

**UNIVERSITY OF BOLTON**

**FACULTY OF HEALTH AND WELLBEING**

**FdSc DENTAL TECHNOLOGY**

**SEMESTER ONE EXAMINATION 2023/2024**

**INTRODUCTORY DENTAL BIOMATERIALS SCIENCE**

**MODULE NO: DNT4005**

Date: Friday 12 January 2024

Time: 10.00 am – 11.30 am

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**INSTRUCTIONS TO CANDIDATES:**

There are 50 questions.

Answer ALL 50 questions.

Each question is awarded 1 mark.

There are a total of 50 marks available.

The pass mark is 40%.

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- 1. Dental ceramics have high values of which type of strength?**
  - a. Impact
  - b. Compressive
  - c. Tensile
  - d. Flexural
  
- 2. The term elastic memory refers to a materials ability to?**
  - a. Readily distort.
  - b. Fracture through grain boundaries.
  - c. Return to its original dimension after a force is removed.
  - d. Increase its density.
  
- 3. Which one of the following alloys has the highest biocompatibility?**
  - a. Silver palladium
  - b. Cobalt Chromium
  - c. Stainless Steel
  - d. Titanium
  
- 4. How many types of alloy classification are stated in the BSI Standards Publication BS EN ISO 22674:2022?**
  - a. 2
  - b. 4
  - c. 6
  - d. 8
  
- 5. Which of the following terms can be related to dental enamel?**
  - a. Dimensional stability
  - b. Flexibility
  - c. Translucency
  - d. Grain structure
  
- 6. Which of the following is not a biomaterial?**
  - a. Lithium Disilicate
  - b. Zirconia Oxide
  - c. Calcium Sulphate Dihydrate
  - d. Metal Alloys

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- 7. A material is categorised as being brittle when its elongation value is below?**
- 5%
  - 10%
  - 15%
  - 20%
- 8. Which one of the following biomaterials is cured using UV light?**
- Polymethylmethacrylate
  - Poly Ethyl Ethyl Ketone
  - Composite
  - Zirconia Oxide
- 9. Why would a chrome denture be selected in preference to an all acrylic denture?**
- Lower cost
  - Easier to construct
  - Quicker to make
  - Maintains hot and cold stimulus to gum tissue.
- 10. Which of the following statements relate to the term glass transition?**
- A material with high translucency
  - Colour stability
  - Grain structure
  - A temperature at which a material can be moulded
- 11. When selecting a denture base alloy what would be the most important property?**
- Colour
  - Corrosion resistance
  - Flexibility
  - Tensile strength

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**12. Which of the following acrylics has the potential to retain the most residual monomer?**

- a. Heat Cured PMMA
- b. Light Cured PMMA
- c. Cold Cured PMMA
- d. Milled PMMA

**13. Why is Chromium used in base metal alloys?**

- a. Grain refiner.
- b. Biocompatibility.
- c. Bonding mechanism.
- d. Corrosion resistance

**14. Feldspar is used in ceramics for?**

- a. Its strength
- b. The formation of a glass matrix
- c. Its opaque properties
- d. Elongation

**15. Which of the following methods provides the best chemical bond with metal alloys and ceramics?**

- a. Oxidisation of the alloy
- b. Roughened surface to alloy substrate
- c. Coefficient of thermal expansion control
- d. Adhesives

**16. Base metal alloys may contain elements that are toxic or known to cause allergic reactions in some patients, which of the following is known to cause irritation?**

- a. Cobalt
- b. Nickel
- c. Silver
- d. Chromium

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**17. For an implant alloy what would be the most important clinical consideration?**

- a. Ductility
- b. Biocompatibility
- c. Strength
- d. Cost

**18. Metal oxides are used in dental polymers for...**

- a. Strength
- b. Pigmentation
- c. Bonding agents
- d. Initiation

**19. Which type of porosity could be caused by under-packing acrylic resins during flasking?**

- a. Gaseous porosity
- b. Contraction porosity
- c. Granular porosity
- d. Expansion porosity

**20. Copper is used in alloys to produce high levels of biocompatibility.**

- a. True
- b. False

**21. Zinc is included in a dental alloy as a?**

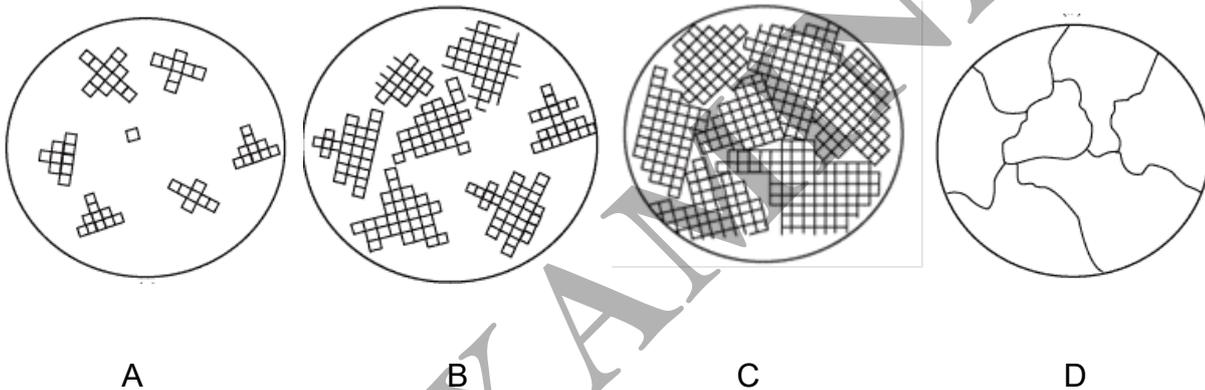
- a. Metal that raises the melting range
- b. Grain refiner
- c. Bonding element
- d. Scavenger metal

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**22. Stainless steel wires used in orthodontics are made from?**

- a. 20/10 austenitic stainless steel
- b. 18/10 austenitic stainless steel
- c. 18/8 austenitic stainless steel
- d. 19/8 austenitic stainless steel



**23. The images above show?**

- a. Internal fractures in ceramics
- b. Cross linking
- c. The solidification process of metal alloys
- d. Acrylic porosity

**24. Which image above contains nuclei of crystallisation?**

- A)
- B)
- C)
- D)

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**25. Feldspathic Dental Ceramics have complex mechanical properties. Which of the following terms is associated with this material?**

- a. High compressive strength
- b. High tensile strength
- c. High flexural strength
- d. Flexible

**26. Fusing porcelain to metal requires a surface preparation to increase....**

- a. Translucency
- b. Non chemical attraction between materials
- c. Sharp, angled surfaces
- d. Micro mechanical retention

**27. Which of the following materials has the greatest tensile strength?**

- a. Acrylic Resin
- b. Cobalt Chromium
- c. Composite
- d. Feldspathic Porcelain

**28. As a metal cools it changes state from a liquid to a solid. This is initiated by ...**

- a. Formation of stable nucleus
- b. Grains
- c. Inhibitor
- d. Metallic grains forming until the metal is at room temperature

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**29. Which one of the following materials should be selected for denture wearing patients presenting deep undercuts on their natural teeth?**

- a. cast gold alloy
- b. wrought wire
- c. cobalt chromium
- d. ceramics

**30. Aesthetic composite materials are made up of ...**

- a. ceramics and polymers.
- b. alloys and ceramics.
- c. ceramics and zirconia.
- d. polymers and alloys.

**31. When milling Zirconia the restoration are oversized. Why?**

- a. To make the material more flexible.
- b. To increase the translucency of the material.
- c. To allow for expansion of the material during sintering.
- d. To allow the material to contract to correct dimensions during sintering.

**32. Which one of the following materials wear at the same rate as natural dentition to opposing dentition?**

- a. Ceramic
- b. Alloy
- c. Composite
- d. Acrylic

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**33. Cold cure resins are weaker than heat cure resins by approximately**

- a. 10%
- b. 20%
- c. 30%
- d. 40%

**34. Which of the following metals found in dental alloys is coloured yellow?**

- a. Zinc
- b. Indium
- c. Palladium
- d. Nickel

**35. Electropolishing is used in the manufacturing of?**

- a. CoCr denture frames.
- b. Acetal denture frames.
- c. Zirconia crowns.
- d. Composite inlays.

**36. Why do dental alloys have melting ranges?**

- a. To allow for expansion
- b. They don't have melting ranges as alloys have melting points
- c. The different metals in the alloy have melting points when combined form melting ranges.
- d. To enable ceramics to be added to the metal.

**37. An elastomeric material is?**

- a. Glass like
- b. A brittle material
- c. Rubber like
- d. A crystalline like material

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**38. A vacuum is used as part of a firing cycle for ceramics because.....**

- a. It keeps the restorations clinically clean.
- b. It reduces porosity and matures the ceramic.
- c. It increases porosity within the ceramic material.
- d. It weakens the ceramic making it easier to trim.

**39. Alumina Oxide is used to treat alloy surfaces to?**

- a. Buffer the effects of expansion.
- b. Make castings more accurate.
- c. Aid with increasing the bond with ceramics.
- d. Act as a barrier to corrosion experienced in the oral environment.

**40. Which of the following metals is primarily used for corrosion resistance?**

- a. Ruthenium
- b. Amalgam
- c. Palladium
- d. Platinum

**41. At what temperature does free radical polymerisation start?**

- a. 50°C
- b. 60°C
- c. 70°C
- d. 80°C

**42. Glycol dimethacrylate is used in dental polymers for what purpose?**

- a. Cross linking agent
- b. Plasteriser
- c. Activator
- d. Inhibitor

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**43. What is the role of Hydroquinone in a dental polymer?**

- a. Pigment
- b. Inhibitor
- c. Activator
- d. Initiator

**44. Benzoyl peroxide is present in heat cure denture base resin as a ...**

- a. Pigment
- b. Cross linking agent
- c. Activator
- d. Initiator

**45. Methyl Methacrylate has a flashpoint temperature of?**

- a. 5°C
- b. 10°C
- c. 15°C
- d. 20°C

**46. The highly polished surface on a full metal crown ...**

- a. Lets the patient see if any caries is present in the adjoining tooth
- b. Prevents bacterial infestation.
- c. Improves heat conductivity
- d. Full metal crowns cannot be highly polished

**47. Which classification of biomaterial is associated with sintering?**

- a. Dental alloys
- b. Polymers
- c. Ceramics
- d. Inorganic salts

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**48. Identify the type of denture base porosity in image A**

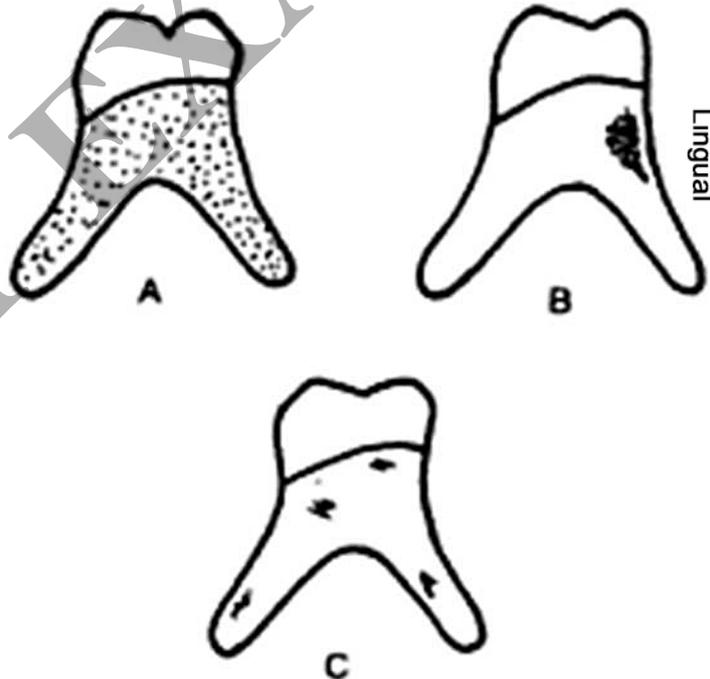
- a. Gaseous
- b. Expansion
- c. Granular
- d. Contraction

**49. Identify the type of denture base porosity in image B**

- a. Gaseous
- b. Expansion
- c. Granular
- d. Contraction

**50. Identify the type of denture base porosity in image C**

- a. Gaseous
- b. Expansion
- c. Granular
- d. Contraction



**END OF QUESTIONS**