

**B.E. CIVIL ENGINEERING SECOND YEAR FIRST SEMESTER SUPPLEMENTARY EXAM - 2023**

Subject: SURVEYING I

Time : Three hours

Full Marks : 100

**( 50 Marks for each Part)****Use a separate Answer-Script for each part**

No. of Questions	PART I Answer All Questions	Marks														
1	Describe Main Station, Main Survey Line, Tie/Subsidiary Stations, Tie Line, Base Line, and Check Line with a neat sketch.	[5]														
2 (a)	A 30m Chain was tested before starting the day's work and was found to be 10cm too short. After measuring a length of 1600m, the chain was found to be 30cm too long. After measuring a length of 1000m, the chain was found to be 20cm too short. At the end of the work the chain was found to be 30.15m. Find the true length of the line if total measured length was 4689m, on a sloping ground where the level difference between starting and ending point was 250cm.	[10]														
(b)	What are the different types of metric chain? Describe any one type of metric chain in details with a neat sketch.	[5]														
3 (a)	Describe the working principle of a <i>prismatic compass</i> with a neat sketch.	[5]														
(b)	What is ranging? Describe reciprocal ranging with the help of a neat sketch.	[5]														
(c)	What is slope correction? Derive the expression for slope correction with a neat sketch.	[5]														
4 (a)	Find the included angles of a traverse from the RB of the lines given here.	[10]														
	<table border="1" data-bbox="296 1420 1286 1603"> <thead> <tr> <th>Line</th> <th>AB</th> <th>BC</th> <th>CD</th> <th>DE</th> <th>EF</th> <th>FA</th> </tr> </thead> <tbody> <tr> <td>RB</td> <td>N 61° 35' E</td> <td>S 87° 15' E</td> <td>S 22° 50' E</td> <td>S 66° 22' W</td> <td>N 80° 30' W</td> <td>N 29° 54' W</td> </tr> </tbody> </table>	Line	AB	BC	CD	DE	EF	FA	RB	N 61° 35' E	S 87° 15' E	S 22° 50' E	S 66° 22' W	N 80° 30' W	N 29° 54' W	
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(b)	Explain Fore bearing and Back bearing of a survey line in details with a neat sketch with respect to WCB and RB systems.	[5]														

[ Turn over

**B.E. CIVIL ENGINEERING SECOND YEAR FIRST SEMESTER SUPPLEMENTARY  
EXAM 2023  
SUBJECT: SURVEYING I (CE/PC/B/T/215)**

Time: 3 hours

Full Marks: 50

Instructions: Use Separate Answer scripts for each part.

## Part - II

Sl. No.	Question	CO	Marks																					
1	<p>The angles at the stations of a closed traverse ABCDEFA were observed as given below:</p> <table border="1"> <thead> <tr> <th>Internal Angle</th> <th>Lengths (m)</th> <th>Whole Circle Bearing</th> </tr> </thead> <tbody> <tr> <td><math>\angle A = 130^\circ 18' 45''</math></td> <td>AB = 17.098</td> <td>AF = <math>136^\circ 25' 12''</math></td> </tr> <tr> <td><math>\angle B = 110^\circ 18' 23''</math></td> <td>BC = 102.925</td> <td></td> </tr> <tr> <td><math>\angle C = 99^\circ 32' 35''</math></td> <td>CD = 92.782</td> <td></td> </tr> <tr> <td><math>\angle D = 116^\circ 18' 02''</math></td> <td>DE = 33.866</td> <td></td> </tr> <tr> <td><math>\angle E = 119^\circ 46' 07''</math></td> <td>EF = 63.719</td> <td></td> </tr> <tr> <td><math>\angle F = 143^\circ 46' 20''</math></td> <td>FA = 79.087</td> <td></td> </tr> </tbody> </table> <p>(a) Adjust the angular error in the observations, if any.</p> <p>(b) Calculate the bearings of the traverse lines in the following systems: i) Whole circle bearing in the sexagesimal system &amp; ii) Quadrantal bearing in the sexagesimal system.</p> <p>(c) Calculate latitudes, departures, and closing error for the above-mentioned traverse, and adjust using Bowditch's rule.</p>	Internal Angle	Lengths (m)	Whole Circle Bearing	$\angle A = 130^\circ 18' 45''$	AB = 17.098	AF = $136^\circ 25' 12''$	$\angle B = 110^\circ 18' 23''$	BC = 102.925		$\angle C = 99^\circ 32' 35''$	CD = 92.782		$\angle D = 116^\circ 18' 02''$	DE = 33.866		$\angle E = 119^\circ 46' 07''$	EF = 63.719		$\angle F = 143^\circ 46' 20''$	FA = 79.087		[CO6]	[3+(2+2) +(3+3+4)] = 17
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2	State the fundamental lines of a theodolite. State the direct relationship between them.	[CO1]	[3]																					
3	<p>A closed traverse was conducted round an obstacle and the following observations were made. Work out the missing quantities:</p> <table border="1"> <thead> <tr> <th>Side</th> <th>Length (m)</th> <th>Azimuth</th> </tr> </thead> <tbody> <tr> <td>AB</td> <td>160</td> <td>Missing</td> </tr> <tr> <td>BC</td> <td>270</td> <td><math>102^\circ 36'</math></td> </tr> <tr> <td>CD</td> <td>125</td> <td>Missing</td> </tr> <tr> <td>DE</td> <td>310</td> <td><math>270^\circ 00'</math></td> </tr> </tbody> </table>	Side	Length (m)	Azimuth	AB	160	Missing	BC	270	$102^\circ 36'$	CD	125	Missing	DE	310	$270^\circ 00'$	[CO3]	[9]						
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4	<p>Reproduced below is the page in a level book. Fill in the missing data. Apply usual checks.</p> <table border="1" data-bbox="217 376 1217 943"> <thead> <tr> <th>Station</th> <th>B.S. (m)</th> <th>I.S. (m)</th> <th>F.S. (m)</th> <th>Rise (m)</th> <th>Fall (m)</th> <th>R.L.</th> <th>Remarks</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>3.125</td> <td></td> <td></td> <td></td> <td></td> <td>?</td> <td>B.M.1</td> </tr> <tr> <td>2</td> <td>?</td> <td></td> <td>?</td> <td>1.325</td> <td></td> <td>125.005</td> <td>T.P</td> </tr> <tr> <td>3</td> <td></td> <td>2.320</td> <td></td> <td></td> <td>0.055</td> <td></td> <td></td> </tr> <tr> <td>4</td> <td></td> <td>?</td> <td></td> <td></td> <td></td> <td>125.350</td> <td></td> </tr> <tr> <td>5</td> <td>?</td> <td></td> <td>2.655</td> <td></td> <td></td> <td></td> <td>T.P</td> </tr> <tr> <td>6</td> <td>1.620</td> <td></td> <td>3.205</td> <td></td> <td>2.165</td> <td></td> <td>T.P</td> </tr> <tr> <td>7</td> <td></td> <td>3.625</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>8</td> <td></td> <td></td> <td>?</td> <td></td> <td></td> <td>122.590</td> <td>T.B.M</td> </tr> </tbody> </table>	Station	B.S. (m)	I.S. (m)	F.S. (m)	Rise (m)	Fall (m)	R.L.	Remarks	1	3.125					?	B.M.1	2	?		?	1.325		125.005	T.P	3		2.320			0.055			4		?				125.350		5	?		2.655				T.P	6	1.620		3.205		2.165		T.P	7		3.625						8			?			122.590	T.B.M	[CO2]	[10]
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5	<p>The horizontal angle subtended at a theodolite by a subtense bar with vanes 2 m apart is <math>9^{\circ}35''</math>. (a) Calculate the horizontal distance between the instrument and the bar. (b) Also find the error of horizontal distance if the bar was <math>3^{\circ}</math> from being normal to the line joining the instrument and bar stations.</p>	[CO2]	[5]																																																																								
6	<p>The vertical angles to vanes fixed at 1 m and 3 m above the foot of the staff held vertically at a station A were <math>+4^{\circ}30'</math> and <math>+7^{\circ}58'</math> respectively. Find the horizontal distance and the reduced level of A if the height of the instrument, determined from observation on to a bench mark is 438.556 metres above datum.</p>	[CO2]	[6]																																																																								