Dental Materials II: Final Exam (version 22) April, 2008

1. According to Powers and Sakaguchi, 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

2. 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

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

   a) incorporation of amalgam filings;
   b) incorporation of polyacrylic acid;
   c) incorporation of resin monomers and polymerization initiators-accelerators;
   d) incorporation of methyl methacrylate polymer to the powder;
   e) incorporation of a fluoride glass filler.

4. One of the foremost advantages of polycarboxylate cements is:

   a) Very high compressive strengths
   b) Good biocompatibility/Low potential for pulpal irritation
   c) Dual curing mechanism
   d) Short working time
   e) Greater viscoelasticity than zinc phosphate cement

5. Examples of dental materials which cure by free-radical, addition polymerization, are:

   a) Poly methyl methacrylate, composite resin, poly vinylsiloxane elastomers, resin-modified glass ionomer;
   b) Zinc phosphate cement, calcium hydroxide chelate cement, zinc polycarboxylate;
   c) Conventional glass ionomer, Irreversible alginate, reversible hydrocolloid;
   d) A and C
   e) None of the above

6. Tin and zinc in relatively fixed amounts (2 to 4%) contribute what property (properties) for gold soldering alloys.

   a) Raise the fusing temeperature of the solder;
   b) Lower the fusing temperature of the solder;
   c) Improves corrosion resistance
   d) Has no effect on the fusing temperature of the solder.

7. The purpose of using flux in soldering is:

a) promotes the flow of solder by cleaning the surfaces and removing oxides;
b) eliminates the need to pre-clean the surfaces to be soldered;
c) confines the flow of solder away from its area of application;
d) cleans the surface and promotes the formation of metallic oxides were it is applied;
e) none of the above.

8. In investment soldering of two segments of a four unit fixed partial denture, the critical "gap" distance for minimizing defective soldering is:

a) less than 0.1 mm;
b) at least 0.1 mm, but no more than the thickness of a business card (0.20-0.34 mm);
c) more than 0.5 mm;
d) between 0.05 and 0.1 mm;
e) none of the above.

9. The fusion temperature of a dental solder should be at least 56 degrees C. below that of the parts being joined to prevent distortion of the framework. True or False?

a) True
b) False

10. True or False: 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) calcium hydroxide
c) acetone
d) borax
e) water

11. 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 do not contain water;
c) RMGI's have early water resistance (solubility) and do not require a coating or varnish;
d) RMGI's have significantly higher compressive and tensile strength compared to CGIs;
e) none of the above.

12. 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)
d) A significant reduction in compressive strength

13. True or false: Like glass ionomer, zinc phosphate cement displays a true adhesive behavior to tooth structure.

B

a) True
b) False

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

a) phosphoric acid;
b) glycol salicylate;
c) eugenol;
d) polyacrylic acid;
e) benzoyl peroxide.

15. True or False: The application of a flux on the surface of a casting metal reduces the formation of surface oxides prior to soldering:

a) True
b) False

16 In considering the adherence of porcelain veneering to cast metal substructures; a critical element in adequate bonding of the ceramic material to metal is:

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a) formation of the hybrid zone;
b) formation of an interprismatic zone;
c) formation of a mixed oxide layer containing metal and porcelain oxides;
d) formation of an oxide-free layer;
e) none of the above.

17. Critical to the selection of a particular veneering porcelain for a PFM metal substructure:

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a) Is the selection of a porcelain with a CTE (coefficient of thermal expansion) slightly lower to that of the metal;
b) Is the selection of a porcelain with a CTE (coefficient of thermal expansion) much lower than that of the metal;
c) Is the selection of a porcelain with a CTE (coefficient of thermal expansion) much higher than that of the metal;
d) Is the selection of a porcelain with a CTE (coefficient of thermal expansion) slightly higher to that of the metal;
e) none of the above

18. The chemical initiator, in a heat-cured, processed, PMMA-based denture base is?

a) Campho-Quinone (CQ);
b) An aromatic amine;
c) Benzoyl-peroxide;
d) An organic peroxide compound;
e) none of the above.

19. 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.

20. 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

21. True or false: Osteoinductive materials induce in-situ new bone formation via the conversion of mesenchymal cells preferentially to bone progenitor cells.

a) True
b) False

22. The range of diameters of titanium and titanium-alloy endosseous dental implants is (are):

a) 1.8 to approximately 7.0 millimeters in diameter;
b) 4.0 millimeters to approximately 5 to 5.5 millimeters in diameter; 3.25 - 5.0
c) 5 to approximately 8.0 millimeters in diameter (wide-body implants);
d) 0.5 to 7.0 millimeters in diameter
e) None of the above

23. 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

24. 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-cured denture base resin;
e) Heat-cured, fiber reinforced denture base resin

25. In comparing late (months-years) versus early (days-weeks) failures in porcelain-ceramic restorations, which statement below accurately summarizes the usual respective location of the initiation of such defects:

a- early failures usually occur within the bulk of veneering porcelain, late failures usually occur at or near the porcelain-metal interface;
b- early failures usually occur at or near the porcelain-metal interface, late failures usually occur within the bulk of veneering porcelain;
c- both failure modes usually occur within the bulk of veneering porcelain;
d- both failure modes usually occur at or near the porcelain-metal interface;
e- none of the above.

26. 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.

27. Select the proper ranking of materials, based on flexural strength and fracture toughness, from highest to lowest:

a- high-leucite pressable ceramic>machined, sintered, high-density zirconia>machined, sintered, high-density alumina
b- machined, sintered, high-density alumina>machined, sintered high density zirconia>high-leucite pressable ceramic
c- machined, sintered, high-density zirconia>machined, sintered, high-density alumina>high-leucite, pressable ceramic
d- high-leucite pressable ceramic>machined, sintered high-density alumina>machined, sintered high-density zirconia
e- machined, sintered high-density alumina>high-leucite pressable ceramic>machined, sintered high-density zirconia

28. According to Powers & Sakaguchi, the maximum film thickness (ANSI/ADA Specification No. 96) for a dental, water based, luting cement (i.e. glass ionomer, zinc phosphate, and zinc polycarboxylate) is:

a- 70 microns
b- 10 microns
c- 50 microns
d- 25 microns
e- 100 microns

20-40

29. Titanium dental implants demonstrate which of the following interactions with soft tissue (epithelium) and connective tissue:

a- presence of hemi-desmosome like structures connecting epithelium to the titanium surface
b- presence of connective tissue insertion into the implant interface
c- presence of a Sharpey's fiber attachment into the implant interface;
d- all of the above
e- none of the above

30. 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

31. True or false: The chemical compounds 4-META and phosphonates as adhesion promoters that promotes bonding to tooth structure in self-adhesive resin cements.

a) true
b) false

32. The oxide layer in an osseointegrated titanium implants:

a) is in immediate contact with a thin amorphous proteoglycan layer and continues to grow over time;
b) remains stable in thickness over time;
c) decreases in thickness over time;
d) transforms to a silicon dioxide layer;
e) none of the above.

33. Osseous crestal changes (at the level of the implant coronal threads) considered within normal limits are:

a) 1.0 millimeter marginal bone loss per year after the first year of function;
b) 2.0 to 4.0 millimeters marginal bone loss per year after the first year of function;
c) 0.1 to 0.2 millimeters marginal bone loss per year after the first year of function;
d) 0.5 millimters marginal bone loss per year after the first year of function;
e) None of the above.

34. In two stage implant surgery:

a) At stage one, the dental implant is placed, a healing screw is inserted in the fixture, and the implant fixture plus healing screw are buried beneath the mucosa flap for a specific time period;
b) At stage one, the dental implant is placed and a healing abutment is attached to the implant fixture through the sutured mucosa for a specific time period;
c) At stage one, the dental implant is placed and a temporary abutment is attached via an abutment screw to support a cemented temporary in light occlusal loading;
d) None of the above.

35. 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.

36. Due to a relatively low elastic recovery value of approximately 97 %, alginate (irreversible) hydrocolloid should not be used for which type of clinical impression(s)?

a) Fixed partial denture impressions
b) Preliminary impressions for complete dentures
c) Orthodontic and study models
d) Removable partial dentures with clasps
e) Items c and d above

37. Which of the following statement(s) is/are false?

a) The elastic recovery (resistance to permanent deformation) of addition silicone is superior to polyether impression material;
b) The stiffness and flexibility properties of polyether impression materials can occasionally make for difficult removal from the mouth after setting.T
c) Decreased water temperature increases the working and setting times of alginates.T
d) Addition silicone impression materials are generally available in a wide range of viscosities (i.e., light, medium, and heavy body; monophase and putty viscosities).T
e) A light-bodied polyether material will bond readily to a polyvinyl siloxane (addition silicone) tray material.

38. It is desirable to rapidly remove (within the levels of patient comfort and tolerance) elastomeric impression materials to optimize which property of the impression?

a) Wetability - hydrophilicity
b) Tear strength
c) Permanent deformation
d) Surface detail
e) Stiffness

39. _____- containing substances, which can diffuse from latex gloves and rubber dams, can retard or inhibit the setting reaction of Addition Silicone (Vinyl Polysiloxane) impression materials. Select the appropriate term below for the missing word in the preceding sentence.

a) Sulfur
b) Silicon
c) Calcium
d) Phosphate
e) Chocolate

40. In comparing palladium-based casting alloys to high-gold casting alloys, one can conclude:

a. palladium increases tarnish
b. palladium increases melting temperature
c. palladium produces no change in color
d. palladium reduces hardness
e. none of the above

41. The approximate volumetric shrinkage of a heat-cured denture acrylic denture base material is:

b) 60 %
c) 21%
d) 5%
e) 1 to 3%
f) Less than 1% shrinkage

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

b) Camphoquinone (CQ)
c) Benzoyl Peroxide
d) LC Amine
e) Methyl methacrylate monomer
f) 4-META

43. 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

44. A type III gold dental casting alloy (Au-Cu-Ag-Pd-I) contains approximately 75% gold, 10% silver, 10% 10% copper, and 2-3% palladium. This casting alloy would be categorized under which ADA classification?

60% noble, 40% gold
25% noble
25% noble

a. high noble alloy
b. medium noble alloy
c. low noble alloy
d. noble alloy
e. base metal

45. 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.

46. In considering the classification of various bone graft materials; demineralized, freeze-dried, particulate bone would be classified as:

a. a xenograft
b. an allograft
c. an alloplastic material
d. an autograft
e. none of the above

47. In densely-sintered zirconia substructures, the tetragonal to monoclinic phase transformation which occurs as a micro-crack extends is termed:

(a) Transformation toughening
b. Inversion formation
c. Strain hardening
d. Cold welding
e. None of the above

48. 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 crosslinking agent

49. During polymerization of UDMA (Urethane Dimethylacrylate) 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

50. 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

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

a- PMMA
b- bis-GMA
c- Nylon 6,6
(d) both PMMA and bis-GMA
e- both PMMA and Nylon 6,6

52. 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- thermo-electric, thermo-magnetic
e- thermoelastic, thermorigid

53. Conventional (water-based, acid-base) polycarboxylate cements 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

54. 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

55. Powers and Sakaguchi indicate which of the following materials can be used as a pulp-capping agent:

a- calcium hydroxide
b- glass ionomer
c- poly carboxylate
d- resin-modified glass ionomer (RMGI)
e- all of the above

56. As the coefficient of thermal expansion (CTE) of a crown or bridge substructure material <u>decreases</u> (i.e. going from a casting metal to high density, sintered zirconia), how would one would expect the leucite content of a properly designed veneering porcelain to vary?

a- the leucite content of the veneering porcelain would increase;
b- the leucite content of the veneering porcelain would decrease;
c- the leucite content of the veneering porcelain would not vary;
d- leucite is not a component of veneering porcelain.

57. Increasing the amount of leucite in a feldspathic porcelain (as would be the case for a heat-pressed ceramic material) would affect the physical properties in what manner?

a- increases the flexural strength
b- decrease the flexural strength
c- no change in flexural strength
d- reduce the CTE of the ceramic
e- Quadruple the fracture toughness of the ceramic

58. 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- has no effect on the glass transition temperature
d- eliminates the glass transition temperature of the material; material is temperature insensitive

59. A bone graft material (Bioplant-HTR) consists of spherical porous particles of poly hydroxyethyl-methacrylate (Poly-HEMA) coated with calcium hydroxide. In terms of the classification of hard tissue grafting materials, Bioplant-HTR would be classified as an:

a- autograft
b- xenograft
c- allograft
d- alloplast
e- none of the above