

December 2017

SURVEYING

Time Allowed: 3 Hours

Full Marks: 70

Answer to Question No.1 is compulsory and to be answered first.

This answer is to be made in separate loose script(s) provided for the purpose.

Maximum time allowed is 45 minutes, after which the loose answer scripts will be collected and fresh answer scripts for answering the remaining part of the question will be provided.

On early submission of answer scripts of Question No.1, a student will get the remaining script earlier.

Answer any five questions from the rest.

1. Answer the following questions (any twenty): 1x20
- i) The curvature of the earth's surface is taken into account only if the extent of survey is more than – a) 80 sq km, b) 500 sq km, c) 260 sq km, d) 1500 sq km.
 - ii) Offsets are – a) Chain lines out of alignment b) small measurements from chain line c) Measurements taken in chain surveying d) None of the above.
 - iii) The length of an Engineer's chain should be – a) 100 ft b) 66 ft c) 30m d) 20m.
 - iv) The error due to bad ranging is – a) compensation b) Cumulative positive c) Cumulative negative d) Both b) and c) above.
 - v) As per Indian standard the total number of links in a 30 m chain should be – a) 100 b) 150 c) 300 d) 75.
 - vi) The longest chain line passing through the center of the area is known as – a) Base line b) Tie line c) Check line d) All of the above.
 - vii) An obstacle which obstructs both chaining and ranging may be – a) River b) Lake c) Hillock d) Building.
 - viii) The length of a ranging rod should be – a) 1.5 to 2 m b) 2 to 3 m c) 3 to 4 m d) 2.5 to 4.5 m.
 - ix) The principal of optics used in construction of an optical square is – a) Reflection b) Double Reflection c) Refraction d) Double refraction.
 - x) Which of the following instrument is used for measurement of angles – a) Geodimeter b) Tellurometer c) Sextant d) Telescope.
 - xi) If the end stations of a line are free from local attraction then the difference in between fore and back bearing of that line should be degree of – a) 180 b) 120 c) 360 d) 90.
 - xii) The graduated ring of a prismatic compass starts with zero mark and it is marked at – a) North side b) South side c) East side d) West side.
 - xiii) In a plane table survey the method used for locating details is – a) Resection b) Radiation c) Intersection d) a) or b) above.
 - xiv) Accurate centering of a plane table is done by – a) Spirit level b) Plumbing fork c) Alidade d) Ranging rod.

- xv) The two point and three point problem are the methods of – a) orientation b) Resection c) Traversing and Resection d) Orientation and Resection.
- xvi) A straight line normal to the plumb line at a point and tangential to the level line at that point is called – a) A level line b) Vertical line c) Horizontal line d) Plumb line.
- xvii) The first observation taken on the change point is known as – a) Fore sight b) Back Sight c) Intermediate sight d) None of the above.
- xviii) Which of the following may be classified as personal error in levelling – a) Error in sighting b) Wind vibration c) Error due to defective joint d) Atmospheric refraction.
- xix) A correction for error due to refraction is – a) $0.01d^2$ b) $0.001d^2$ c) $0.01122d^2$ d) $0.078d^2$.
- xx) If temperature increases the sensitivity of a bubble tube is – a) Increases b) Decreases c) Remain constant d) None of the above.
- xxi) The vertical distance between any two consecutive contours is known as – a) Contour Line b) Contour Interval c) Contour Interval d) Horizontal Equivalent.
- xxii) Closed contours with higher values inside represents a – a) Depressions b) Hill c) Plain Surface d) None of the above. <https://www.wbsctonline.com>
- xxiii) The height of instrument method is – a) Less tedious b) More rapid c) Includes less calculations d) All of the above.
- xxiv) The errors in levelling due to earth's curvature are – a) positive b) Negative c) Both d) Cumulative.
- xxv) Geodimeter is an instrument used for measurement of – a) angles b) time c) distances d) elevation.

- 2. a) What are the sources of error in chaining? What precautions would you like to take guard against them?
b) A 30m steel tape was standardized at a temperature of 20°C and under a pull of 5 kg. The tape was used in a catenary at a temperature of 25°C and under a pull of P kg. The cross sectional area of the tape is 0.02 cm², its weight per unit length is 22g/m. Young's modulus = 2×10^6 kg/cm², $\alpha = 11 \times 10^{-6}$ per °C. Find the correct horizontal distance, if P is equal to 5 kg. 2+2+6
- 3. a) What do you mean by well-conditioned and ill conditioned triangles? What are the different types of offsets? Describe them.
b) Describe the procedure of field work in chain surveying. 2+3+5
- 4. a) What do you mean by Dip of Magnetic Needle? What is closing error in a traverse?
b) The following fore and back bearings were observed while traversing an area with a compass:

Line	FB	BB
PQ	S 37° 30' E	N 37° 30' W
QR	S 43° 15' E	N 44° 15' E
RS	N 73° 00' W	S 72° 15' E
ST	N 12° 45' E	S 13° 15' W
TP	N 60° 00' E	S 59° 15' W

Find the corrected bearing of the line. +4+6
- 5. a) Differentiate between radiation and intersection.
b) What is a two-point problem? Explain with neat sketch the procedure of solving a two point problem in plane table surveying. 3+7
- 6. Define the followings: datum surface, line of collimation, reduced level, fly levelling, reciprocal levelling. 2x5

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7. The following consecutive reading were taken with a level and a 4-meter levelling staff on a continuously sloping ground at common interval of 30m:
0.855, 1.545, 2.335, 3.115, 3.825, 0.455, 1.380, 2.055, 2.855, 3.455, 0.585, 1.015, 1.850, 2.755, 3.845
The RL of starting point was 380.500. Make entries in a level book and apply the usual checks. Determine the gradient of the total survey line. 10
8. a) Define the terms: contour line, contour interval, horizontal equivalent. 6+4
b) Describe the method of direct contouring.
9. a) State the trapezoidal rule and Simpsons rule. What is the limitation of Simpsons rule?
b) The following perpendicular offsets were taken at 10m intervals from a chain line to an irregular boundary line:
3.10, 4.20, 5.35, 6.45, 7.15, 8.25, 7.95 and 5.20m 4+6
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