1. Which of the following is the greatest influence on the direction in which a city grows?
   1. Population influx
   2. Street layout
   3. Business district
   4. Underdeveloped areas
2. Which one of the following is not necessarily part of a city’s business district?
   1. Parking facilities
   2. Retail stores
   3. Gasoline stations
   4. Truck and freight terminals
3. An arterial route from an expressway to a city should in most cases take all the traffic to?
   1. Residential section
   2. Outskirts of the city
   3. Bypass the city
   4. Central business district
4. Which best describes a progressive traffic light system on a street?
   1. One which allows continuous movement for groups of vehicles in one direction only, at pre-determined speeds
   2. One which allows intermittent movement in one direction, for sequences of several blocks and subsequent stops
   3. One which allows intermittent movement in both directions for sequences of several blocks and subsequent stops
   4. One which allows continuous movement for groups of vehicles in both directions at pre-determined speeds
5. Which one of the following is the most important argument in favor of providing parking lanes in addition to pavement lanes for moving traffic in urban areas when pavements are bounded by curbs?
   1. The capacity of the highway will be increased
   2. The local businesses will have an increase in clients
   3. It allows room to remove snow
   4. It allows free parking
6. For an origin and destination survey to accomplish its purpose it must?
   1. Provide a representative sample of all commercial vehicles
   2. Provide a representative sample of all personal vehicles
   3. Provide a representative sample of all vehicles that pass through the area being surveyed
   4. At least 80% of all vehicles that pass through are being surveyed
7. For which of the following purposes would a cordan count be most useful?
   1. A parking study
   2. Finding the best route through traffic
   3. Finding the true trend of urban expansion
   4. Finding the traffic redevelopment needs
8. The sequence of the design of drainage structures and of the final grade should be done:
   1. Before the final grade
   2. Simultaneously
   3. Independently
   4. After the final grade
9. In making an investigation, which one of the following procedures should be avoided?
   1. Searching exclusively for facts that are expected to be found
   2. Issuing questionnaires
   3. Determining parameters of the investigation and the knowns
   4. Collect all available evidence and any supporting evidence
10. When performing the fact gathering phase of a survey, which one of the following steps should you do first?
    1. Determining what facts are necessary for diagnosing and solving problems and selling recommendations
    2. Determining which of the facts needed are available from currently maintained sources
    3. Obtain facts from one source and make a determination
    4. Evaluate the known facts and determine the final decision
11. Which one of the following types of averages are most affected by the extreme cases?
    1. Arithmetic mean
    2. Median
    3. Temperature
    4. Grading curve
12. The best method of presenting graphically the accident pattern, and other important details of a street intersection is by a?
    1. Vehicle flow volume diagram
    2. Collision diagram
    3. Bar graph
    4. Illustrated drawing
13. The method of least squares is most likely to be used in?
    1. Fitting trend lines
    2. Solving simultaneous equation
    3. Testing reliability
    4. Finding the errors
14. Which one of the following terms is the name of the statics used to designate the value occurring most frequently in a distribution?
    1. Frequency distribution
    2. Mode
    3. Mean
    4. Median
15. Which is usually accepted as an approximate basic capacity in passenger cars per hour per lane on a 4 lane, two lane road, with two lanes each direction on an urban highway?
    1. 500 vehicles
    2. 1000 vehicles
    3. 1500 vehicles
    4. 2000 vehicles
16. The practical capacity of a two-lane highway in vehicles per hour is most nearly?
    1. 4,000 vehicles/ hr.
    2. 7,000 vehicles/ hr.
    3. 10,000 vehicles/ hr.
    4. 20,000 vehicles/ hr.
17. The practical capacity of a four-lane highway in vehicles per hour is most nearly?
    1. 12,000 vehicles/ hr.
    2. 20,000 vehicles/ hr.
    3. 30,000 vehicles/ hr.
    4. 40,000 vehicles/ hr.
18. In designing it is best practice to design a highway to accommodate hourly traffic more than which one of the yearly peak hours?
    1. 100 peak hours
    2. 50 peak hours
    3. 30 peak hours
    4. 10 peak hours
19. To determine if the construction of a highway improvement is economically justified, it is necessary to estimate the savings passed on to the motorist by the proposed new improvement. To estimate this, which one of the following must be known?
    1. Construction cost, maintenance cost, time saved, mileage saved
    2. Annual traffic volume, time saved, mileage saved
    3. Traffic peak hours, annual traffic volume, arterial traffic study
    4. Cost per vehicle per mile, maintenance cost, arterial traffic study
20. If bids for a certain contract, let by an organization, are received, all the bids can be declared null and void under certain conditions. Which one of the following correctly describes the condition?
    1. When the majority of bidders are out of state
    2. When the contract details are incomplete
    3. When all bids received are much higher than the engineers estimate
    4. When all bids received are just below the engineer’s estimate
21. In bidding for contracts, the addendums are an integral part of the contract if a certain time limitation condition is adhered to. Which one of the following is the above-mentioned condition?
    1. Before the award of the contract
    2. Before depositing of bids
    3. Before lowest bidder is announced
    4. Before the award of the contract
22. Which one of the following is an important similarity between rural highway and urban arterial highway design?
    1. Control of access is needed to the same extent
    2. Alteration and replacement of all types of utilities is an expensive and far reaching problems in both
    3. Design of drainage facilities for both requires the same type of analysis and involves proximately the same proportion of the total cost
    4. The required quality of a particular pavement surfacing is the same for both rural and urban
23. The highway must be designed during a period of shortage of engineering crews. Which type of survey is best suited for this condition?
    1. Stadia
    2. Aerial
    3. Ground
    4. Topographical
24. The most important purpose of the aerial surveys in highway engineering is to?
    1. Get a better overall scope of the magnitude of the problems involved in the design
    2. To better design structures
    3. To cover a large span of roadway in a short period with adequate precision
    4. Prevent delays by encompassing entire worksite in single survey
25. When planning and designing a new highway, which is most important advantage of using information obtained by the methods of photogrammetry programmed on an electronic computer?
    1. It is possible to eliminate the need for ground survey crews
    2. It is possible, economically, to compare several alternate routes and provide a basis for narrowing the choice to two or three preliminary routes
    3. It is possible to determine span and type of bridge at a particular location, without rainfall or runoff data
    4. It is possible to, economically, compare the locations of bridges without additional studies of foundation conditions
26. The following five steps are usually taken in planning the location of the highway.
    * + 1. Preliminary location survey
        2. Traffic survey
        3. Reconnaissance survey
        4. Elements of geographic design
        5. Final location survey

In what sequence are these steps performed?

1. 3, 1, 5, 2, 4
2. 2, 4, 3, 1, 5
3. 2, 1, 3, 4, 5
4. 1, 5, 2, 3, 4
5. Which one of the following is the maximum design speed, in miles per hour, recommended by AASHO for the highest type of highway?
   1. 60 mph
   2. 65 mph
   3. 70 mph
   4. 80 mph
6. The Highway Capacity Manual would usually be of the most value to?
   1. Pavement Designer
   2. Soils engineer
   3. Maintenance engineer
   4. Geometrics Designer
7. Which one should be the most important quality of the engineer responsible for the design or construction of a highway project?
   1. Familiarity with the part of the project assigned to engineer
   2. Familiarity with applicable specifications
   3. Familiarity with job location
   4. Familiarity with the contractor and personnel
8. Which one of the following states the true general principle that applies to the design and placing of the intersections?
   1. Traffic signals are desirable at all intersections where there have been frequent accidents
   2. Traffic signals are never desirable except where the total traffic volume exceeds 1000 vehicles per hour
   3. Separate turning lanes are confusing to most drivers
   4. Anything that surprises drivers will introduce elements of danger
9. Which statement is important to remember when designing a highway?
   1. Grades more than 5% are dangerous
   2. Changes in quantities of construction materials are expensive after construction starts
   3. Any sudden change to the driver introduces an element of danger
   4. Cost is of the highest priority (initial cost + maintenance)
10. Which of the following is the most important characteristic of properly designed highways?
    1. Lack of high dangerous fills
    2. Ample Right of Way
    3. Highway connecting as many as possible communities
    4. Freedom from surprise changes in alignment, grade and sight distance
11. Which of the following is most important to guard against when designing a highway using roller grades?
    1. A grade more than 7%
    2. A long steep grade
    3. Undulations allowing vehicles to disappear from view
    4. Proper drainage
12. When redesigning a highway, which of the following should be avoided?
    1. Short flat slope
    2. Primary dip
    3. Secondary dip where the vehicle can not be seen
    4. Short flat grade less than minimum slope
13. What is the most important thing to avoid when designing a highway?
    1. Sudden changes
    2. Narrow pavement
    3. Steep grades
    4. Curves
14. To promote highway safety, when designing a road, the most important factor to be considered is?
    1. Width of pavement
    2. Width of shoulders
    3. Sight distance
    4. Volume of traffic
15. Non-passing sight distance, as commonly used in highway design, should be at least?
    1. Braking distance required on a level, clear, dry pavement when traveling at the design speed of the highway
    2. Distance traveled after the obstruction is received and before the driver brakes, plus the braking described in ‘a’
    3. Safe distance behind a car at which a car traveling at the highway design speed should be able to brake safely to a stop without a collision
    4. The sight distance beyond a car directly ahead, which is less than the minimum distance required for safe passing at the highway design speed.
16. Which is the best possible improvement to be made in sight distance over a vertical curve contained on a horizontal curve?
    1. Increase the length of the vertical curve and excavate the outside of the horizontal curve
    2. Increase the length of the vertical curve and widen the shoulders
    3. Increase the length of the vertical curve and excavate the inside of the horizontal curve
    4. Do not alter the vertical curve but increase the length of the horizontal curve
17. One lane of an existing two-way traffic highway must be reconstructed. It is desired to widen the existing median, which is on a long tangent. To do this, which of the following should be used?
    1. Compound curves
    2. Short radius reverse curves
    3. Long radius reverse curves
    4. Radius and compound curves
18. The main objection to using superelevated reverse curves is?
    1. One curve would have to be superelevated on the wrong side
    2. Both curves would have to be superelevated to the wrong side
    3. The superelevation would have to be changed from one side to the other and this could not be done abruptly
    4. It’s a really technical process and no one wants to think that hard
19. Which one of the following reasons justifies the use of the compound curves?
    1. Correction of an error in the design of the original curve
    2. To shorten the distance for economical reasons
    3. It allows multiple adjustments to fit the alignment to existing grade
    4. Prevents the use of adjustment panels to realign grades
20. Under which of the following conditions in a highway alignment would a five-degree curve having a length of 1000’ be most dangerous?
    1. In conjunction with a series of short tangents
    2. After a long tangent
    3. Following a reverse curve
    4. In a central city location
21. The most important element of highway horizontal curvature standards is?
    1. Consistency
    2. Limitation
    3. Asphalt quality
    4. Shoulder width
22. The main objection to lengthening the road to get flatter grades is?
    1. Element of economy
    2. Objectionable horizontal curves may be introduced
    3. Difficulty in design
23. Where considerable elevation must be gained by a practically continuous rising grade, which has the most important effect on the rate of grade that should be used?
    1. The length of grade
    2. The horizontal curvature
    3. Surrounding terrain
    4. Direction of travel
24. A contractor persistently disregards specifications for a certain item. Which one of the following is the best action to be taken up by the engineer in charge?
    1. Institute legal action immediately
    2. Advise superiors before pursuing legal actions
    3. Confer with the contractor before taking legal action
    4. Allow the contractor to continue but pay less on the monthly pay items
25. When designing a proposed state highway to be constructed on a new location, which one of the following factors would have the greatest influence on the required number of traffic lanes?
    1. Average speed of traffic
    2. Sight distance
    3. Estimated traffic density
    4. Road grade
26. In which one of the following locations on a proposed new state highway would there be the most reason to provide additional traffic lanes for slow moving vehicles?
    1. On a highway bypassing a scenic location
    2. Next to big terminals and airports
    3. Where maximum grades of considerable length slow down large vehicles
    4. To prevent vehicle movement from being impeded by busses
27. Which one of the problems of the highway design would most likely require soil investigations for its solution?
    1. Widths of pavement and shoulders
    2. Side slopes of cuts and fills
    3. Horizontal or vertical curvature
    4. Ability to grow foliage
28. In the construction of a highway where cuts and fills alternate the distribution of quantities of the earth to be moved is most satisfactorily studied graphically using?
    1. Maps
    2. Profile
    3. Traverse table
    4. Mass diagram
29. Which one of the following highways would have the lowest initial cost per mile?
    1. Brick
    2. Cement
    3. Penetration
    4. Asphalt concrete
30. Which of the following does not constitute an important factor in designing a ramp for an interchange?
    1. Speed of traffic
    2. Degree of curve
    3. Type of pavement
    4. Width of pavement
31. To determine a safe radius of a turning lane at an intersection, which one of the following lists all the factors that must be known or assumed?
    1. Turning speed and the amount of superelevation per foot
    2. Turning speed, amount of superelevation per foot, and design coefficient of friction
    3. Sight distance, design coefficient of friction and the design speed
    4. Size of vehicles, turning speed, and shoulder width
32. Which of the following does not effect the desirable length of a deceleration lane?
    1. Speed at which most vehicle will enter the deceleration lanes
    2. Design speed of the highway that vehicles enter after turning
    3. Percent grade
    4. Weight of the vehicles traveling the roadway
33. What is the reason behind pitching an outside lane of a four-lane highway more than the inside lane?
    1. Expedite flow of water off shoulders
    2. Expedite flow of water off traveling lanes
    3. Prevent a loss of sight distance for vehicles traveling the highway
    4. Increase the sight distance for vehicles traveling the highway
34. What is the most important reason for using adequate shoulders on a highway?
    1. Appearance of the highway is improved
    2. Lesser maintenance cost
    3. The full capacity of the highway can then be utilized
    4. Prevents foliage from crowding roadway
35. Which of the following best describes the relationship that should exist between cross slope of the shoulder and the cross slope of adjoining outside lane?
    1. The cross slopes should conform
    2. The shoulder cross slope should be less
    3. The shoulder cross slope should be greater
36. What is the reason for having the outside shoulder of a superelevated highway sloping away from the pavement?
    1. To prevent water from running across the travelling lane
    2. To discourage cars from driving on the shoulder
    3. To prevent thawing snow and ice from draining across the pavement during the winter months
    4. To allow a smooth transition for vehicles entering the median
37. In designing a separated highway, the reason for using wide median strips is?
    1. To facilitate drainage
    2. Improvement of the appearance of the highway
    3. Reduction of headlight glare and accidents
    4. Utilization of the existing Right of Way
38. Where opposing lanes are separated by a 10’ wide median strip, the width of the strip is sufficient to?
    1. Make it safe to make left turns from the divided road
    2. Make the drainage a complicated problem
    3. Provide a safety island for crossing traffic
    4. Permit planting of shrubbery in median strip
39. Which is the main reason for planting shrubbery in the median strips on divided highways?
    1. Improvement in appearance
    2. Protection of traffic from headlight glare
    3. Prevent drainage issues
    4. Deter vehicles from crossing the median in case of accident
40. The minimum allowable highway bridge clearance is?
    1. 13’
    2. 14’
    3. 15’
    4. 16’
41. After the contract has been in progress for some time, a discovery is made that a certain item has been omitted. Of the following, which one is the best procedure to remedy the omission?
    1. Pay for the item under a cost-plus basis
    2. Include the omitted item in the largest quantity item of the contract
    3. Include the omitted item in the smallest quantity item of the contract
    4. Issue a change order
42. Which is generally considered the most important advantage of grade separation?
    1. It eliminates undesirable grades on both routes
    2. Lends itself well to stage development
    3. Through traffic may proceed through the intersection with safety, without reducing speed
    4. It allows roadways to be separated to prevent collisions from another direction
43. Comparative costs of two types of highway structures, designed for the same location and purpose, may be best determined on the basis of?
    1. Capitalized cost
    2. Maintenance cost
    3. Salvage value
    4. Life expectancy
44. In the design of a grade separation interchange, which one of the following criteria is most logical plan determining whether the major, four lane, road should go over or under the minor, two lane road?
    1. Where turning traffic is significant, the ramp profiles are best suited when the major road is under
    2. Usually the major road should go under the minor to minimize the cost of the earthwork in the approaches.
45. In which one of the following cases would it be most desirable to include subsurface investigation in the preliminary survey for the construction of a new highway 10 miles long?
    1. Where it will be necessary to make several deep cuts and heavy fills
    2. Where highway must cross a large stream, requiring a new bridge
    3. Where a broad area must be surveyed to consider several possible locations
    4. In city locations where utilities may affect roadway
46. What is the most important factor in determining bridge elevations?
    1. Depth of the stream
    2. Length of the single span
    3. High water elevation
    4. Velocity of the stream
47. Which is the determining factor in the timing of RR grade crossing elimination?
    1. As soon as either the railroad or highway traffic increases to a point where many cars are delayed
    2. As soon as the funds for such a structure are available
    3. As soon as the structure can be designed and contracted for
    4. As soon as the roadway is established and compacted
48. Drainage is most likely to be a complicated problem in which one of the following highway locations?
    1. Under the railroad
    2. Across another highway
    3. On a side hill
    4. Parallel to a stream
49. To provide adequate drainage, when designing a highway, the most consideration should be given to?
    1. Cost of providing and maintaining drainage facilities
    2. The distance that the collected water must be carried
    3. The satisfactory disposal of precipitation from the roadway section
    4. Building in sandy desert like areas
50. Of the following, which one is the most important reason why the engineer should exercise extreme care when designing highway drainage?
    1. Water should not be carried for long distances
    2. Construction should be expedited where possible
    3. In order that the private property will not be damaged
    4. To make sure the excess drainage is carried to the nearest river
51. It might be considered desirable to construct roadside ditches deep enough to carry sub surface water. Which is the main objection to such a construction method?
    1. Deep side ditches are dangerous to traffic
    2. Side ditches are designed to carry surface water only
    3. The construction of such ditches would be to expensive
52. In heavy construction, which of the following locations would give the best results in discharge?
    1. Top of fill outside the shoulder
    2. Bottom of slope in the fill section
    3. At the foot of cut slope outside of the shoulder
    4. To of cut slope
53. Which would be the best relationship between roadway profile and bottom of the ditch that runs along a level or very flat section of rural area highway?
    1. Profiles should be the same
    2. Ditch profile should be steeper
    3. Ditch profile should be less
    4. Ditch profile should be varied
54. Which of the following best maintains the stability of side hill cut section against action of flowing underground water?
    1. Intercepting drain
    2. Retaining wall
    3. French drain
    4. Underdrain
55. What is the most important use for longitudinal underdrain in highway construction?
    1. To carry surface water
    2. To intercept and carry capillary water
    3. To intercept and carry away the seepage from side hills cuts
    4. To prevent the travelling public from getting stuck in mud
56. The best method of eliminating undesirable sub surface water from under pavement is?
    1. Use of impervious pavement
    2. Use of impervious soils in subgrade
    3. Use of course pervious soils in subgrade
    4. Use of imperious material in shoulders
57. An important factor when designing a curb section is?
    1. Gradient
    2. Drainage
    3. Thickness of pavement
    4. Appearance
58. When the road section does not have curbs, the best location for the underdrain is?
    1. Edge of the pavement
    2. Edge of should
    3. Inside the edge of pavement
    4. Under the side ditch
59. What is primary reason for using vertical sand drains?
    1. To drain underlying soil courses
    2. To lower the water table and prevent settlement of soils under the fill
    3. To improve the compressive strength of the subbase
    4. To increase the rate of settlement of the compressible soils by allowing the water to escape
60. Which of the following would provide the contractor with the initial working fund on a construction project?
    1. Prequalifying for the bid
    2. Finishing another job before dead line in hope that the bonus will be paid
    3. Setting high unit prices on items that must be finished first
    4. Setting high unit prices on high quality items
61. Which one of the following is the best description of the “unbalanced bid”?
    1. That which include a high unit bid price for a low quantity item
    2. That which include a low unit price for a high quantity item
    3. As in “A” with a knowledge where this item will increase and as in “B”, with a knowledge that item will decrease
    4. A bid where the estimated bid does not compose the necessary items to complete the contract
62. Per State Architects Specifications, which of the following is the interpretation to be given by bidders to the estimated quantities?
    1. It is usually only approximate
    2. It is the only guide available to the bidders
    3. Sometimes portions are omitted
    4. More information can be provided upon request
63. Per the State Architects Specifications, what is the contractor required to submit to state architects for approval?
    1. Drawings and bar list of structural reinforcement
    2. Complete proposed sequence of construction
    3. Detailed drawings of concrete forms
    4. Employee time sheets
64. A limited increase of a specific item, while the contract is in progress, is usually paid under?
    1. Cost plus basis
    2. A unit item price
    3. Capitalized cost
    4. A change of monthly estimate order

Terms and Definitions that pertain to Planning and Design

1. Right- of -Way Cost

2. Construction cost

3. Maintenance of traffic (Reconstruction)

4. Traffic volume safety

5. O & D survey

6. Door to Door survey

7. Alternate streets investigations

8. Trucking/ parking concerns

9. Limited access roads

10. Arterial routes

1. A 45. A

2. C 46. C

3. D 47. C

4. D 48. C

5. A 49. B

6. C 50. D (overhauls now on contractor to figure out economical fill/haul)

7. D 51. B

8. B 52.C

9. A 53.B

10. A 54. B

11. A 55. B

12. A 56. C (disabled cars can pull off leaving both lanes for moving traffic)

13. C 57. C

14. B 58. C

15. C 59. C

16. C 60. A & D (for safe turns a turn lane is necessary so 10’ allows lane)

17. B 61. B

18. C 62. D

19. B 63. D

20. C 64. C

21. B 65. A

22. D 66. A

23. B 67. B

24. C 68. C

25. B 69. A

26. A 70. A (Railway grade cant be adjusted do road must be causing dip)

27. C 71. C

28. D 72. C

29. B 73. A

30. D 74. C

31. C 75. B

32. D 76. A

33. C 77. C

34. C 78. C

35. A 79. B

36. C 80. D

37. B 81. D

38. C 82. C

39. C 83. C

40. C 84. A

41. C 85. A

42. B 86. B

43. A

44. C