

UNIVERSITY OF BOLTON
QUEENS DENTAL SCIENCES CENTRE
FdSc DENTAL TECHNOLOGY
SEMESTER TWO EXAMINATION 2024/2025
INTRODUCTORY DENTAL BIOMATERIALS SCIENCE
MODULE NO: DNT4005

Date: Tuesday 13 May 2025

Time: 2.00 pm – 3.30 pm

INSTRUCTIONS TO CANDIDATES:

There are 50 questions.

Answer ALL 50 questions.

There are a total of 50 marks available.

The pass mark is 40%

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1. **Zinc is used in a dental alloy as a ?**
 - a. Grain refiner
 - b. Bonding element
 - c. Scavenger
 - d. High strength element

2. **Which metal is considered the least biocompatible from the list below?**
 - a. Pt
 - b. Cu
 - c. Ni
 - d. Co

3. **From the list below which biomaterial is most suited to the oral environment?**
 - a. Zirconia
 - b. Cobalt Chromium
 - c. Stainless Steel
 - d. Polymethyl Methacrylate

4. **Which of the following statements relates to the term glass transition?**
 - a. A material with high translucency
 - b. Colour stable at room temperature
 - c. Grain structure is homogenous and stable
 - d. A temperature at which a material can be moulded

5. **Which of the following has the lowest strength values as a biomaterial?**
 - a. Lithium Disilicate
 - b. Zirconia Oxide
 - c. Feldspathic Ceramic
 - d. Alumina Reinforced Ceramic

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6. **Zirconia is milled to form dental appliances. It is then sintered to form the final state material. What is the average shrinkage of this material during sintering?**
- a. 20%
 - b. 30%
 - c. 40%
 - d. 50%
7. **Which of the following materials can be processed using a lost wax technique?**
- a. Composite
 - b. Poly Ethyl Ethyl Ketone
 - c. Lithium Disilicate
 - d. Zirconia Oxide
8. **Why would a chrome denture be selected in preference to an all acrylic denture?**
- a. Allows stimulation of gums
 - b. Easier to construct
 - c. Quicker to make
 - d. Thicker in cross section
9. **Hazardous chemicals must be stored in**
- a. Locked room
 - b. A lockable metal container
 - c. A sealed plastic container
 - d. A refrigerator
10. **Metal oxides are used in dental polymers for...**
- a. Pigmentation
 - b. Activation
 - c. Inhibition
 - d. Initiation

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11. **Which metal would be chemically least affected by the oral environment?**
 - a. Cobalt Chrome
 - b. Platinum
 - c. Silver
 - d. Gold

12. **When forming an Adams Crib using orthodontic stainless steel wire which gauge should be selected?**
 - a. 1.0
 - b. 0.7
 - c. 0.6
 - d. 0.5

13. **Why is Chromium used in non precious alloys?**
 - a. Bonding mechanism.
 - b. Biocompatibility.
 - c. Grain refiner.
 - d. Corrosion resistance

14. **From the list below which element is used to generate strength in Feldspathic ceramics?**
 - a. Lithium Disilicate
 - b. Quartz
 - c. Kaolin
 - d. Feldspar

15. **Which of the following metal alloy types has the highest melting range?**
 - a. Gold Alloy
 - b. Silver Palladium
 - c. Cobalt chromium
 - d. Titanium Aluminum

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- 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. Gold
 - b. Chromium
 - c. Cobalt
 - d. Nickel
- 17. An implant is normally manufactured from an which alloy?**
- a. Platinum
 - b. Gold
 - c. Titanium
 - d. Zinc
- 18. Which type of porosity could be caused by using the incorrect mixing ratio of polymer and monomer?**
- a. Gaseous porosity
 - b. Contraction porosity
 - c. Granular porosity
 - d. Expansion porosity
- 19. Hydroquinone is present in heat cure denture base resin as a ...**
- a. Pigment
 - b. Activator
 - c. Inhibitor
 - d. Initiator
- 20. Zirconia is used in fixed prosthodontic restorations to produce high levels of strength.**
- a. True
 - b. False

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21. Stainless steel wires used in orthodontics are made from

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

22. Implant surfaces are designed to encourage

- a. Osseo-integration.
- b. Stronger jaw bones
- c. Bacterial colonies
- d. Cement bonding

23. The method by which heat is transferred through a material is called

- a. Thermal osmosis
- b. Thermal conductivity
- c. Thermal compensation
- d. Thermal insulator

24. Dental Ceramics possess a range of properties. Which one of the following terms relates to this type of material?

- a. High tensile strength.
- b. Allergen
- c. Good flexural strength
- d. High compressive strength.

25. What replaced CE marking for dental biomaterials in the United Kingdom after Brexit?

- a. EQA
- b. CAUK
- c. UKCE
- d. UKCA

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26. Chemical bond between dental alloys and dental ceramics is generated by

- a. the use of oxides in both materials
- b. aligning the Coefficient of Thermal Expansion
- c. modifying the surface of the substrate.
- d. using high sintering temperatures.

27. Which of the following is not a biomaterial?

- a. Sodium Alginate
- b. Lithium Disilicate
- c. Zirconia Oxide
- d. Metal Alloys

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

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

29. Stainless steel wire when bent a number of times break through the grain boundaries within the metal.

- a. True
- b. False

30. An elastomeric material is?

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

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31. In the current ISO standard for dental alloys ISO 22674 which type has the highest strength values?

- a. 2
- b. 4
- c. 6
- d. 8

32. Composite materials are most commonly made up of ...

- a. Alloy and polymer
- b. Ceramics and polymer
- c. Polymer and Zirconia
- d. Lithium Disilicate and Polymer

33. What is the minimum thickness of a Cobalt Chromium coping used in the manufacturing a metal ceramic crown?

- a. 0.1mm
- b. 0.3mm
- c. 0.5mm
- d. 0.7mm

34. What is the role of Opaque ceramic?

- a. Form the morphology of a restoration.
- b. Provide strength to the ceramic material
- c. Mask a dark metal coping
- d. To balance thermal shock.

35. Brittle materials are classified by elongation percentage of less than ...

- a. 2%
- b. 3%
- c. 5%
- d. 7%

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36. Glaze is used on porcelain surfaces of crowns to

- a. Close the porosity associated with dental ceramics
- b. To increase attrition of opposing dentition.
- c. Allow the uptake of oral fluids.
- d. Maintain the colour fast properties of this material.

37. Glycol Dimethacrylate is used to form

- a. Hydrogen bonds
- b. Cross linking structure
- c. Free radicals
- d. High impact acrylic

38. Denture base acrylic should be packed at which stage of polymerisation?

- a. Wet sand
- b. Elastomeric
- c. Dough
- d. Stringy

39. Galvanism occurs in the mouth when ...

- a. Dissimilar metals are in contact in the presence of an electrolyte
- b. Patient has a dry mouth and generates issues with dental alloys
- c. Similar metals are in contact with each other as part of an appliance
- d. Dissimilar metals are in contact but electrolyte is not present

40. Ceramic restorations internal surfaces are etched to...

- a. Seal surface porosity
- b. Give the restoration shape
- c. Increase surface area
- d. Increase strength

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41. Co-efficient of Thermal Expansion is linked to which bonding mechanism?

- a. Chemical bond
- b. Micro mechanical retention
- c. Van der Waals forces
- d. Physical bond

42. Surfaces of materials appear polished because

- a. reflected light is directed directly back to the source
- b. reflected light is directed away from the source
- c. reflected light is brighter than the original source.
- d. light is absorbed by dental biomaterials.

43. Traditional dental ceramics are hand built. At the end of this process the dental technician will whip, vibrate and use tissue to carry out which of the following actions?

- a. Sintering
- b. Bonding
- c. Compaction
- d. Casting

44. When a patient presents deep undercuts, clasps used for retention should ideally be constructed using –

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

45. High performance polymers for example - PEEK and PEKK possess properties that match natural bone properties. What are they?

- a. Corrosion and tarnish resistance
- b. Chemical and heat insulation
- c. Tensile and flexural strength
- d. Aesthetic qualities.

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- 46. Dibutyl Phthalate is used in an acrylic for what purpose?**
- a. Pigment
 - b. Activator
 - c. Plasticiser
 - d. Inhibitor.
- 47. Which of the following materials has the greatest compressive strength?**
- a. Acrylic Resin
 - b. Feldspathic Porcelain
 - c. Composite
 - d. Zirconia
- 48. Which of the following acrylics retain the least residual monomer?**
- a. Heat Cure
 - b. Light Cure
 - c. Cold Cure
 - d. Auto cure
- 49. Dibenzoyl peroxide is present in heat cure denture base resin as a ...**
- a. Pigment
 - b. Cross linking agent
 - c. Activator
 - d. Initiator
- 50. At what temperature does free radical polymerisation start?**
- a. 50°C
 - b. 60°C
 - c. 70°C
 - d. 80°C

END OF QUESTIONS