1. What types of pile should be used on a permanent structure when the end of pile will extend above the ground?
   1. Creosote timber
   2. Untreated timber
   3. Precast concrete
   4. Treated timber
2. Which one of the following is the most important use of inclined leads in pile driving?
   1. To drive a pile below the ground or water level
   2. To drive all piles
   3. To drive a pile into cohesive soils
   4. To drive a batter pile
3. When accurate alignment and plumbness is required in driving piles, the equipment most often used to insure this is?
   1. A follower
   2. A swinging lead
   3. Some sort of template
   4. A spud
4. When a thin, hard upper layer is encountered at the site of timber piles, this layer would usually be penetrated with?
   1. Steel test pile
   2. Concrete pile
   3. A spud
   4. Fixed lead
5. The pile is to be driven next to an existing structure that has no piles. The soil is comparatively soft clay. Under these conditions the best pile driver would be?
   1. Single acting steam hammer
   2. Single acting pneumatic hammer
   3. Double acting steam or pneumatic hammer with a light ram
   4. Driver with a fixed lead
6. For best results, untreated timber piles should be driven where possible, with which of the following?
   1. Steam or pneumatic hammer with the proper follower
   2. Steam or pneumatic hammer with proper lead
   3. Drop hammer with proper follower
   4. Water jet
7. When driving piles into dense substances including stiff blue clay, hard gumbo, incipient shale, hard pan, compacted gravel the best pile driving equipment to use is?
   1. Drop hammer
   2. Double acting pneumatic hammer
   3. Driver with fixed lead
   4. Single acting hammer
8. Which one of the following species of wood would give most satisfactory result when used as a permanent untreated timber piles?
   1. Ash
   2. White birch
   3. Oak
   4. Southern pine
9. Which one of the following species of wood would be most satisfactory result as permanent creosote timber piles?
   1. Willow
   2. Yellow poplar
   3. Elm
   4. Douglas fir
10. Untreated timber piles are peeled by removing all the rough bark and a minimum of what % of inner bark?
    1. 80%
    2. 85%
    3. 90%
    4. 100%
11. A line drawn from the center of the tip of an untreated timber pile to the center of the butt shall lie wholly within the body of the pile, and shall not fall outside of the center of the pile at any point by more than what percent of the length of the pile?
    1. 1%
    2. 2%
    3. 4%
    4. 5%
12. Untreated timber piles less than 40’ in length shall have a minimal diameter of how many inches at the tip?
    1. 4”
    2. 5”
    3. 6”
    4. 8”
13. Untreated timber piles greater than 60’ in length shall have a minimum diameter of how many inches, at the section of 4’ from the butt?
    1. 6”
    2. 7”
    3. 8”
    4. 12”
14. Untreated timber piles less than 20’ in length shall have a minimum diameter of how many inches, at the section 4’ from the butt?
    1. 6”
    2. 8”
    3. 9”
    4. 12”
15. The diameter of the pile at the butt shall not exceed how many inches?
    1. 14”
    2. 16”
    3. 18”
    4. 20”
16. Piles shall be driven with a variation from vertical or from the batter not to exceed how much per foot?
    1. 1/16”
    2. 1/8”
    3. 3/16”
    4. ¼”
17. Which one of the following best describes condition where metal shoes should be used on a timber pile?
    1. Where the piles are to be driven by double acting steam hammer
    2. Where piles are to be jetted into place
    3. Where the soil to be penetrated is plastic clay
    4. Where the soil to be penetrated contains large boulders or other obstructions
18. If a foundation for a permanent structure is to have creosote timber piles it is not important if:
    1. The piles are handled with steel hooks
    2. The piles are handled by wire cable
    3. Piles used are longer than specified
    4. Piles are driven below the elevation shown on plans
19. The timber piles under a proposed structure to be built on plastic soils were improperly designed to be too closely spaced. Which one of the following would generally be the most important results?
    1. The group of piles would not be able to properly carry the design load
    2. During construction, the piles would not be spaced in accordance to the plans
    3. The compaction results from the area surrounding the piles
    4. The effects of vibration on surrounding structures
20. The actual length of cast in place concrete pile is usually determined in the field by which of the following methods?
    1. Observing the lengths indicated on plans
    2. Making actual load test
    3. Taking borings
    4. Driving castings to the required resistance
21. If a precast concrete pile can be spliced, it should first be completely driven and then the concrete should be properly cut away, leaving the reinforcement steel exposed for a minimum length of how many diameters of the steel bars?
    1. 10’
    2. 40’
    3. 70’
    4. 100’
22. Which of the following best indicates the minimum allowable center to center spacing, in feet of precast concrete friction piles?
    1. 2.5’ to 3’
    2. 3.5’ to 4’
    3. 4.5’ to 5’
    4. 7.5’ to 8’
23. When splicing is not allowed, which of the following would not be justification for an engineer to require a contractor to either remove a driven untreated timber pile or to drive a second pile adjacent to the first?
    1. Pile pushed up by any cause after been driven
    2. Top of pile driven below the elevation fixed by the plans or established by the engineer
    3. Pile broken from driving because of internal deflects after the engineer permitted it to be placed in the lead
    4. When building plans have changed
24. If the valve mechanism of a contractor’s pile driving double acting steam hammer is defective so that the hammer will not operate at the speed specified by the manufactures catalogue, which one of the following is usually the best action to be taken by the state engineer?
    1. Require the contractor to remove the defective equipment from the site
    2. Allow the equipment to be used without change but properly apply a factor when computing the bearing power of the piles
25. Wooden piles 100’ long are to be inspected for straightness prior to driving. When a line is stretched from the center of the tip to the center of the butt, the maximum distance that the stretched line can fall outside the center line of piles is?
    1. 0.60’
    2. 0.80’
    3. 1.0’
    4. 1.2’
26. When a course granular material is encountered with frequent large boulders, the pile that would be best suited for this condition is?
    1. Creosote timber pile
    2. Precast pile
    3. “H” pile
    4. Cast in place pile
27. Sometimes, when unusual conditions exist, piles are driven to support structural foundation even though the natural soils have enough bearing capacity to support it alone. Which one is an unusual condition?
    1. Resistance to sudden wind forces
    2. Unusual erosion conditions
    3. Prevents solid from contaminating work area
    4. Creates a reference point to take measurements from
28. A pile driving formula used to determine approximately the load carrying capacity in pounds of a concrete pile driven by a single acting steam or pneumatic hammer is R = (2WH) / (s + 0.1p / w), p=Weight of pile in pounds. The term H refers to?
    1. The height of the fall of the ram in inches
    2. The height of the fall of ram in feet
    3. The average penetration of the pile per blow in inches for the last 10 to 20 blows
    4. The average penetration of the pile per blow in feet for the last 10 to 20 blows
29. In question #28 the term “s” equals?
    1. The height of the fall of the ram in inches
    2. The height of the fall of ram in feet
    3. The average penetration of the pile per blow in inches for the last 10 to 20 blows
    4. The average penetration of the pile per blow in feet for the last 10 to 20 blows
30. In question #28 the term “s” equals?
    1. The weight of pile in lbs.
    2. The combined weight of the pile, ram, and leads in lbs.
    3. The combined weight of pile and ram in tons
    4. The weight of the ram in lbs.
31. A contractor is required to drive precast concrete piles, each weighting 15,000 lbs. A single acting Vulcan pile driver is used which has a stroke of 36” and a hammer weighing 5,000 lbs. that delivers 60 blows per minute. Each pile must support a load of 20 tons. What should the penetration be for the last 10 to 20 blows?
    1. 0.45”
    2. 0.55”
    3. 0.65”
    4. 0.75”
32. With the same pile driver as in Question #31, the maximum allowable weight of precast concrete pile to be used is?
    1. 13,000 lbs.
    2. 14,000 lbs.
    3. 15,000 lbs.
    4. 16,000 lbs.
33. Formula for bearing capacity of piles driven in granular material is apt to be more accurate then for the piles driven in clay because?
    1. Closer relation between penetration per blow and the bearing capacity of the pile
    2. Less penetration per blow
    3. Better bearing capacity
    4. Clay contains more water than stone
34. Describe “swing lead” and purpose of it in pile driving.
35. What is the difference between single acting and a double acting pile driver and what are the advantages of each?
36. Structural steel weighs approximately how many pounds per cubic foot?
    1. 210 lbs./ft^3
    2. 320 lbs./ft^3
    3. 490 lbs./ft^3
    4. 600 lbs./ft^3
37. Which one of the following is the approximate weight, in pounds per 100 heads of fully formed 7/8” shop or field driven rivet heads?
    1. 5.15 lbs.
    2. 21.25 lbs.
    3. 43.45 lbs.
    4. 62.15 lbs.
38. Unless otherwise permitted by the engineer, which of the following types of equipment should generally be used for field riveting?
    1. Indirect acting riveter
    2. Direct acting riveter
    3. Pneumatic hammer
    4. Electric hammer
39. To what extent should structural steel rivets be heated before being driven?
    1. Until the rivet is slightly covered by slag
    2. Until the point of the rivet is hotter than the rest
    3. Until rivets are uniform light cherry red color
    4. Until the point of the rivet is hotter than the rest
40. If new structural steel bridge members are not imbedded in concrete, they should generally be painted a total of how many shops plus field coats?
    1. 1 coat
    2. 2 coats
    3. 3 coats
    4. 4 coats
41. Which one of the following is the minimum air temperature below which field coats of paint should not be applied?
    1. 20⁰F
    2. 30⁰F
    3. 40⁰F
    4. 60⁰F
42. Which one of the following methods of straightening bent structural plates, angles and other shapes would be the best?
    1. Without heating straighten the metal carefully
    2. Heat metal to white color, straighten, cool slowly
    3. Heat metal to cherry red, straighten, cool slowly
    4. Heat metal to dark cherry, straighten, cool fast
43. Which one of the following methods should be used to set anchor bolts for arch, girder and truss bridges?
    1. Set bolts in pipe sleeves with plate washers
    2. Set bolts in proper locations and then pour concrete around them
    3. Drill holes in completed footings and set bolts in mortar therein
    4. Insert bolts in freshly poured concrete before it sets
44. When setting steel plates used for pads to support a steel beam, the correct procedure of doing this is?
    1. Shim the plate to true elevation then grout in place
    2. Trowel concrete to true elevation and set the plates
    3. Trowel concrete 1/8” higher then chip it to grade
    4. Install pad then pour concrete around and the grade will adjust as it forms
45. Which of the following statements gives the true meaning of “Poissons Ratio”?
    1. Ratio of unit stress to lateral stress
    2. Always greater than 1
    3. Ratio of apparent stress to stress due to strain
    4. Ratio of lateral unit stress to longitudinal unit stress
46. Which one of the following types of snow removal equipment should generally be used to remove a light fall of snow?
    1. V shaped snow plow
    2. Single straight blade snow plow
    3. Rotary type snow plow
    4. V snow plow with wings
47. Which one of the following chemicals is the best to treat icy pavement surfaces by direct applications without abrasives?
    1. Sodium Chloride
    2. Potassium Chloride
    3. Magnesium Chloride
    4. Sodium Sulfate
48. For best results, which one of the following chemicals should be mixed with abrasives that are to be used on ice or packed snow?
    1. Calcium Chloride
    2. Potassium Chloride
    3. Sodium Chloride
    4. Magnesium Sulfate
49. Wherever accurate alignment and plumbness are required when driving piles, the piles should be started correctly using?
    1. Some form of template
    2. Fixed lead
    3. Metal pile shoes
    4. A form of a pile head cushion
50. In pile driving, a follower is used most often to drive a pile:
    1. Into cohesive clay and silts
    2. On a batter
    3. Below the ground or water surface
    4. Through a compressible upper soil layer into still layers
51. A steel shoe is placed on a wooden pile when it is driven:
    1. Through sand
    2. Through hard pan
    3. On a batter
    4. To rock
52. When a hammer on the pile driving rig is not giving the required blows per minute, the following action should be taken:
    1. Remove the rig from the job
    2. Use it as is
    3. Permit the use of machine and record the number of blows per minute
    4. Allow machine to be used if required depth is reached
53. Which one of the following would not be justification for the Engineer to have the contractor pull a pile or place a new one adjacent to a pile driven?
    1. Pile split while being driven
    2. Pile proved to be defective after being driven even though the Engineer allowed it to be driven
    3. Pile raised from reasons of pressures which are not the fault of the contractor
    4. Pile is broomed after being driven
54. Which one of the following would be least likely to leave a rebound of a pile?
    1. When it is driven to refusal
    2. When it is driven into wet sand or soft material
    3. When it is driven onto a boulder
    4. When it has reached its maximum friction
55. When a test pile is driven in the location of a bearing pile such pile should be?
    1. Extracted
    2. Bearing pile driven right next to it
    3. Incorporated in the bearing pile between
    4. Driven below the footing
56. A test pile loaded with 40 tons settles ¼” in the first 48 hours. After which time no appreciable settlement is registered. The safe loading of the pile is, in tons?
    1. 10 tons
    2. 20 tons
    3. 40 tons
    4. 50 tons

1. C 43. B

2. D 44. C

3. C 45. D

4. C 46. B

5. C 47. A

6. C 48. A

7. D 49. A

8. D 50. C

9. D 51. B

10. A 52. A

11. A 53. C

12. D 54. D

13. A 55. C

14. C 56. B

15. D

16. D

17. D

18. C

19. A

20. D

21. B

22. A

23. A

24. A

25. C

26. C

27. B

28. B

29. C

30. D

31. A (pile bearing capacity formula)

32. C

33. A

34. Swing leads are suspended from a crane line and hang freely, stab into the ground, or are braced. Swing lead or “inclined lead” is used in driving batter piles

35. Single acting – long steady strokes suitable for driving piles in dense soils

Double acting – short rapid strokes, does not create as strong of a shock wave

36. C

37. B

38. C

39. C

40. C

41. C

42. A