

B.CIVIL ENGG. 2<sup>nd</sup> YEAR 1<sup>st</sup> SEM. EXAMINATION 2019

## SURVEYING - II

Full Marks 100  
(60 marks part I)

Time: Three hours

Use a separate Answer-Script for each part

**Part-I**

Answer all questions

*(Assume any data, if required, reasonably)*1. Write short notes on the following (any four): (4×5) = 20

- I. Discuss the relations between the fundamental axes to be a proper condition theodolite
- II. Discuss the significance of 'spherical excess' in triangulation survey
- III. Formation of enlarged inverted virtual image of distant object by Keplerian telescope
- IV. Requirement and description of 'spire test' in theodolite
- V. Sequential field works to be done in triangulation survey
- VI. Setting out of a horizontal angle of  $58^{\circ} 34' 17''$  with a  $20''$  least count theodolite
- VII. The Subtense bar method in tacheometric survey

2.

- a) i) Discuss the problem and its remedy (with prove) in theodolite survey due to the eccentricity of 'upper plate' and 'lower plate' axes of a theodolite. 8
- ii) What is the correction to any side for the 'Axis method' of closing error adjustment of a traverse? Why 'Axis method' is favoured for the adjustment of closing error in theodolite traverse? 6

**Or**

- b) It is impossible to observe the length and bearing of a line AB directly and the following are the observations made from two stations C and D.

Line	Lengths in m	Bearing
CA	129.0	S $68^{\circ} 24'$ W
CD	294.0	N $20^{\circ} 36'$ E
DB	108.0	N $60^{\circ} 18'$ W

Compute the length and bearing of AB, and also the angles CAB and DBA.

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3. Find the horizontal distance PQ, levels at P and Q, and the gradient from P to Q. The instrument constants were 100 and 0.3. Horizontal angle PAQ =  $68^{\circ} 30'$ . Staff held vertically and R.L. of horizontal line of sight = 0 m.

Instrument at	Staff at	Vertical angle	Cross hair readings
A	P	$6^{\circ} 50'$	1.835, 2.58, 3.325
A	Q	$-3^{\circ} 30'$	1.455, 2.22, 2.985

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4. a) i) What is the significance of using 'braced quadrilateral' in triangulation network? Discuss and justify/prove the necessary and sufficient conditions of a closed 'braced quadrilateral'.

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ii) Directions were observed from a satellite station S, 62.195m from triangulation station C. The following observations were recorded from satellite station S

Triangulation Station	Observed Direction
A	$00^{\circ} 00'$
B	$71^{\circ} 54' 32.25''$
C	$296^{\circ} 12'$

Angle CAB is  $64^{\circ} 50'$  and angle CBA is  $43^{\circ} 20'$  and length AB is 22817m. From these data, compute the angle BCA.

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Or

- b) i) Discuss about the classification of triangulation work and their significance.

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ii) In triangulation survey of a clockwise braced quadrilateral ADBC the observed internal angles after first two corrections are as follows:

Angle	$^{\circ}$	'	''	Angle	$^{\circ}$	'	''
BAD	58	10	25	ABC	54	55	40
CDA	22	17	43	DCB	25	32	28
CDB	19	08	55	DCA	38	09	59
ABD	80	22	57	BAC	61	21	53

Adjust the angles (with a precision of 1") by the method of equal shifts and tabulate the corrected angles. Neglect the correction for spherical excess.

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B.E (Civil Engg.) 2<sup>nd</sup> YEAR 1<sup>st</sup> SEMESTER EXAMINATION, 2019(1<sup>st</sup> / 2<sup>nd</sup> Semester / Repeat / Supplementary / Annual / Biannual)

## SUBJECT: SURVEYING-II

(Name in full)

Time: Two hours/Three hours/Four hours/ Six hours

Full Marks: 100

(40 marks for this part)

Use a separate Answer-Script for each part

Question No.	Part-II	Marks
	<b>Answer Question-1 and 2 and any <i>Two</i> questions from the rest</b>	
Q.1) A)	<p>Fill in the blanks with appropriate word(s):</p> <p>i. The distance between the vertex and the apex of a simple curve is called -----.</p> <p>ii. .... is called "Ideal Transition Curve".</p> <p>iii. Valley curve is one type of ..... curve.</p> <p>iv. Dye or chemical tracer is required for measurement of ..... of any water body.</p> <p>v. In tunnel survey short vertical depths are measured by .....</p>	1*5=5
Q.2)	<p>a) Establish the fundamental concept behind computing the deflection angle for n<sup>th</sup> peg on a simple circular curve in "Double Theodolite Method" of setting out of simple curve.</p> <p>b) Deduce the necessary expression for forward tangent length (<math>T_f</math>) of a reverse curve comprising two simple circular arcs bending in opposite direction.</p> <p>c) Describe the "Simm's Method" of transferring the surface centerline underground with the help of pertinent sketch.</p>	5 5 5

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## SUBJECT: SURVEYING-II

(Name in full)

Time: Two hours/Three hours/~~Four hours~~/ Six hours

Full Marks: 100

(40 marks for this part)

No. of Question	Part-II	Marks
Q.3)	The chainage of the point of intersection of two straights is 951.65m with an angle of intersection of 25°47'. The straights are to be connected by a simple circular curve having radius of 208m. Set out the simple curve by 'Tangential angle method' using a 20" theodolite.	10
Q.4)	Two straights AB (bearing 27°42') and BC (bearing 61°51') are to be connected by a compound curve such that the first tangent length AB=219 m and the second tangent length BC= 321 m. If the first intersection angle (I <sub>1</sub> )=13°46', what are the radii of the constituent arcs? Calculate the total length of the compound curve.	5+5=10
Q.5)	An observer taking soundings from a boat (O) wished to locate his position and measured with a sextant the angles subtended at (O) by three points A, B and C on the shore. The length AB and BC were scaled from the map and found to be 215m and 249m respectively and the angle ∠ABC was 121°58'. The observed angles ∠AOB and ∠BOC were 31°52' and 41°07' respectively. What are the distances of (O) from A, B and C?	3+3+4=10