow insulin are given once daily through s.c. route.
- In the current era there are numerous insulins analogues that are available in the market such as:

Long acting

- Insulin glarging
- Insulin detemir

Rapid acting

- Insulin lispro
- Insulin aspart
- Insulin glulisine

Short acting

- Regular (soluble) insulin

Intermediate acting

- Insulin zinc suspension
- Neutral protamine hagedorn
- Isophane insulin

Q7. Uses and Adverse effects of Atropine. (July 2019)

Q8. Anti-caries drugs.

Ans:

These are the drugs that act as a preventive measure in causing dental caries.

The drugs are classified in two ways such as:

a. Fluoride application (July 2018)

b. Antiplaque agents (July 2019)

c. Additional measures such as:

- Control of sugar compounds: Carbohydrate containing substances are restricted in the diet.
- Regular brushing of teeth: Patient is advised to brush the daily twice in a day.
- **Xerostomia:** In patient with xerostomia drugs that stimulate saliva are given and are advised to avoid sticky chocolates.

Q9. Phenytoin. (July 2015)

Q10. Common properties of Aminoglycosides. (June 2012)

Q11. Sublingual route. (July 2015) (Routes of drug administration)

Q12. Neostigmine. (Dec 2018)

Q13. Rationale for combining Levodopa and carbidopa.

Ans:

Carbidopa and benserazide are peripheral decarboxylase inhibitors.

- These drugs do not penetrate blood-brain barrier.
- They inhibit the conversion of levodopa to dopamine hence can be used in parkinsonism disease.
- Levodopa is actually a precursor of the trans-

mitter dopamine.

- The combination of levodopa + carbidopa is called fixed dose combinations.
- The combination increases its t½.
- The influx of dopamine created by levodopa helps treat the motor symptoms of parkinsonism disease.
- This also means that lower doses of levodopa can be given.

Q14. Mention the adverse effects of Beta Blockers. (Dec 2019)

Q15. Mention uses of Alpha Blockers.

Ans:

Presurgery of pheochromocytoma: Phenoxybenzamine.

- During surgery: Phentolamine
- Carcinoid tumour: Phenoxybenzamine.
- Mastocytosis: Phenoxybenzamine
- Accidental infiltration of alpha agonist: Phentolamine.
- Overdose of sympathomimetics such as amphetamine
- Raynaud's phenomenon: Phentolamine
- Hypertensive emergencies
- Benign prostatic hyperplasia
- Tissue necrosis: By giving phentolamine through extravasation of α-agonists, the necrosis is prevented.

NOVEMBER 2021

LONG ESSAY (1 x 10 = 10 Marks)

1. Name the bacteria which are sexually transmitted. (Dec 2013) Describe the laboratory diagnosis of primary Syphilis. (June 2019)

SHORT ESSAYS (3 x 5 = 15 Marks)

2. Moist heat method of sterilization. (July 2018)
3. Innate immunity (Dec 2014)
4. Laboratory diagnosis of streptococcus pyogenes

SHORT ANSWERS (5 x 2 = 10 Marks)

5. Robert Koch (Dec 2015)
6. List the lesions caused by staphylococcus aureus. (July 2015)
7. Viruses causing meningitis.
8. Lesions caused by candida albicans. (June 2014)
9. Diagnosis of hepatitis B virus (Dec 2017)

ANSWERS

Q1. Name the bacteria which are sexually transmitted. (Dec 2013) Describe the laboratory diagnosis of primary Syphilis. (June 2019)

Q2. Moist heat method of sterilization. (July 2018)

Q3. Innate immunity (Dec 2014)

Q4. Laboratory diagnosis of streptococcus pyogenes

Ans:

Streptococcus pyogenes, or Group A streptococcus (GAS), is a facultative, Gram-positive coccus which grows in chains.

- It causes numerous infections in humans including pharyngitis, tonsillitis, scarlet fever, cellulitis, erysipelas, rheumatic fever, post-streptococcal glomerulonephritis, necrotizing fasciitis.

In acute infections:

- The diagnosis is made by Isolation and identification of b-streptococci from the patient

In non-suppurative complications:

- Diagnosis is made by Identifying for a rising titer of antibody to one or more streptococcal antigens in patient's serum.

Acute Suppurative infections

Swabs:

- In such condition the specimens are collected from throat and nose swabs, high vaginal swabs, pus or pus swabs.
- Serum is also collected for antibody demonstration.

Microscopy:

- The pus and CSF are examined for gram-stained films.
- If gram-positive cocci are seen in chains, then it is suspecting diagnosis for streptococcal infection.

Culture:

- It is cultured on blood agar and incubated at 37°C under 5–10% CO2.

Selective media are:

- Crystal violet blood agar
- PNF medium

Identification:

- Culture on sheep blood agar:
- It shows transparent and smooth colonies that are shows areas of β-hemolysis.
- Gram staining: Gram positive cocci with short chains.
- Lancefield technique is used group hemolytic streptococci.
- Group A streptococci are identified by the fluorescent antibody technique.
- Bacitracin and hydrolyzes PYR are the test that are positive for streptococcus pyogenes.
- Presence of the antigen is determined by en-

zyme immunoassay (EIA) or agglutination tests.

Nonsuppurative Complications:

Tests performed:

- Anti-streptolysin O (ASO) test: ASO titers >200 Todd units/mL is positive.
- Anti-deoxyribonuclease B: Titers >300 or 350
- Streptozyme test
- Anti-hyaluronidase (ASH) tests

Q5. Robert Koch (Dec 2015)

Q6. List the lesions caused by staphylococcus aureus. (July 2015)

Q7. Viruses causing meningitis.

Ans:

Definition:

- Meningitis is a serious infection of the meninges, the membranes covering the brain and spinal cord.

Viruses causing meningitis are:

- Arboviruses
- Herpes simplex
- Varicella-zoster
- Coxsackieviruses
- Echoviruses
- Measles
- Mumps
- Adenoviruses
- Polioviruses

Q8. Lesions caused by candida albicans. (June 2014)

Q9. Diagnosis of hepatitis B virus (Dec 2017)

NOVEMBER 2021

LONG ESSAY (1 x 10 = 10 Marks)

1. Define shock. Mention the types and discuss the etiopathogenesis of septic shock. (Dec 2015)

SHORT ESSAYS (3 x 5 = 15 Marks)

2. Define Gangrene. Mention the types and discuss the difference between them. (June 2019)
3. Downs syndrome.
4. Osteogenic sarcoma. (Osteosarcoma) (Dec 2018)

SHORT ANSWERS (5 x 2 = 10 Marks)

5. List four opportunistic infections in AIDS. (Dec 2017) (Microbiology)
6. Causes of Eosinophilia -any four. (July 2018)
7. Ghon's focus. (March 2021)
8. Microscopic features of squamous cell carcinoma. (Dec 2019)
9. Factors affecting wound healing. (Dec 2012)

ANSWERS

Q1. Define shock. Mention the types and discuss the etiopathogenesis of septic shock. (Dec 2015)

Q2. Define Gangrene. Mention the types and discuss the difference between them. (June 2019)

Q3. Downs syndrome.

Ans:

Down syndrome was first described by an English physician John Langdon Down in 1866.

- It is the presence of all or part of the third copy of chromosome 21 which causes Down syndrome, the most common chromosomal abnormality occurring in humans.
- It is also found that the most frequently occurring live born aneuploidy is trisomy 21 that causes this syndrome.
- It is one of the leading causes of mental retardation.

Etiology:

- The majority of patients with Down syndrome have an extra copy of chromosome 21.
- The commonly suspected etiology is gene dosage imbalance in which there is an increased dosage or number of genes of Hsa21, which results in increased gene expansion.
- Nondisjunction in the first meiotic division of gametogenesis that can cause trisomy 21.
- Robertsonian translocation

Clinical features:

These patients have a wide array of signs and symptoms like

a. Intellectual and developmental disabilities or neurological features

- Patients have an IQ of (25–50).

b. Congenital heart defects:

- Patient shows atrioventricular septal defect (AVSD)
- The other cardiac defects associated with trisomy 21 are secundum atrial defect
- Tetralogy of Fallot
- Isolated PDA
- Patients usually have more than one cardiac defect.

c. Gastrointestinal (gi) abnormalities

- Defects seen are like duodenal and small bowel atresia or stenosis

- Annular pancreas
- Imperforate anus
- Hirschsprung disease occur more commonly in these patients.

d. Hematologic Disorders

It includes constitute:

- Neutrophilia
- Thrombocytopenia
- Polycythemia and acute myeloid leukemia.

e. Characteristic facial features and abnormalities

- Flat face and occiput
- Low-bridged nose
- Reduced interpupillary distance
- Oblique palpebral fissures.
- Mongolism
- Brush field spots
- Malformed ears.
- Macroglossia

f. Endocrine abnormalities: Hypothyroidism

g. Reproductive system: Men are sterile

h. Down syndrome: Alzheimer disease at younger age.

Q4. Osteogenic sarcoma. (Osteosarcoma) (Dec 2018)

Q5. List four opportunistic infections in AIDS. (Dec 2017) (Microbiology)

Q6. Causes of Eosinophilia -any four. (July 2018)

Q7. Ghon's focus. (March 2021)

Q8. Microscopic features of squamous cell carcinoma. (Dec 2019)

Q9. Factors affecting wound healing. (Dec 2012)

NOVEMBER 2021

LONG ESSAY (2 x 10 = 20 Marks)

1. Define and classify dental composite resins. (Dec 2019) Describe in detail the properties and uses of hybrid composites.
2. Classify impression materials. (Dec 2018) Write in detail the composition, properties and uses of zinc oxide eugenol impression pastes. (Dec 2014)

SHORT ESSAYS (8 x 5 = 40 Marks)

3. Die material- types and uses.
4. Tarnish and corrosion. (June 2019)
5. Composition of ceramics. (Dec 2014)
6. Sprue former.
7. Pit and fissure sealants. (July 2015)
8. Dough stage in acrylic resins.
9. Nickel chromium alloys.
10. Biocompatibility of dental materials. (June 2019)

SHORT ANSWERS (5 x 2 = 10 Marks)

11. Acid etch technique. (Dec 2017)
12. Zinc polycarboxylate cement. (Dec 2017)
13. Stress and strain. (Dec 2018)
14. Objectives of Amalgam condensation.
15. Soldering. (Dec 2019)

ANSWERS

Q1. Define and classify dental composite resins. (Dec 2019) Describe in detail the properties and uses of hybrid composites.

Ans:

Hybrid composites can be defined as the materials that consist of two or more types of fibers embedded in a single polymer matrix.

- They have properties like lightweight, strength to weight ratio, low cost, ease of structure development and high strength.
- Reduced polymerization shrinkage, packability, esthetics of a ceramic in a composite, non-sticky consistency for easy sculpting, excellent polish ability, high bond strength and radiopacity.
- Hybrid composites are light cured and with an average curing time of 30 seconds.
- They are composed of two types of filler particles, such as the colloidal silica and barium glass.
- Colloidal silica provides increased surface area.
- The filler particles size is approximately around 0.6–1 µm.
- These composites have presented better surface smoothness.
- They also have higher mechanical properties.

Properties of hybrid composite:

Compressive	500 MPa strength
Tensile strength	34–62 MPa
MOE	13,500–18,000 Mpa
COTE	25–38 ×10–6/°C
Thermal diffusivity	0.675 mm2/ sec

Uses

- They are recommended for use in anterior teeth restoration as they necessitate surface smoothness and renders good strength.
- These composites are broadly used for stress bearing areas.

Q2. Classify impression materials. (Dec 2018) Write in detail the composition, properties and uses of zinc oxide eugenol impression pastes. (Dec 2014)

Q3. Die material- types and uses.

Ans:

A die is a positive replica of single tooth or reproductions of multiple teeth with prepared cavities that are employed during formation of restorations such as crowns, bridges, inlays and onlays.

Types of Die Materials

a. Electroformed dies such as metal plated dies.

b. Zinc-silico phosphate cement.

c. Type IV Gypsum, Die stone with high strength.

d. Type V Gypsum, Die stone with high strength and high setting expansion.

e. Epoxy resins, polyesters and epimines

f. Metal sprayed dies

g. Silver amalgam.

f. Ceramic die materials

Electroformed dies such as metal plated dies.

- Dies are formed by the electrodeposition of metal.
- The dental electroplating process of impression material is formed electrically conductive that gives cathode (-ve), and the metal which is to be deposited is made as anode (+ve).

Types

1. Copper (Cu) plated
2. Silver (Ag) plated

Uses:

- They are used in electroplating an impression material such as impression compound, addition polysilicone, can be copper plated and addition polysilicone and polysulfides can be silver-plated.

Die stones:

- The die stone have decreased abrasion resistance.
- The hardness of gypsum products is increased by adding to the set gypsum with methyl methacrylate which is kept to polymerize.
- Polymerization creates a polymer phase, that occupies many of the porosities in set gypsum and eventually elevates the strength and hardness.

Uses

- For making casts or dies for crown, bridge and inlay fabrication.
- They provide strength and surface hardness which is superior to stone.

Ceramic die materials:

- They are formed as a putty-like consistency of material that are packed into an impression of the prepared tooth.
- It is removed from the impression and fired at 600°C for 8 minutes that form a very strong die.

Uses:

- Ceramic dies are used in the fabrication of porcelain restorations.

Epoxy resin die materials:

- They have high strength and greater abrasion resistance as compared to die stone.
- They can be added with polyether and polyvinyl siloxane impression materials.

Uses:

- They are used as a die material to overcome the low strength and abrasive resistance of die stone.

Q4. Tarnish and corrosion. (June 2019)

Q5. Composition of ceramics. (Dec 2014)

Q6. Sprue former.

Ans:

Sprue former is a wax, plastic or metal pattern used to form the channel or channels allowing molten metal to flow into a mould to make a casting.

- The sprue also acts as a reservoir from where the casting may draw molten alloy during so-

lidification, thus avoiding porosity due to shrinkage.

- Sprue design is a factor that controls the velocity and adequate supply of metal to the mould.
- Sprue formers are selected on the basis to decrease the occurrence of casting defects.

Materials used for the formation of sprue formers or sprue:

- Sprue former are made up of special wax that is supplied as rope form of various diameters.
- Stainless steel wires that are hollow of various diameters and lengths.
- The stainless-steel wires are coated with thin layer of inlay wax.
- The wax is applied so that there is very much minimal damage to the sprue former.

Diameter of sprue former:

- The diameter of the sprue former should be equal to the maximum thickness of the pattern.
- When large patterns are used it is recommended that sprues of larger diameters should be used.
- *Small castings:* Diameters is 1.3 mm/16 gauge - 2.6 mm/10 gauge
- If the diameter is too small during pouring of liquid molten it can cause incomplete casting.
- Large diameters sprue has numerous disadvantages such as rough surface, suck back or localized shrinkage porosities.

Length of the sprue former:

- The length is maintained in such a way that the wax pattern is in the middle of the casting ring.
- The distance is maintained to minimize distortion and maintain the thickness of investment.
- Gypsum bonded investment maintains 6 mm
- Phosphate bonded investments maintains 3–4 mm
- The length of the casting mandates to allow the trapped air to escape out.

Incomplete casting	Sprue and casting ring are too long.
Incomplete casting	Too thin sprue former
Rough surfaces, suck back porosity, as well as damage of thin sections	Too short (or thick) sprue

Sprue attachment:

Procedure: It is made by applying a small droplet of wax to the wax pattern.

a. At the bulkiest part

- **Consideration:** The alloy liquid enters and flows to the thinner portion with lower speed and less turbulence this avoids localized shrinkage porosity.

b. Sprue maintained at an angle of 45° inclination:

- This reduces turbulent flow to the extremities of mold.
- **Considerations:** Force of casting can fracture investment.

c. Reservoir:

- Large drop of wax is used for placing reservoir by direct spruing.
- Distance maintained is 1–2 mm from the attached position.
- **Considerations:** The localized shrinkage porosity is minimized, by reserving portion of the last liquid from solidifying in it.

d. Indirect spruing:

- It is a technique in which the reservoir bar is used that provides extra liquid to overcome solidification shrinkage that can lead to localized shrinkage porosity.
- This technique allows to pour 3 or 4 patterns with the use of a common bar.
- In certain situations, a plastic or ceramic crucible former is attached.
- It is placed to the other end of sprue former.

Q7. Pit and fissure sealants. (July 2015)

Q8. Dough stage in acrylic resins.

Ans:

Dough is formed when the powder dissolves in liquid that is convenient for packing the mould, under compression.

During manipulation of denture bases resins

Procedure:

- When the monomer liquid is collected in a non-conducting thick porcelain mixing jar with a lid and the powder is added.
- The ratio of the powder and liquid is until all the powder added gets wetted completely.
- The lid is kept closed of the jar to prevent evaporation of monomers.

The acrylic resin when mixed are formed into 5 stages such as:

a. **Wet sandy stage:** In this stage the polymer mixed in the monomer that forms an incoherent uncontrollable mass.

b. **Stringy or Sticky–**Tacky stage: The monomer is mixed with the polymer and in this stage the monomer enters the polymer chains and softens the polymer. Now the polymer begins to dissolve in the monomer.

c. **Dough stage:** It also called as the gel stage. In this stage the monomer enters completely into the polymer to form a mass which is more saturated with polymer in solution. It is now smooth and dough like.

d. **Rubbery or elastic stage:** The formed product now loses its plasticity; it is rubbery in consistency that is not suitable for molding

e. **Stiff stage:** The mix now becomes very stiff as the free monomer has evaporated.

The appearance of the mix is very dry and is resistant to mechanical deformation.

Dough stage:

- The mix which is formed appears like a homogeneous, soft, 'dough' like mass.
- The formed mass is moldable and nonsticky.
- In dough stage the material is removed from the jar and is packed into the flask which is then further proceeded for curing.
- The doughy stage is preferred for packing acrylic resin as the acrylic in this stage is packable and workable.
- Heat-activated resin systems are very similar to chemically activated systems.
- In heat-activated resin the mixed material stays in the dough stage for a longer period of time.

Duration:

- **Dough time:** It is defined as the time interval from the starting of mixing till the dough stage is just reached.
- **Dough time:** 5 - 10 min.

Factors affecting working and dough forming time

a. Size of the polymer particle:

- When smaller particle size of polymer are selected then the dissolution and dough formation is very rapid.

b. Molecular weight of polymer:

- Rapid dough formation time is seen if particles of lower the molecular weight is selected.

c. Plasticizers:

- The solubility of the polymer is elevated by the addition of plasticizers in monomer that affects the working time.

d. Polymer-monomer ratio:

- Increased polymer monomer ratio then the dough forming time decreases.

e. Temperature:

- Dough forming time decreases when the temperature is high.

Q9. Nickel chromium alloys.

Ans:

On combination of Nickel with chromium the alloy formed gives adequate properties.

- The formed alloy can be used with ceramics.
- The Ni-Cr alloy has hardness and elastic modulus that makes it to be used as a thinner cross-section of material.
- Such thinner cross-section gives more space for porcelain veneering and providing good resistance.
- Addition benefit is its linear thermal expansion coefficient with veneering porcelain.

Material	Percentage
Nickel	61.5%–77.5%
Chromium	12.8%–22%
Molybdenum	4%–14%
Aluminum	0%–4%
Iron	0%–5%
Ni-Cr-Be alloys	0%–2% beryllium

Material	Effect
Chromium	Corrosion resistance
Molybdenum	Decreases the CTE
Beryllium	Improves castability
Beryllium	Lower the melting range

Material	Property
Yield strength	260–830 MPa
Hardness	175 VHN and 380 VHN
Tensile strength	400–1200 MPa
Modulus of elasticity	150–210 GPa
Percentage elongation	8%–28%.

Advantages

- Nickel aluminide is the alloy formed that giving strength to the alloy.
- Beryllium is added so as to use it as a gypsum-bonded investments. It also helps in the formation of thicker oxide layer for bonding to porcelain.

Disadvantages

- When beryllium is added to the Ni-Cr alloys they are corroded more easily.
- Beryllium can also cause its toxicity called as berylliosis.
- In most of the female's nickel acts as an allergen causing contact dermatitis and hypersensitivity reactions.

Q10. Biocompatibility of dental materials. (June 2019)

Q11. Acid etch technique. (Dec 2017)

Q12. Zinc polycarboxylate cement. (Dec 2017)

Q13. Stress and strain. (Dec 2018)

Q.14 Objectives of Amalgam condensation.

Ans: -Condensation:

- It is the procedure in which the mass of amalgam formed is inserted into a prepared cavity by force under pressure.

Objectives of Amalgam condensation are:

- Superior marginal adaptability.
- Acceptable bonding between gradual layers of amalgam.
- Elimination of excess mercury.
- Density of mix in enhanced so that the optimum mechanical properties are maintained.
- To decrease porosities and voids.

Q15. Soldering. (Dec 2019)

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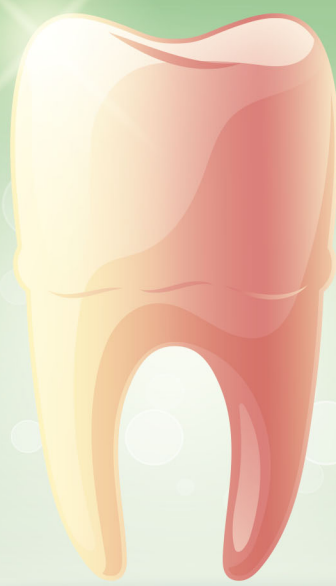

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