Corrected.

DENTAL MATERIALS II; FINAL EXAMINATION, April 12, 2010 **Version 1.1**

1. When heated at 1150 degrees C., the main raw ingredient of classical high-fusing porcelain, feldspar, forms leucite and what other component?

a. molten glass b. zirconium oxide c. calcium oxide d. zinc oxide e. lithium oxide

2. In addition to feldspar and quartz, the other major ingredient of dental porcelain is:

a. calcium oxide b. clay (kaolin) c. potassium sulfate d. lead oxide e. latex

3. The addition of the chemical components boron oxide and/or alkaline carbonates modifies porcelain powders in the following manner?

a. increases the fusing temp. b. reduces the fusing temp. c. does not effect fusing temp.

4. Conventional dental ceramics contain both glassy phase surrounding domains or areas of a (an) _____ phase.

a. amorphous b. vitreous c. crystalline d. polymer e. dispersed

5. The common approaches or schemes used to classify dental ceramics, include:

a. application (indication for use) b. fusion temp. c. degree of crystalline content d. fabrication technique e. all of these answers

6. Increasing the proportion of the glassy phase in a dental ceramic has what effect on crack propagation?

a. improves resistance to crack propagation b. reduces the resistance to crack propagation c. no effect

7. The element added to noble alloys to enhance the bonding of porcelain to that metal is:

a. magnesium b. sodium c. iridium d. ruthenium e. indium

8. Lanthanide oxides (i.e. cerium oxide) are specifically added to convey which property to dental porcelain?

a. opalescence b. translucency c. increased strength d. fluorescence e. none of these

9. The proper chemical name for leucite is:

a. magnesium oxide b. potassium alumino silicate c. calcium silicate d. calcium chloride e. zinc oxide

10. True or false: Sharp angles on the metal framework of a ceramo-metal restoration should be rounded to avoid sharp angles, leading to stress concentration areas in the overlying porcelain ceramic.

a. True b. False

11. The _____ is the initial firing of the dentin and enamel porcelain layers.

a. biscuit bake b. bisque bake c. glaze firing d. a and b e. a and c

12. Yttrium-stabilized, high-density zirconia framework ceramic materials are best classified as:

a. slip-cast ceramic materials b. polycrystalline ceramic materials c. Fluoroapatite ceramics d. glassy ceramic materials e. leucite ceramic

13. In a conventional, multicomponent PFM porcelain system, in which component would one expect to find the highest concentration of titanium oxide?

a. opaque porcelain b. dentin porcelain c. enamel porcelain d. surface glaze e. translucent incisal porcelain

14. A technique for enhancement of the formation of the oxide layer on a high noble or noble dental alloy prior to application of porcelain is:

a. heat treatment in air or partial vacuum b. contact with a stream of nitrogen c. place in boiling water d. polishing with aluminium oxide

15. Stress induced, transformation toughening, occurs in which ceramic dental material?

a. densely sintered aluminum oxide b. lithium disilicate ceramics c. leucite reinforced feldpathic porcelains

d. densely sintered, yittrium-stabilized zirconia e. aluminium oxide, slip cast ceramics

16. A critical element in adequate bonding of ceramic to metal is formation of a mixed _____ layer between the metal & porcelain.

a. oxide b. calcium c. glassy d. phosphate e. radioactive

17. The coefficient of thermal expansion (CTE) for the metal substructure of a porcelain fused-to-metal restoration, ideally, should be _____ _____ than the CTE of the overlying porcelain ceramic.

a. slightly higher b. slightly lower c. significantly higher d. significantly lower e. roughly equal

18. As described in question 17 above; under optimal matching of the CTEs of the metal substrate to overlying porcelain in a porcelain-fused-to-metal restoration, the porcelain ceramic is subjected, under cooling after the firing cycle, to _____ stresses.

a. slight compressive b. slight tensile c. slight flexural d. slight torsional e. none of the answers listed

19. The usual bond strength levels associated with adequate bonding of porcelain to metal are on the order of:

a. 2 to 5 MPa b. 5 to 10 MPa c. 10 to 15 MPa d. 15 to 20 MPa e. 25 to 40-60 MPa

20. Increased humidity and temperature alters the setting behavior of calcium hydroxide and zinc oxide – eugenol cements in which manner?

a. Decrease the setting time b. Lengthen the setting time c. Have no effect

21. IRM (Intermediate Restorative Material) has a higher strength than an unmodified, conventional zinc oxide-eugenol cements due to incorporation of:

a. amalgam filings b. polyacrylic acid c. resin monomers d. pre-polymerized synthetic polymer particles e. a fluoride glass filler.

22. One of the foremost advantages of polycarboxylate cement is:

a. high compressive strengths b. Minimal effect on the pulp/Good biocompatibility c. Dual curing mechanism d. Zero solubility

23. Which cement has the basic components of polyacrylic acid and a reactive, fluoro-alumino silicate glass?

a. glass ionomer b. zinc phosphate c. polycarboxylate d. resin cement e. zinc oxide eugenol

24. Which of the following cements is classified as a "phenolate" based cement?

a. glass ionomer b. zinc phosphate c. calcium hydroxide d. resin cement e. polycarboxylate cement

25. Polyacid modified composite resins (Compomers) share many of the same components as resin-modified glass ionomers (RMGIs); except the presence of which substance in sufficient qualities to begin an immediate, acid-base glass ionomer reaction?

a. ethanol b. tartaric acid c. acetone d. borax e. water

26. Resin modified glass - ionomer (RMGI) cements are different than conventional glass ionomer (CGI) cements in the following aspects:

a) RMGI's do not form a calcium and aluminum polysalt matrix; b) RMGI's have early water resistance (solubility) and do not require a coating or varnish; c) RMGI's do not contain water; d) RMGI's have significantly higher compressive and tensile strength compared to CGIs; e) RMGI's do not release fluoride

27. True or false: Glass ionomer cement displays adhesive behavior to tooth structure.

a) True b) false

28. A conventional, two component, paste-paste calcium hydroxide cements sets due to the reaction of calcium hydroxide AND:

a. phosphoric acid; b. salicyclate ester; c. eugenol; d. polyacrylic acid; e. benzoyl peroxide.

29. According to Powers and Sagaguchi, the minimum acceptable compressive strength for a water-based luting cement under the ADA and ISO (ISO 9917) standards is?

a. 10 MPa b. 30 MPA c. 100 MPa d. 70 MPa e. None of the above

30. Resin modified glass ionomers (RGMIs) display what type of dimensional change behavior when subjected to an aqueous environment over relatively long periods of time?

a. Little or no dimensional change over time b. Expansion or increased dimensional change c. A negative dimensional change (shrinkage)

31. The types of curing modes used in polymer-based cements include:

a. visible light polymerization (light-curing) b. chemical-mediated, self-curing polymerization c. dual-curing mechanisms (light and self-curing)

d. All of the above e. None of the above

32. True or false: The chemical compounds 4-META and methylacrylate-containing phosphonates/phosphate esters serve as adhesive monomers that promotes bonding to tooth structure in self-adhesive resin cements.

a. true b. false

33. Conventional (water-based, acid-base) Polycarboxylate and Glass Ionomer cements share which of the following components in their compositions:

a. phosphoric acid b. a reactive, calcium fluoroaluminosilicate glass c. polyacrylic acid d. a salicylate ester e. methyl methacrylate

34. Powers and Sagaguchi (and Dr. Jefferies) indicate which of the following materials can be used as a pulp-capping agent:

a. glass ionomer b. calcium hydroxide & MTA (Mineral trioxide Aggregate) c. poly carboxylate
d. resin-modified glass ionomer (RMGI) e. all of the above

35. According to Powers & Sakaguchi, what is the maximum film thickness (ANSI/ADA Specification No. 96) for a dental, water-based luting cement?

a. 25 microns b. 40 microns c. 50 microns d. 10 microns e. 75 microns

36. Which component of the "phenolate" class of dental cements has an "obtundent" effect on the tooth?

a. phosphoric acid b. polyacrylic acid c. urethane dimethylacrylate d. tartaric acid e. eugenol

37. In terms of polymer classification type, Cross-linked PMMA polymer is to Nylon 6,6 polymer as _____ is to _____.

a. thermoplastic, thermoset b. thermoset, thermoplastic c. condensation, ring-opening d. thermoelastic, thermorigid e. none listed

38. Processing of conventional, flasked, pressure-packed acrylic denture base materials at an elevated temperatures above 74 degrees C., for the entire curing cycle, could result in:

a. increased porosity; b. reduced porosity; c. color change in the denture polymer; d. longer curing cycles; e. none of the above.

39. The initiator molecule of a heat-cured and chemically-cured denture acrylic denture base systems is:

a. Camphoquinone (CQ) b. Benzoyl Peroxide c. Light Curing Amine d. Methyl methacrylate monomer e. 4-META

40. An advantage of rubber-reinforced denture base materials, as compared to conventional heat-cured acrylic, would be:

a. increased surface hardness (increased Knoop hardness); b. increased flexural strength; c. higher or improved impact strength;
d. no methyl methacrylate monomer; e. improved denture base retention compared to other denture base materials

41. Acrylic chairside soft denture liners have which noteworthy property when used as a soft reline material?

a. do not bond well to the hard acrylic denture base, thus allowing easy removal; b. maintain their resilience over extended periods of time;
c. have high peel strength to hard acrylic denture bases, without the need of a separate bonding agent; d. do not absorb stains or odors;
e. care must be exercised with use of denture cleansers; damage can readily occur.

42. How is the Glass Transition Temperature (Tg) of acrylic polymer-based soft liners modified by the addition to plasticizers to the polymer matrix?

a. decreases the Tg b. increases the Tg c. no effect on the glass transition temperature d. eliminates the glass transition temperature of the material; e. material is temperature insensitive

43. Aromatic amines serve what role in polymeric dental materials:

a. the polymerization initiator; b. the polymerization accelerator; c. the polymerization terminator; d. a plasticizer; e. a cross-linking agent

44. During polymerization of UDMA (Urethane Dimethacrylate) in a light-activated, single-component, denture-base system (Triad™ resin); which of the following is split to form two free radicals?

a. camphorquinone b. an organic amine c. ethylene glycol dimethacrylate d. benzoyl peroxide e. Bis-GMA

45. Which the following clinical stage descriptions for the polymerization of powder/liquid cold-cured poly (methyl methacrylate) is the FIRST stage?
a. dough-like b. runny c. sandy d. hard e. rubbery

46. Which of the following polymers are formed by addition polymerization?

a. polycarbonate b. Nylon 6,6 c. both PMMA and urethane dimethacryate d. both PMMA and Nylon 6,6 e. both Nylon 6,6 and urethane dimethacrylate

47. Nylon 6,6 and Polystyrene are examples of which class of denture base material:

a. Heat-cured acrylic resin denture base material b. Auto-cured acrylic resin denture base material c. Dimethacrylate light-activated denture base material d. Thermoplastic, injection-mold denture base material e. None of the above

48.. With respect to methyl methacrylate monomer content, which of the following denture-base materials has little or none:

a. Heat-cured denture base resin; b. Heat-cured, rubber reinforced denture base resin; c. Light-activated denture base resin; d. auto- polymerized denture base resin; e. Heat-cured, fiber reinforced denture base resin

49. Failure in the development (or breakdown in the process) of osseointegration is characterized by:

a. a direct structural and functional connection to ordered living bone; b. contact predominantly with fibrous soft tissue and fibroblasts; c.an organized structure of living bone with the ability to support a load-carrying implant; d. a dynamic interface which matures within time; e. occurs with high predictability, at the stable oxide interface of titanium.

50. A critical advantage of titanium alloy over commercially pure (CP) titanium in the fabrication and use in endosseous, root form, dental implants, is:

a. formation of a more biocompatible oxide layer for titanium alloy (Ti-6Al-4V) as compared to commercially pure (CP) titanium; b. titanium alloy (Ti-6Al-4V) is significantly stronger than commercial pure (CP) titanium; c. there more types of titanium alloy (Ti-6Al-4V) than commercial pure (CP) titanium; d. titanium alloy (Ti-6Al-4V) has a longer history of clinical use than commercial pure (CP) titanium; e. none of the above.

51. True or false: Osteoconductive materials do not induce the differentiation of new bone forming cells, but rather act as a scaffold for new bone formation.

a. True b. False

52. True or false: Primary stability of a newly placed endosseous dental implant is of critical importance for successful osseointegration.

a. True b. False

53. Titanium dental implants, like bioactive glasses, form a chemical bond to bone as part of the osseointegration process. True or false?

a. True b. False

54. Between the oxide layer of the Titanium implant and living bone is a (an) _____ layer.

a. lipid b. connective tissue c. proteoglycan d. muscle cell e. none of these answers

55. Tri-calcium phosphate is a synthetic bone replacement material which would best be classified as a (an) _____ material.

a. xenograft b. allograft c. alloplastic d. autograft e. none of the listed answers

56. Titanium implants can demonstrate a (an) _____ like structure connecting the oral gingival epithelium to the implant surface.

a. proteinous b. acellular c. irregular d. hemi-desmosome e. connective tissue

57. A new bone graft material is being tested by subcutaneous (soft tissue – not near bone) implantation in animals. The material is confirmed to form new bone in the implanted area by converting undifferentiated mesenchymal cells into osteoblasts with formation of new bone osteoid. This material would best be classified as _____.

a. osteoinductive b. osteoconductive c. osseointegrative d. biocompatible e. osteofaciliative

58. In the third year of function of a single tooth dental implant replacing tooth number 5, a radiographic examination indicates a severe area of radiolucency along the mesial surface of the bone contacting side of the implant and an adjacent area of vertical bone loss of about 1 mm within the last year. The implant also displays a mobility of 1 mm, which was not previously evident. True or false: this implant meets the minimum success criteria for dental implants?

a. True b. False

59. Freeze-dried, demineralized particulate bone (DFDBA), which is derived from human organ donation after death, is best classified as:

a. an autograft; b. an allograft c. an alloplastic material d. a xenograft e. none of these answers

60. True or false: The oxide layer on the titanium implant, once formed, is very stable and does not change in dimension or thickness during the life of the implant. a. True b. False