



Name :

Roll No. :

Invigilator's Signature :

CS/B.TECH (CE-OLD)/SEM-4/CE-403/2012

2012

SURVEYING-II

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following :

$10 \times 1 = 10$

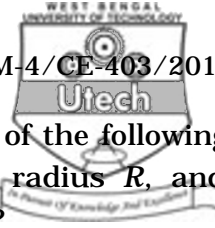
- i) The process of turning the telescope about the vertical axis in horizontal plane is known as
- a) transiting
 - b) reversing
 - c) plunging
 - d) swinging.

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[Turn over



- ii) The cross hairs in the surveying telescope are placed
 - a) midway between eyepiece and objective lens
 - b) much closer to the eyepiece than to the objective lens
 - c) much closer to the objective lens than to the eyepiece
 - d) anywhere between eyepiece and objective lens.
- iii) If the reduced bearing of a line AB is $N60^\circ W$ and length is 100 m, then the latitude and departure resp. of the line AB will be
 - a) + 50 m, + 86.6 m b) + 86.6 m, - 50 m
 - c) + 50 m, - 86.6 m d) + 70.7 m, - 50 m.
- iv) Bowditch rule is applied to
 - a) an open traverse for graphical adjustment
 - b) a closed traverse for adjustment of closing error
 - c) determine the effect of local attraction
 - d) none of these.
- v) The multiplying constant for the tacheometer is
(f, i, d have their usual meaning in tacheometry)
 - a) f / i b) $f + d$
 - c) $f/i + d$ d) $f/d + i$.
- vi) In measuring horizontal angles, the theodolite should be turned
 - a) clockwise from the forward station to the back station
 - b) clockwise from the back station to the forward station
 - c) anticlockwise from the back station to the forward station.



- vii) For a simple circular curve, which one of the following gives the correct relation between the radius R , and degree of curve D , the 20 m arc length ?
- a) $R = 5729.6/D$ b) $R = 1718.9/D$
 c) $R = 1145.9/D$ d) $572.9/D$.
- viii) The radius of curvature of an ideal transition curve should be
- a) inversely proportional to its length from the beginning
 b) directly proportional to its length from the beginning
 c) proportional to the speed of the vehicle
 d) proportional to the superelevation.
- ix) If R is the radius of the main curve, θ the angle of deflection, S the shift and L the length of the transition curve then total tangent length of the transition curve is given by
- a) $(R - S) \tan \theta/2 - L/2$
 b) $(R + S) \tan \theta / 2 - L / 2$
 c) $(R + S) \tan \theta/2 + L / 2$
 d) $(R - S) \tan \theta/2 + L / 2$.
- x) Setting out a simple curve by two theodolite method does not require
- a) angular measurements
 b) linear measurements
 c) both angular and linear measurements
 d) none of these.
- xi) The length of the long chord of a simple circular curve of radius R and angle of deflection δ is
- a) $R \cos \delta / 2$ b) $2R \cos \delta / 2$
 c) $2R \sin \delta / 2$ d) $R \sin \delta / 2$.



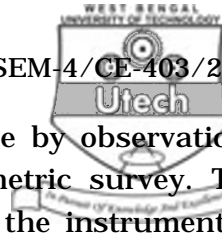
- xii) Overturning of vehicles on a curve can be avoided by using
- a) compound curve b) vertical curve
 - c) reverse curve d) transition curve.
- xiii) If in a closed traverse, the sum of the north latitudes is more than the sum of the south latitudes and also the sum of the west departures is more than the sum of the east departures, the bearing of the closing line is in the
- a) NE quadrant b) SE quadrant
 - c) NW quadrant d) SW quadrant.
- xiv) For a sight inclined at θ with the horizontal and the staff held normal to the line of sight, the staff intercept is s . The horizontal distance D be tacheometer with an anallatic lens and staff station is
- a) $ks \cos \theta + r \sin \theta$
 - b) $ks \sin \theta + r \cos \theta$
 - c) $(Ks + c) \cos \theta + r \sin \theta$
 - d) $(Ks + c) \sin \theta + r \cos \theta$.

GROUP - B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. Explain Trigonometrical leveling when
 - a) base of an object is accessible
 - b) when indirect leveling is done.
3. Establish the distance and elevation formula in tacheometer for staff vertical and inclined sight.



4. The elevation of a *pt P* is to be determine by observations from two adjacent stations of a tacheometric survey. The staff was held vertically upon the *pt* and the instrument is fitted with in an anallatic lens, the const of the instrument being 100. Compute the elevation of the *pt P* from the following data, taking both the observations as equally trustworthy :

Inst stn.	Ht of axis	Staff pt	Vertical angle	Staff reading	Elevation of stn
A	1.42	P	$+ 2^{\circ} 24'$	1.230, 2.055, 2.880	77.75
B	1.40	P	$+ 3^{\circ} 36'$	0.785, 1.80, 2.815	97.135

5. Calculate the ordinates at 7.5 m intervals for a circular curve, given that the length of the long chord is 60 m and the radius is 180 m.
6. Write short notes on any *two* of the following :
- Horizontal and Vertical control
 - Eco sounding
 - Station pointer
 - Tide gauge.
7. What do you understand by Remote Sensing ? Differentiate between active & passive remote sensing. Name the applications of remote sensing in civil engineering.
8. Explain Bowditch rule in connection to error distribution in a traverse.
9. In a clockwise traverse the included (exterior) angle as obtained by a theodolite rotated clockwise are as follows :
- $A = 291^{\circ} 33'$, $B = 225^{\circ} 13'$, $C = 300^{\circ} 26'$, $D = 231^{\circ} 12'$,
- Bearing of AB of $10^{\circ} 12'$. What are the bearing of the others ?

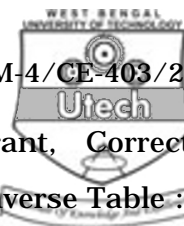


GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

10. a) Two tangents intersect at chainage 1190 m the deflection angle being 36° . Calculate all the data necessary for setting out a curve with a radius of 300 m by deflection angle, the peg interval being 30 m.
- b) Determine the offset at a distance (say x) from long chord of a simple curve. R being the radius of the curve.
- c) What do you mean by Degree of a curve ? Derive its relationship with radius of a curve. $7 + 5 + 3$
11. a) Write Intrinsic equation and tangent length for cubic spiral and cubic parabola.
- b) Write shortly on length of transition curve.
- c) Describe tacheometric method of setting out curve. $5 + 5 + 5$
12. a) Describe different methods of locating sounding points in a hydrographic survey.
- b) Describe in detail the analytical method of three point problem in Hydrographic surveying.
- c) During a sounding fieldwork, P and Q were two stations on the shore. S was a sounding station. The angles measured were $SPQ = 42^\circ 32'$ and $SQP = 64^\circ 36'$. Find the coordinates of S with respect to P if the distance PQ is 1580 m. $5 + 5 + 5$



13. Find the Reduced Bearing & its Quadrant, Corrected Consecutive Co-ordinates in the following Traverse Table :

<i>Inst Stn.</i>	<i>W. C. Bearings</i>	<i>Line</i>
A	$287^{\circ} 54' 10''$	AB – 69.90 m
B	$182^{\circ} 57' 15''$	BC – 81.0 m
C	$162^{\circ} 2' 18''$	CD – 42.9 m
D	$110^{\circ} 35' 49''$	DE – 37.65 m
E	$11^{\circ} 1' 7''$	EA – 114.60 m

14. To determine the elevation of the top of the aerial pole, the following observations were made :

<i>Inst Stn.</i>	<i>Reading on B.M.</i>	<i>Angle of elevation</i>	<i>Remarks</i>
A	1.377	$11^{\circ} 53'$	R. L. of
B	1.263	$8^{\circ} 5'$	B.M. = 30.15 cm

Station A & B and the top of the aerial pole are in the same vertical plane. Find the elevation of the top of the aerial pole, if the distance between A & B was 30 m.

15. The following angles were measured at a station O so as to close the horizon :

$$AOB (\theta) = 83^{\circ} 43' 28'' .75, \text{ weight } 3$$

$$BOC (\theta) = 102^{\circ} 15' 43'' .26, \text{ weight } 2$$

$$COD (\theta) = 94^{\circ} 38' 27'' .22, \text{ weight } 4$$

$$DOA (\theta) = 79^{\circ} 23' 23'' .77 \text{ weight } 2$$

Adjust the angle.

Write in brief the process of determining vertical angle by theodolite.

10 + 5



16. Write short notes on any five of the following : 5×3

- Transition curve
- Hydrography
- Errors in Tacheometer method
- Setting out curve by Rankine's Tangential Method
- Difference between Transiting and Swinging
- Gale's Table
- Temporary adjustments in theodolite.

17. What is Tacheometer ? What are the Tacheometric Constants ? How can you determine the constants ? What are the advantages of Anallatic lens ? What is the principle of the Stadia method ? Calculate the gradient of line MN from the following observations. Observation pt is O and included angle MNO is 90° .

Staff Stn.	Top Hair	Middle Hair	Bottom Hair
M	1.135	1.285	1.435
N	1.025	1.324	1.625

Given, Multiplying and Additive constants are 600 and 0.45 resp. $1 + 2 + 2 + 2 + 3 + 5$

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