

ADVANCED SURVEYING*Time Allowed: 2.5 Hours*

Full Marks: 60

Answer to Question No. 1 & 2 are 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 30 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 & 2, a student will get the remaining script earlier.

Answer any Eight (08) Questions from the rest.

1. Choose the correct alternatives (any ten)

1x10= 10

- (i) Setting out a curve by two theodolite method, involves (a) linear measurements only (b) angular measurements only (c) both linear and angular measurements (d) none of these
- (ii) The chord of a curve less than peg interval is known as (a) small chord (b) sub chord (c) normal chord (d) full chord
- (iii) The curve composed of two arcs of different/same radii having their centres on the opposite side of the curve is known as (a) simple curve (b) compound curve (c) reverse curve (d) vertical curve
- (iv) The line which passes through the point of intersection of the cross hairs of the eye-piece and optical centre of the objective and its continuation is called (a) line of collimation (b) axis of telescope (c) axis of the level tube (d) horizontal axis
- (v) Theodolite traverses are generally run in Direction. (a) clockwise (b) anti-clockwise (c) straight (d) normal
- (vi) Tacheometry is the branch of surveying in which measurements of distances are made by (a) chaining (b) pacing (c) computation (d) all of these
- (vii) Tacheometric measurements requires (a) slope correction (b) tension correction (c) temperature correction (d) no correction
- (viii) If the distance between the tacheometer and the staff increases, then the staff intercept by stadia hair (a) increases (b) decreases (c) remain constant (d) none of these.
- (ix) To obtain the correct volume using the trapezoidal rule, the prismoidal correction should always be (a) added (b) subtracted (c) multiplied (d) divided.
- (x) Fine adjustment in a theodolite is done by the (a) focussing screw (b) tangent screw (c) clamp screw (d) none of these
- (xi) The second tangent point of a simple curve is also known as the (a) end point (b) point of tangency (c) rear point (d) point of curve

- (xii) The stadia diaphragm is provided for measuring (a) elevation (b) bearing (c) horizontal distance (d) angle
- (xiii) The graph prepared in order to facilitate proper distribution of excavated earth is known as the (a) mass diagram (b) working diagram (c) balancing diagram (d) none of the above.
- (xiv) The value of the planimeter constant is added only when the anchor point is (a) inside the figure (b) outside the figure (c) on the boundary line (d) none of these.
- (xv) The characteristic of Gale's table is that the independent coordinates of all points are brought to the (a) first quadrant (b) second quadrant (c) third quadrant (d) fourth quadrant

2. Fill in the blanks (any ten)

1x10=10

- (i) If the radius of a circular curve is 500 m, then the degree of the curve is
- (ii) The length of long chord of a simple circular curve having angle of deflection ϕ and radius R is
- (iii) Generally the least count of a theodolite is
- (iv) Measurement of several angles at a common station is made by method.
- (v) The angle between the prolongation of the preceding line and the forward line of a traverse is called angle.
- (vi) instrument is used for measuring area.
- (vii) Simpson's rule of areas can only be applied if the number of ordinates is
- (viii) In trapezoidal formula of areas, the line joining the ends of the ordinates is assumed
- (ix) The accuracy of the area obtained by the any rules depends upon the of divisions of the survey line.
- (x) A tacheometer is nothing but a fitted with stadia hairs.
- (xi) A stadia diaphragm consists of one vertical and horizontal hairs.
- (xii) The multiplying constant of a theodolite is
- (xiii) The additive constant of a theodolite is determined by adding the distance along the telescope from the centre of the theodolite to the objective and it's
- (xiv) is the most popular and modernised instruments for measuring horizontal and vertical angles along with slope distances of an object in surveying operation in a single set-up.
- (xv) The true bearing of a line is called its

3. A railway embankment is 9 m wide at formation level with side slope of 1 in 2. Assume the ground to be level transversely, calculate the volume of the embankment in a length of 180 m, the centre heights at 30 m intervals being 0.6, 0.8, 1.5, 1.8, 0.7, 0.3 and 0.9 m respectively. Use Trapezoidal method. <https://www.wbscteonline.com>

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4. A series of offsets were taken at 3 m intervals in the following order from a chain line to a curved hedge.

0, 2.26, 1.62, 2.80, 2.04, 2.22, 2.46, 0 m

Calculate the area between the chain line, the hedge and the end points of the chain line by Simpson's rule.

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5. Describe with the help of neat sketches, the construction and working of a planimeter.

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6. The length & bearing of the sides of a closed traverse are as follows. Calculate the missing data.

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Line	Length (m)	Bearing
AB	100.00	?
BC	80.50	140°30"
CD	60.00	220°30"
DA	?	315°15"

7. Explain with neat sketches to find out the height of a tower when it is inaccessible by a theodolite.

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8. Describe the process of measuring the horizontal angle by a theodolite. What is the temporary adjustment of a theodolite?

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9. Explain the setting out a simple circular curve by perpendicular Offsets from the Long Chord.

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10. Derive the expressions for horizontal and vertical distances in the fixed hair method when the staff is held vertically and the measured angle is that of angle of elevation.

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11. A tacheometer was set up at a station C and the following readings were obtained on a staff vertically held.

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Instrument Station	Staff Station	Vertical angle	Hair readings (m)	Remark
C	BM	(-)5°20'0"	1.500, 1.800, 2.450	RL of BM= 250.500 m
C	D	(+)8°12'0"	0.750, 1.500, 2.250	

Calculate the RL of D, when the multiplying and additive constants of instrument are 100 and 0.12 respectively.

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12. A tacheometer has a diaphragm with three cross hairs spaced at distances 1.5 mm. The focal length of the object glass is 30 cm and the distance from the object glass to the trunion axis is 12 cm, calculate the tachometric constants. Purpose of tachometric surveying.

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