

ENGINEERING SURVEYING I

Multiple Choice Questions:

1. Which principle of surveying involves establishing control points with high precision before filling in details?
 - a. Working from part to whole
 - b. Working from whole to part
 - c. Method of triangulation
 - d. Method of traversing
2. A scale of 1:1000 is an example of a:
 - a. Full size scale
 - b. Enlarging scale
 - c. Reducing scale
 - d. Graphical scale
3. Which type of scale is used to read three dimensions such as meters, decimeters, and centimeters?
 - a. Plain scale
 - b. Diagonal scale
 - c. Vernier scale
 - d. Scale of chords
4. If the Representative Fraction (R.F.) is $1/500$, how many meters does 2 cm represent on the ground?
 - a. 1 m
 - b. 10 m
 - c. 5 m
 - d. 50 m
5. Which instrument is used to determine the slope of the ground for distance correction?
 - a. Ranging rod
 - b. Abney level
 - c. Plumb bob
 - d. Peg
6. The length of a Gunter's chain is:
 - a. 100 feet
 - b. 33 feet
 - c. 66 feet
 - d. 20 meters
7. How many links are found in a 30-meter metric chain?
 - a. 100
 - b. 150
 - c. 200
 - d. 300
8. Which tape is most suitable for high-precision work due to its low thermal expansion?
 - a. Linen tape
 - b. Metallic tape
 - c. Steel tape
 - d. Invar tape
9. The process of aligning intermediate points on a straight line is called:
 - a. Offsetting
 - b. Ranging
 - c. Leveling
 - d. Chaining
10. Which correction is always subtractive when measuring distance?
 - a. Temperature correction
 - b. Pull correction
 - c. Sag correction
 - d. Alignment correction
11. Calculate the R.F. for a scale where 1 cm = 10 meters.
 - a. $1/10$
 - b. $1/100$
 - c. $1/1000$
 - d. $1/10000$
12. Convert 5 acres into square meters (Assume 1 acre = 4046.86 sq. m).
 - a. 20234.3 sq. m
 - b. 10117.1 sq. m
 - c. 40468.6 sq. m
 - d. 5000 sq. m
13. A 20m chain is 5cm too long. If the measured distance is 200m, what is the true distance?
 - a. 199.5 m
 - b. 200.5 m
 - c. 205.0 m
 - d. 195.0 m
14. The horizontal distance between two points is 100m. If the slope is 1 in 10, the slope distance is approximately:
 - a. 100.5 m
 - b. 101.0 m
 - c. 99.5 m
 - d. 110.0 m
15. Conversion: How many centimeters are in 1.5 inches? (1 inch = 2.54 cm).
 - a. 3.00 cm
 - b. 3.81 cm
 - c. 2.54 cm
 - d. 4.12 cm
16. Which of the following is an accessory for ranging?
 - a. Tape
 - b. Ranging rod
 - c. Arrow
 - d. Chain
17. Accuracy required in a survey depends on:
 - a. The instrument used
 - b. The purpose of the survey
 - c. The time available
 - d. The weather
18. An error that occurs by human oversight, like misreading a number, is a:
 - a. Cumulative error
 - b. Compensating error
 - c. Mistake
 - d. Natural error
19. Which error follows the law of probability and tends to cancel out?
 - a. Cumulative error
 - b. Systematic error
 - c. Compensating error
 - d. Gross error
20. Precision is a measure of:
 - a. Closeness to the true value
 - b. Consistency or repeatability of measurements
 - c. Absence of mistakes
 - d. Speed of work

21. In a chain survey, “offsets” are usually:
a. Parallel to the chain line b. Perpendicular or oblique to the chain line
c. Horizontal angles d. Vertical heights
22. A well-conditioned triangle has no angle less than:
a. 20 degrees b. 30 degrees c. 45 degrees d. 60 degrees
23. The longest survey line in chain surveying is the:
a. Tie line b. Check line c. Base line d. Boundary line
24. Reconnaissance survey involves:
a. Final plotting b. Detailed measurement
c. Preliminary inspection of the field d. Calculation of errors
25. The field book used to record chain survey data is usually a:
a. Single line or double line book b. Spiral notebook
c. Ledger d. Graph paper
26. Which symbol is used for a permanent bench mark?
a. A triangle b. A circle with a dot
c. A BM label d. A broad arrow or specific conventional sign
27. Triangulation is the principle used in:
a. Compass survey b. Chain survey c. Leveling d. Plane table survey
28. Tie stations are used to:
a. Check the accuracy of the base line b. Locate interior details
c. Start the survey d. Measure the slope
29. If a map is drawn to a scale of 1:500, what is the area on the map (in sq. cm) for a ground area of 500 sq. meters?
a. 1 sq. cm b. 20 sq. cm c. 10 sq. cm d. 5 sq. cm
30. Convert 100 cubic meters to cubic feet (Assume 1 m = 3.28 ft).
a. 328 cu. Ft b. 1075 cu. Ft c. 3531 cu. Ft d. 1000 cu. Ft
31. If the pull applied is greater than the standard pull, the correction is:
a. Positive b. Negative c. Zero d. Subtractive
32. Representative Fraction is the ratio of:
a. Ground distance to map distance b. Map distance to ground distance
c. Map area to ground area d. Ground area to map area
33. Which of the following is a “natural error” in surveying?
a. Sag of tape b. Expansion of tape due to temperature
c. Incorrect recording d. Faulty instrument
34. A line connecting the apex of a triangle to some point on the opposite side to check accuracy is a:
a. Tie line b. Check line c. Base line d. Detail line
35. The method of measuring distance on sloping ground by “stepping” involves:
a. Measuring only the slant distance b. Measuring small horizontal segments
c. Using a clinometer only d. Using GPS
36. An “Ill-conditioned” triangle has an angle greater than:
a. 90 degrees b. 120 degrees c. 100 degrees d. 110 degrees
37. Arrows are used in chaining to:
a. Mark the end of each chain length b. Measure the height
c. Check the slope d. Fix the ranging rod
38. The unit of volume in the SI system is:
a. Square meter b. Cubic meter c. Hectare d. Liter
39. Numerical practice: 1 Hectare is equal to how many square meters?
a. 1,000 b. 10,000 c. 100,000 d. 4,046
40. How many links are in an Engineer’s chain?
a. 66 b. 100 c. 150 d. 200
41. Which of the following is NOT a type of tape?
a. Invar b. Metallic c. Gunter d. Steel

42. In chain surveying, detailing is done by:
a. Traversing b. Offsetting c. Leveling d. Triangulation
43. A station mark that is permanent and used as a reference for future surveys is:
a. Tie station b. Subsidiary station c. Main station d. Bench mark
44. Calculate the area of a rectangular field 50m by 40m in Hectares.
a. 2.0 Ha b. 0.2 Ha c. 0.02 Ha d. 2000 Ha
45. The correction for temperature is added if the field temperature is:
a. Less than standard temperature b. Greater than standard temperature
c. Equal to standard temperature d. 0 degrees Celsius
46. Which chain is 33 feet long and has 16 links?
a. Engineer's chain b. Gunter's chain c. Revenue chain d. Metric chain
47. The error due to bad ranging is:
a. Positive cumulative b. Negative cumulative
c. Compensating d. Random
48. A "Location Sketch" of a survey station is prepared to:
a. Calculate area b. Identify and relocate the station in the future
c. Plot the map d. Measure bearings
49. If a chain is used to measure a line but is not held horizontal on a slope, the error is:
a. Compensating b. Positive cumulative c. Negative cumulative d. Zero
50. 1 Square Kilometer is equal to:
a. 10 Hectares b. 100 Hectares c. 1,000 Hectares d. 10,000 Hectares
51. The principle of compass surveying is:
a. Triangulation b. Traversing c. Leveling d. Offsetting
52. In a Prismatic Compass, the graduations are:
a. Upright b. Inverted c. Horizontal d. Vertical
53. The Whole Circle Bearing (WCB) of a line is 150° . Its Quadrantal Bearing (QB) is:
a. N 30° E b. S 30° E c. S 30° W d. N 30° W
54. If the magnetic declination is 5° East, and the magnetic bearing is 100° , the true bearing is:
a. 95° b. 105° c. 100° d. 110°
55. The difference between Fore Bearing (FB) and Back Bearing (BB) should be:
a. 90° b. 180° c. 270° d. 360°
56. Local attraction in a compass is caused by:
a. Sunlight b. Proximity to iron or magnetic objects
c. Curvature of the earth d. Wind speed
57. If the Fore Bearing of a line is 60° , what is the Back Bearing?
a. 240° b. 120° c. 300° d. 150°
58. The line passing through the North and South geographic poles is the:
a. Magnetic Meridian b. True Meridian c. Arbitrary Meridian d. Grid Meridian
59. A traverse that starts and ends at the same station is a:
a. Open traverse b. Closed traverse c. Loop traverse d. Running traverse
60. Which compass is used to measure Quadrantal Bearings directly?
a. Prismatic Compass b. Surveyor's Compass
c. Mariner's Compass d. Solar Compass
61. Magnetic declination:
a. Remains constant at all places b. Varies from place to place and time to time
c. Is always zero at the equator d. Is independent of the magnetic meridian
62. Numerical: If WCB is 280° , the QB is:
a. N 80° W b. S 80° W c. N 80° E d. S 80° E
63. The reading on the staff at a point of known elevation is:
a. Fore sight b. Back sight c. Intermediate sight d. Change point
64. If a staff is held upside down on a ceiling, the reading is called:
a. Negative reading b. Inverted staff reading c. Zero reading d. Height of instrument

65. In leveling, "Datum" refers to:
 a. A fixed point of known elevation
 b. An imaginary level surface used as a reference
 c. The height of the instrument
 d. The distance from the center
66. The "Rise and Fall" method of leveling provides a check on:
 a. Back sights only
 b. Fore sights only
 c. All staff readings (BS, IS, FS)
 d. Only the last station
67. Height of Instrument (HI) is equal to:
 a. RL of BM + BS
 b. RL of BM – BS
 c. RL of BM + FS
 d. RL of BM - FS
68. The curvature correction for leveling is:
 a. Always positive
 b. Always negative
 c. Sometimes positive
 d. Zero
69. Numerical: If RL of BM is 100.000m and the BS is 1.500m, what is the HI?
 a. 98.500 m
 b. 101.500 m
 c. 100.000 m
 d. 101.000 m
70. Numerical: If an inverted staff reading is 2.10m and the HI is 105.00m, the RL of the point is:
 a. 102.90 m
 b. 107.10 m
 c. 105.00 m
 d. 100.00 m
71. Which method is used to determine the height of a point whose RL is to be calculated from a known BM?
 a. Fly leveling
 b. Reciprocal leveling
 c. Differential leveling
 d. Profile leveling
72. Error due to refraction is:
 a. 1/7th of curvature correction
 b. 7 times curvature correction
 c. Equal to curvature correction
 d. Negative
73. The Two Peg Test is used to check the:
 a. Sensitivity of bubble
 b. Parallelism of line of collimation and bubble tube axis
 c. Verticality of staff
 d. Sharpness of focus
74. A point on which both a back sight and a fore sight are taken is a:
 a. Bench mark
 b. Intermediate station
 c. Change point
 d. Datum
75. If the Fore Bearing of line AB is 45° and BC is 120° , the included angle ABC is:
 a. 75°
 b. 255°
 c. 105°
 d. 165°
76. The combined correction for curvature and refraction (in meters) for a distance of 1 km is approximately:
 a. 0.0673 m
 b. 0.0785 m
 c. 0.0112 m
 d. 0.1000 m
77. Which instrument is self-leveling?
 a. Dumpy level
 b. Tilting level
 c. Automatic level
 d. Wye level
78. "Reduced Level" is:
 a. The reading on the staff
 b. The vertical distance of a point above or below datum
 c. The height of the instrument
 d. The slope of the ground
79. Longitudinal sectioning is used for:
 a. Calculating land area
 b. Determining the profile of a center line for roads or canals
 c. Locating trees
 d. Measuring horizontal angles
80. A permanent mark of known elevation established by a government agency is:
 a. Arbitrary BM
 b. G.T.S. Bench Mark
 c. Temporary BM
 d. Relative BM
81. Reciprocal leveling is used when:
 a. There is an obstacle like a river between two points
 b. The ground is perfectly flat
 c. The distance is very short
 d. The sun is very bright
82. In a closed traverse, the sum of internal angles should be:
 a. $(n-2) \times 180^\circ$
 b. $(n+2) \times 180^\circ$
 c. $(2n-4) \times 90^\circ$
 d. Both a and c
83. Parallax in a telescope is removed by:
 a. Moving the objective
 b. Focusing the eyepiece and objective
 c. Leveling the instrument
 d. Cleaning the lens
84. Magnetic declination 2° West means:
 a. True North is 2° West of Magnetic North
 b. Magnetic North is 2° West of True North
 c. The bearing is 2°
 d. The dip is 2°

85. A line of collimation is:
- A vertical line
 - The line joining the intersection of cross-hairs and the optical center of the objective
 - The axis of the bubble tube
 - A line on the staff
86. Cross-sectioning is used to determine:
- The height of a mountain
 - The earthwork volume for a road
 - The magnetic meridian
 - The distance to the sun
87. Which error is caused by the earth's surface not being flat?
- Refraction error
 - Curvature error
 - Instrumental error
 - Personal error
88. If the BS is 2.0m and FS is 3.5m, there is a:
- Rise of 1.5m
 - Fall of 1.5m
 - Rise of 5.5m
 - Fall of 0.5m
89. A "Change Point" is required when:
- The survey is finished
 - The staff is no longer visible from the instrument station
 - The weather changes
 - The surveyor is tired
90. In the HI method, the arithmetic check is:
- $\sum Rise - \sum Fall = Last\ RL - First\ RL$
 - $\sum BS - \sum FS = Last\ RL - First\ RL$
 - $\sum BS - \sum IS = RL$
 - $\sum FS - \sum BS = RL$
91. True bearing is also known as:
- Magnetic bearing
 - Azimuth
 - Arbitrary bearing
 - Relative bearing
92. The graduated ring of a Prismatic Compass is attached to:
- The box
 - The needle
 - The pivot
 - The objective vane
93. Numerical: If magnetic declination is 3° W and the true bearing is 180° , what is the magnetic bearing?
- 177°
 - 183°
 - 180°
 - 173°
94. The sensitivity of a bubble tube depends on:
- Its length
 - The radius of curvature of the tube
 - The type of liquid
 - All of the above
95. Leveling from a BM to a station and back to the same BM is:
- Fly leveling
 - Check leveling
 - Profile leveling
 - Precise leveling
96. The horizontal angle between the magnetic meridian and the survey line is:
- Magnetic declination
 - Magnetic bearing
 - Dip
 - True bearing
97. An "Arbitrary BM" is used when:
- High precision is needed
 - Only relative elevations of points are required
 - G.T.S. marks are available
 - Doing a national survey
98. Inverted staff reading is taken on:
- Ground points
 - Underside of a bridge or roof
 - Bench marks
 - Change points
99. Converting 500 liters to cubic meters:
- 5.0 cu. m
 - 0.5 cu. m
 - 0.05 cu. M
 - 50 cu. m
100. The angle between the True North and Magnetic North is:
- Bearing
 - Declination
 - Dip
 - Azimuth
101. Convert 1200 square feet to square meters (1 ft = 0.3048 m).
- 111.48 sq. m
 - 131.25 sq. m
 - 100.00 sq. m
 - 150.60 sq. m
102. If a map area is 4 sq. cm and the ground area is 100 sq. meters, the scale is:
- 1:500
 - 1:250
 - 1:50
 - 1:1000
103. If a 30m chain is 10cm too short, the measured distance of 300m will be:
- 301.0 m
 - 299.0 m
 - 310.0 m
 - 290.0 m
104. The magnetic bearing of a line is S 40° W. If declination is 4° E, the true bearing in WCB is:
- 224°
 - 216°
 - 220°
 - 228°
105. A level is set up at point C. BS on A (RL 100.00) is 1.20m. FS on B (inverted) is 2.50m. The RL of B is:
- 98.70 m
 - 101.20 m
 - 103.70 m
 - 100.00 m

106. Volume of a cylinder with radius 2m and height 5m is:
a. 31.4 cu. m b. 62.8 cu. m c. 15.7 cu. m d. 20.0 cu. m
107. Magnetic bearing is 45° and True bearing is 42° . Declination is:
a. 3° E b. 3° W c. 87° E d. 0°
108. The sum of interior angles of a pentagon (5 sides) is:
a. 360° b. 540° c. 720° d. 180°
109. If a line is measured 500m with a 20m tape at 30°C (standard 20°C , coeff. $0.000012/^\circ\text{C}$), the temperature correction is:
a. +0.06 m b. -0.06 m c. +0.60 m d. -0.12 m
110. The combined correction for 500m distance in leveling is:
a. 0.0168 m b. 0.0673 m c. 0.0336 m d. 0.0112 m
111. A rectangular plot is 0.5 km by 0.2 km. Area in Hectares is:
a. 1 Ha b. 10 Ha c. 100 Ha d. 0.1 Ha
112. If QB is N 60° W, WCB is:
a. 60° b. 120° c. 240° d. 300°
113. "Local attraction" error is categorized as:
a. Natural error b. Personal error c. Instrumental error d. Systematic error
114. If the staff is not held vertical, the reading will be:
a. Smaller than actual b. Larger than actual c. Equal to actual d. Zero
115. In leveling, if BS > FS, the ground is:
a. Rising b. Falling c. Level d. Stepped
116. A survey station should be:
a. Hidden from view b. Easily accessible and mutually visible
c. In the middle of a road d. Near magnetic objects
117. 1 Mile is approximately:
a. 1.61 km b. 1.00 km c. 2.50 km d. 0.50 km
118. The correction for pull is calculated based on:
a. Temperature difference b. Elasticity of the tape material
c. Curvature of the earth d. Gravity
119. A "Well-conditioned" triangle is preferred because:
a. It is easier to walk around b. Plotting errors are minimized
c. It requires fewer arrows d. It uses less chain
120. In a compass, "Dip" is the:
a. Horizontal angle with meridian b. Vertical angle the needle makes with the horizontal
c. Error due to local attraction d. Declination at the poles
121. At the magnetic equator, the dip is:
a. 0° b. 45° c. 90° d. 180°
122. At the magnetic poles, the dip is:
a. 0° b. 45° c. 90° d. 180°
123. Which method of leveling is most suitable for finding the difference in level between two points far apart?
a. Simple leveling b. Differential leveling c. Profile leveling d. Reciprocal leveling
124. "Agonic lines" are lines joining points of:
a. Equal declination b. Zero declination c. Equal dip d. Zero dip
125. "Isogonic lines" join points of:
a. Equal declination b. Zero declination c. Equal dip d. Zero dip
126. A 100m tape is suspended between supports. The correction needed is:
a. Pull correction b. Sag correction c. Temperature correction d. Slope correction
127. If the scale of a map is 1:250,000, it is a:
a. Small scale b. Medium scale c. Large scale d. Enlarged scale
128. How many links in a 20m chain?
a. 100 b. 150 c. 200 d. 66

129. If the Fore Bearing is 180° , the Back Bearing is:
a. 0° b. 360° c. 90° d. Both a and b
130. To eliminate the effect of local attraction in a traverse:
a. Re-measure all distances b. Adjust bearings based on a line free from local attraction
c. Use a different compass d. Level the instrument
131. Numerical: A circle has a diameter of 10m. Its area is:
a. 31.4 sq. m b. 78.5 sq. m c. 100 sq. m d. 314 sq. m
132. Numerical: 1 cubic yard is equal to how many cubic feet?
a. 3 b. 9 c. 27 d. 12
133. If HI = 150.50m and the staff reading on a point is 1.50m, the RL is:
a. 152.00 m b. 149.00 m c. 150.00 m d. 151.00 m
134. If a survey station is affected by local attraction, what remains correct?
a. The FB and BB b. The included angle calculated from bearings
c. The WCB d. The magnetic meridian
135. The "Prismatic Compass" uses:
a. A needle that remains fixed to the box b. A graduated card that remains attached to the needle
c. A telescope d. A spirit level for every reading
136. In "Height of Instrument" method, which reading is not used to calculate HI?
a. Back sight b. Fore sight c. Intermediate sight d. Bench mark RL
137. Which error is considered "Instrumental"?
a. Sighting the wrong station b. Expansion of staff due to heat
c. Non-parallelism of line of sight d. Reading 2.56 instead of 2.65
138. The process of taking levels on both sides of a center line is:
a. Longitudinal sectioning b. Cross-sectioning c. Fly leveling d. Check leveling
139. "Benchmark" is denoted as:
a. CP b. BM c. RL d. HI
140. A "Temporary Adjustment" of a level is done:
a. Once a year b. Every time the instrument is set up
c. Only at the factory d. When it is dropped
141. The first step in temporary adjustment of a level is:
a. Leveling up b. Setting up c. Elimination of parallax d. Centering
142. If the RL of the line of collimation is 100.00m and the inverted staff reading to the ceiling is 2.50m, the ceiling RL is:
a. 97.50 m b. 102.50 m c. 105.00 m d. 100.00 m
143. Which is used for measuring angles in a survey?
a. Chain b. Tape c. Compass d. Level
144. "Scale of chords" is used to:
a. Measure distance b. Plot angles c. Find elevations d. Correct for sag
145. A 20m chain has links of length:
a. 10 cm b. 20 cm c. 30 cm d. 66 cm
146. A line of 100m on ground is 10cm on map. R.F. is:
a. 1/10 b. 1/100 c. 1/1000 d. 1/10000
147. Numerical: If a trench is 10m long, 1m wide, and 1m deep, its volume is:
a. 1 cu. m b. 10 cu. m c. 100 cu. m d. 5 cu. m
148. True bearing of a line is 10° and Magnetic bearing is 355° . Declination is:
a. 15° E b. 15° W c. 5° E d. 345° E
149. The bearing of a line is N 45° E. The Back Bearing is:
a. S 45° W b. N 45° W c. S 45° E d. 225°
150. "Datum" in Nepal is usually taken from:
a. Mount Everest b. Mean Sea Level (at Karachi or Mumbai)
c. Kathmandu Valley d. Local river level

Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	b	31	a	61	b	91	b	121	a
2	c	32	b	62	a	92	b	122	c
3	b	33	b	63	b	93	b	123	d
4	b	34	b	64	b	94	d	124	b
5	b	35	b	65	b	95	b	125	a
6	c	36	b	66	c	96	b	126	b
7	b	37	a	67	a	97	b	127	a
8	d	38	b	68	b	98	b	128	a
9	b	39	b	69	b	99	b	129	d
10	c	40	b	70	b	100	b	130	b
11	c	41	c	71	a	101	a	131	b
12	a	42	b	72	a	102	a	132	c
13	b	43	d	73	b	103	b	133	b
14	a	44	b	74	c	104	a	134	b
15	b	45	b	75	c	105	c	135	b
16	b	46	c	76	a	106	b	136	c
17	b	47	a	77	c	107	b	137	c
18	c	48	b	78	b	108	b	138	b
19	c	49	b	79	b	109	a	139	b
20	b	50	b	80	b	110	a	140	b
21	b	51	b	81	a	111	b	141	b
22	b	52	b	82	d	112	d	142	b
23	c	53	b	83	b	113	c	143	c
24	c	54	b	84	b	114	b	144	b
25	a	55	b	85	b	115	a	145	b
26	d	56	b	86	b	116	b	146	c
27	b	57	a	87	b	117	a	147	b
28	b	58	b	88	b	118	b	148	a
29	b	59	b	89	b	119	b	149	a
30	c	60	b	90	b	120	b	150	b