NSPS

SURVEY TECHNICIAN CERTIFICATION PROGRAM

LEVEL I
SAMPLE EXAMINATION QUESTIONS

NATIONAL SOCIETY OF PROFESSIONAL SURVEYORS

March 2008

This booklet has been prepared to provide an example of what an actual Certified Survey Technician (CST) Examination might be like. Using this as your only study guide is not recommended.

This examination is 25% of an actual exam. The work element order is the same as in the full examination with approximately one quarter the number of questions.

These are not actual questions from past exams, but do reflect the complexity and makeup of actual exam questions.

Additional information about the CST program and exam availability can be obtained at:

- www.nspsmo.org
- 240-632-9716, ext 112
- NSPS CST Program
  6 Montgomery Village Avenue, Suite 403
  Gaithersburg, MD 20879

Work Elements

Test problems will be taken from the following work elements:

1) *Surveying History* (5)
Knowledge of the historical development of survey procedures and practices.

2) *Types of Surveys* (10)
Knowledge of the different types of surveying and the basic differences between them.

3) *Field Equipment & Instruments* (41)
Knowledge of the care, cleaning and use of surveying tolls and equipment, including field radios. Understand the names, purpose and parts, setup, transport and the need for calibration of various surveying field instruments. Some historical knowledge is required.

4) *Electronic Instruments* (8)
Knowledge of the handling, setup and care of electronic instruments and their accessories.

5) *Control Points: Horizontal & Vertical* (6)
Knowledge of types of surveying control points and their differences.

6) *Plan Reading* (17)
Knowledge of the types of surveying maps and the ability to obtain basic information from these maps.

7) *Survey Computations* (50)
Knowledge of mathematics and measurements relating to the surveying (including linear, angular, elevations and unit systems conversion).

8) *Field Operations* (21)
Knowledge of the field duties of a Survey Technician. Such duty areas may include line clearing, establishing points, taping, leveling and compass reading.

9) *Field Notes* (5)
Knowledge of the basic types of surveying field notes.

10) *Drafting/CAD* (17)
Knowledge of basic drafting and CAD skills, tools and procedures.

11) *First Aid & Safety* (20)
Basic knowledge of treatment practices for a variety of medical emergencies. Knowledge of traffic control and safety procedures for surveying and construction operations, including Occupational Safety and Health Administration (OSHA) standards.

NSPS CST LEVEL I SAMPLE EXAMINATION

Survey History

1. The United States Public Land Survey System was established under the direction and guidance of:

    1. Benjamin Franklin
    2. George Washington
    3. John Hancock
    4. Thomas Jefferson

Types of Surveys

2. Hydrographic surveys must be referenced to which of the following control?

    1. horizontal only
    2. horizontal and vertical
    3. vertical only
    4. tidal

3. Stadia surveys are most commonly used as a method for measuring _____.

    1. meridians
    2. bearings
    3. topographic data
    4. azimuths

Field Equipment & Instruments

4. When performing level loops, what is the recommended manner to move an automatic level from one set up point to the next?

    1. Place the tripod and level on the tailgate of the truck
    2. Leave the level on the tripod and carry it horizontally over your shoulder
    3. Leave the level on the tripod and carry it upright in front of yourself
    4. Remove the level from the tripod and put it in its case

5. What is the length of each of the painted alternating bands of contrasting colors on a range pole?

    1. 0.50'
    2. 1.00'
    3. 1.25'
    4. 1.50'

6. Which of the following tools should you use when cutting brush?

    1. pliers
    2. maul
    3. wrench
    4. machete

7. While the rodman, with a Philadelphia level rod, goes downhill from the Level instrument, the level operator readings are:

    1. getting smaller
    2. getting harder to see
    3. getting easier to see
    4. getting larger

8. The needle of the surveyor's compass points to:

    1. true north
    2. geodetic north
    3. geographic north
    4. magnetic north

9. The alternating colors on a range pole are usually painted?

    1. white and black
    2. white and pink
    3. white and green
    4. white and red

10. The proper method to use for cleaning a steel chain is to _____.

    1. wash with soap and water
    2. remove foreign material and apply a light coat of oil
    3. grind off foreign material and apply a light coat of oil
    4. use a rust preventative and polish with a soft dry cloth

11. The cross-sectional shape of most range poles is what shape?

    1. square
    2. triangle
    3. rectangle
    4. round

12. What would be the instrument most commonly used to run a benchmark circuit?

    1. abney hand level
    2. total station
    3. self-leveling level
    4. dumpy level

13. The reason back-sights and fore-sights are "balanced" in leveling, is for:

    1. simplification of computations
    2. ease in finding turning points
    3. keeping the size of the numbers on the rod the same
    4. correcting for instrument mis-adjustment

Electronic Instruments

14. Most total station distance measurements are based upon:

    1. speed of light
    2. stadia measurements
    3. distance between upper and lower transit readings
    4. speed of sound

15. Which of the following procedures will increase the range of a total station measurement?

    1. inverting the prism
    2. measuring at noon
    3. using multiple prisms
    4. using new batteries

Control Points - Horizontal & Vertical

16. The star that is predominantly used for observations for latitudes in the United States?

    1. Cassiopeia
    2. Arcturus
    3. Spica
    4. Polaris

17. What is the primary federal agency responsible for horizontal and vertical control throughout the United States?

    1. BLM
    2. NGA
    3. NGS
    4. USGS

Plan Reading

18. The number 34 in the term "T.34 N." is usually associated with a:

    1. temporary point
    2. town
    3. township
    4. traverse point

19. If a point measures 7¼" from a triangulation point on a map whose scale is 1:62,500, how many miles apart are the two points on the ground?

    1. 7.15
    2. 7.25
    3. 6.90
    4. 11.43

20. One method used to accurately determine the area of an irregular boundary on the hard copy of a drawing would be to use a:

    1. planimeter
    2. scale and triangle
    3. protractor
    4. compass and cross section paper

21. Which one of the following scales is primarily used in the United States for scaling distances on a surveying drawing?

    1. engineer's scale
    2. architect's scale
    3. metric scale
    4. vernier scale

22. A line connecting points of equal elevations on a map is called a/an:

    1. property line.
    2. critical areas line.
    3. line of equal elevation.
    4. contour line

Survey Computations

23. What is the sum in degrees of the interior angles of a six sided polygon?

    1. 360
    2. 540
    3. 720
    4. 900

24. A new point at a lower elevation was set using a level directly from a benchmark. If the rod was clamped 0.20 feet too low from the correct setting, by how much would the point's elevation be in error?

    1. not in error
    2. 0.2' too high
    3. 0.4' too low
    4. 0.2' too low

25. The correct stationing of a point measured 7' 7 ¾" ahead on line (forward) from station 150+45, would be:

    1. 150+37.35
    2. 160+07.50
    3. 150+52.65
    4. 150+52.75

26. When measuring 6'6½" back from station 50+00, what would be the station of the new point?

    1. 49+93.40
    2. 49+93.46
    3. 50+06.60
    4. 50+06.54

27. If the elevation of a level instrument is 106.57', what is the elevation of the ground when the rod reading is 6.22'?

    1. 100.35'
    2. 103.50'
    3. 106.57
    4. 107.16

28. A right triangle has sides of 37.00' and 49.33'. What is the length of the hypotenuse?

    1. 32.63'
    2. 45.00'
    3. 49.33'
    4. 61.67'

29. What is the equivalent of 4.25 meters in feet?

    1. 12.750
    2. 13.940
    3. 13.944
    4. 13.250

30. In highway work, grade is usually given in terms of:

1. percent
2. degrees
3. elevation
4. slope

31. The error resulting from using a tape that is too short is known as a(n) _____ error.

1. cumulative
2. random
3. erratic
4. compensating

32. The legal area of a parcel of land is measured:

1. vertically
2. horizontally
3. along the ground surface
4. between the ellipsoid and geoid

33. A rectangular parcel of land is 44.806 meters x 171.603 meters. What is the area of the parcel in square feet?

1. 7,688.628
2. 8,276.170
3. 76,886.280
4. 82,761.680

34. Which of the following statements best describes precision?

1. the finest measurement
2. degree of refinement of measurement
3. largest number of significant figures in a measure
4. care in reading the instrument

Field Operations

35. A 100 foot cloth or fiber tape is most likely used for measuring _____.

    1. Traverse measurements
    2. Property measurements
    3. slope stakes locations
    4. center line

36. When using a Plumb Bob in a slight wind:

    1. the point of the plumb bob should be set on the point to eliminate sway
    2. you should get someone to hold the plumb bob on the point
    3. you should bounce the plumb bob lightly on the point
    4. you should hold the plumb bob with your foot

37. Which of the following procedures would result in the largest error in a 100 foot standardized chain?

    1. chain is 2 feet off line
    2. chaining on a 5% slope without correcting
    3. chain supported throughout with too much tension
    4. suspended chain supported at both ends with 10 lbs. of tension

38. Cross-section areas are used to calculate:

    1. the cost of the dirt moved
    2. right angle offsets from the centerline
    3. the excavation fill total
    4. total excavation quantities

39. What is the purpose of maintaining equal backsights and foresights in a level circuit?

    1. for easier calculations
    2. minimize refraction errors.
    3. for the convenience of the operator
    4. minimize instrument error

Field Notes

40. Survey notes are usually recorded:

    1. during lunch break
    2. at the time of the field work
    3. back in the office at the end of the day
    4. before the work is done

Drafting/CAD

41. Which of the following is NOT an element of a horizontal curve?

    1. long chord
    2. length
    3. radius
    4. slope

42. You have plotted a road profile. The curve you are looking at is a _____ curve.

    1. horizontal
    2. reverse
    3. spiral
    4. vertical

43. The manual tool used to draw a small circular curve is a:

    1. compass
    2. French curve
    3. proportional divider
    4. protractor

44. The term “2H” refers to a leads:

    1. hardness
    2. darkness
    3. softness
    4. strength

45. A rule for placing text in CAD is that all text should be placed so that it can be read from the _____ side.

1. center
2. bottom
3. bottom and right
4. bottom and left

First Aid & Safety

46. Individual safety is the responsibility of:

1. each individual
2. the property owner
3. the equipment supplier
4. the owner of the company

47. Which of the following has responsibility for overall safety on a construction project?

1. the project owner
2. the design engineer
3. the safety inspectors
4. everyone working on the project

48. All of the following are required on a typical roadway construction project except for:

1. hard hats
2. safety vest
3. protective goggles
4. work shoes

49. Which of the following is NOT a safety rule when using a screwdriver?

1. keep the tips of screwdrivers properly ground and squared.
2. select a screwdriver to fit the size of the screw.
3. keep all parts of your body clear of the screwdriver tip in case it slips.
4. keep a large screwdriver around to use as a pry tool or wrench.

50. Why is it not recommended that survey party members wear soft-soled shoes?

1. other survey party members may not like the color of tennis shoes
2. they're easily penetrated by sharp stubs, nails or glass
3. snakes like tennis shoes
4. tennis shoes get wet

ANSWER KEY

Survey History

Q #1 Ans. 4

Types of Surveys

Q #2 Ans. 2
Q #3 Ans. 3

Field Equipment & Instruments

Q #4 Ans. 3
Q #5 Ans. 2
Q #6 Ans. 4
Q #7 Ans. 4
Q #8 Ans. 4
Q #9 Ans. 4
Q #10 Ans. 2
Q #11 Ans. 4
Q #12 Ans. 3
Q #13 Ans. 4

Electronic Instruments

Q #14 Ans. 1
Q #15 Ans. 3

Control Points - Horizontal & Vertical

Q #16 Ans. 4
Q #17 Ans. 3

Plan Reading

Q #18 Ans. 3
Q #19 Ans. 1
Q #20 Ans. 1
Q #21 Ans. 1
Q #22 Ans. 4

Survey Computations

Q #23 Ans. 3
Q #24 Ans. 1
Q #25 Ans. 3
Q #26 Ans. 2
Q #27 Ans. 1
Q #28 Ans. 4
Q #29 Ans. 3
Q #30 Ans. 1
Q #31 Ans. 1
Q #32 Ans. 2
Q #33 Ans. 4
Q #34 Ans. 2

Field Operations

Q #35 Ans. 3
Q #36 Ans. 3
Q #37 Ans. 2
Q #38 Ans. 4
Q #39 Ans. 4

Field Notes

Q #40 Ans. 2

Drafting/CAD

Q #41 Ans. 4
Q #42 Ans. 4
Q #43 Ans. 1
Q #44 Ans. 1
Q #45 Ans. 3

First Aid & Safety

Q #46 Ans. 1
Q #47 Ans. 4
Q #48 Ans. 3
Q #49 Ans. 4
Q #50 Ans. 2