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April: 2024.

Scoring Indicators

COURSE NAME : BASIC SURVEYING

COURSE CODE :2011 **QID :** 2106220106

Q No	Scoring Indicators	Split score	Sub Total	Total score
	PART A			**9**
I. 1	Base line	1	1	
I. 2	Cross staff, Optical square, Prism square, Site square	1	1	
I. 3	Surveying in which shape of earth is taken in to account. All lines lying in the surface are curved lines and triangles are spherical triangles	1	1	
I. 4	Horizontal angle between true meridian and magnetic meridian	1	1	
I. 5	Whole circle bearing system(WCB) / Azimuthal system	1	1	
I. 6	Datum is any surface to which elevations are referred	1	1	
I. 7	Angular value of 1 division of bubble tube	1	1	
I. 8	Process of determining elevations of points at short measured intervals along a fixed line such as centre line of a railway, highway, canal or sewer	1	1	
I. 9	Two peg test is conducted to make the line of sight truly parallel to axis of bubble tube	1	1	
	PART B			24
II. 1	Correction for chain length = 0.1 m		3	
	Measured length L = 841.5 m	1		
	Nominal length of chain = 20 m			
	Correction for measured length = 841.5 x 0.1/20 =4.21 m	1		
	Actual length of line = 841.50+ 4.21 = 845.71 m	1		
II. 2	Traversing This method of plane table surveying is used to plot a traverse in cases stations have not been previously plotted by some other methods. In this method, traverse stations are first selected. The stations are plotted by method of radiation by taking back sight on the preceding station and a fore sight	1✓ Explanation or procedure - 3marks	3	

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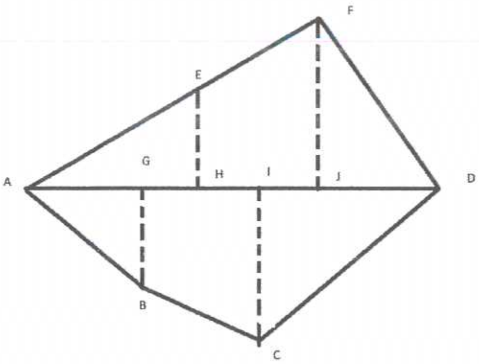
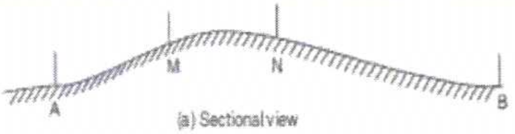
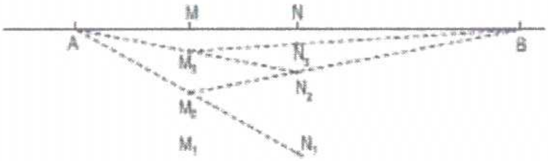
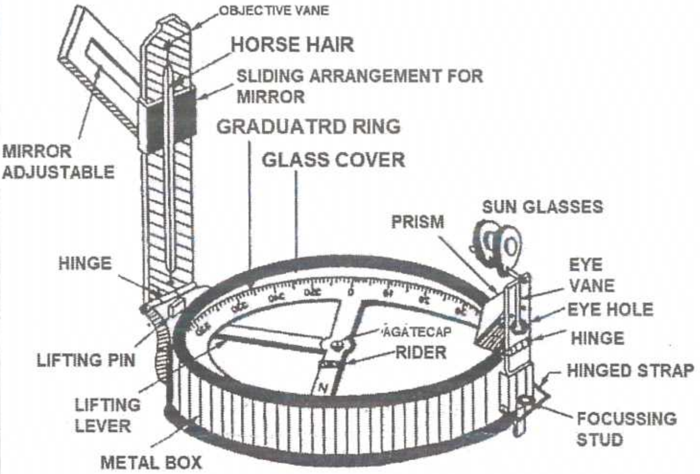
	to the following station. Here distances are generally measured by tachometric method and surveying work has to be performed with great care. • Suppose A,B,C,D are the traverse stations, • The table is set up at the station A, a suitable point a is selected on the sheet in such a way that the whole area may be plotted in the sheet. The table is centered, leveled and clamped. The north line is marked on the right-hand top corner of the sheet. • With the alidade touching point a the ranging rod at B is bisected and a ray is drawn. The distance AB is measured and plotted to any suitable scale. • The table is shifted touching point a the ranging rod at B is bisected and a ray is drawn. The distance is measured and plotted to any suitable scale. • The table is shifted and centered over B. It is then leveled, oriented by back sighting and clamped. • With the alidade touching point b, the ranging rod at C is bisected and ray is drawn. The distance BC is measured and plotted to the same scale. • The table is shifted and set up at C and the same procedure is repeated. • In this manner, all stations of the traverse are connected.	~~2~~		
II. 3	Principles of surveying 1. Location of a point by measurement from two points of reference 2. Working from whole to part Explanation	 1 1 1	3	
II. 4	Variations in declination 1. Diurnal variation Departure of declination from its mean value during a period of 24 hours 2. Annual variation Variation which has a yearly period 3. Secular variation	(Any 3) 3	3	

<table>
<tr><td></td><td>Appears to be of periodic character and follows a roller coaster (sine curve) pattern
4. Irregular variation
Due to magnetic storms, earthquakes and other solar influences</td><td></td><td></td><td></td></tr>
<tr><td>II. 5</td><td>i. R.B = W.C.B = 22°30´ = N 22°30´ E
ii. W.C.B = 180 – R.B = 180° – 31°36´ = 148° 24´
iii. R.B = 360 – W.C.B = 360° – 327°24´ = N32°36´W</td><td>1
1
1</td><td>3</td><td></td></tr>
<tr><td>II. 6</td><td><table><tr><th>Line</th><th>Fore Bearing</th><th>Back bearing</th></tr><tr><td>AB</td><td>60°</td><td>60° + 180° = 240°</td></tr><tr><td>BC</td><td>130°</td><td>130° + 180° =310°</td></tr><tr><td>CA</td><td>270°</td><td>270° -180° = 90°</td></tr></table></td><td>1
1
1</td><td>3</td><td></td></tr>
<tr><td>II. 7</td><td>A leveling staff is a straight rectangular rod having graduations, the foot of the staff representing zero reading. The purpose of the levelling staff is to determine the amount by which the station is above or below the line of sight. Leveling staves is divided in to 2 classes
1. Self reading staff
Can be read directly by instrument man through telescope
3 types
a) Solid staff
b) Folding staff
c) Telescopic staff (Sopwith pattern)
2. Target staff
Contains a moving target against which the reading is taken by staffman</td><td>1
1
1</td><td>3</td><td></td></tr>
<tr><td>II. 8</td><td>Temporary adjustments in leveling
1. Setting up the level
2. Leveling up
3. Elimination of parallax</td><td>1
1
1</td><td>3</td><td></td></tr>
<tr><td>II.9</td><td>Principal lines of dumpy level</td><td></td><td>3</td><td></td></tr>
</table>

	1. Line of sight joining the centre of objective to the intersection of cross hair 2. Axis of the level tube 3. The vertical axis	1 1 1		
II.10	Cross sectioning Cross sections are run at right angles to the longitudinal profile and on either side of it for the purpose of lateral outline of the ground surface They provide data for estimating quantities of earthwork and for other purposes Sketch	2 1	3	

	PART C			42
III. 1	Radiation method In this method a ray is drawn from the instrument station towards the point. The distance is measured between instrument station and that point, and the point is located by plotting to some scale the distance so measured This method is more suitable when the distances are small Intersection method Is resorted to when the distance between the point and the instrument station is either too large or cannot be measured accurately The location of an object is determined by sighting at the object from two plane table stations (previously plotted) and drawing the rays. The intersection of these rays will give the position of the object	3.5 3.5	7	7
III. 2	Area of AGB = ½ x 20 x 30 =300 m^2 Area of GICB = ½ x (30+40) x 40 = 1400 m^2 Area of IDC = ½ x 40 x40 = 800 m^2 Area of AHE = ½ x 50 x30 = 750 m^2 Area of HJFE = ½ x (30+45) x 25 = 937.5m^2 Area of JFD = ½ x 25 x45= 562.5 m^2 Total Area = 300 +1400+800+750+937.5+562.5 = 4750m^2 	1 1 1 1 1 1 1	7	7
III. 3	Reciprocal ranging Indirect or reciprocal ranging is resorted to when both the ends of survey	2	7	7

	line are not intervisible either due to high intervening ground or due to long distance between them. In such case ranging is done indirectly by selecting 2 intermediate points M1 and N1 very near to chain line It needs two assistants one at point M and another at point N, where from those points both station A and station B are visible. It needs one surveyor at A and another at B. To start with M and N are approximately selected, say M1 and N1. Then surveyor near end A ranges person near M to position M2 such that AM2N1 are in a line. Then surveyor at B directs person at N, to move to N2 such that BN2M2 are in a line. The process is repeated till AMNB are in a line.  (a) Sectional view  (b) Plan view	3 (Procedure) (figure) 2		
III. 4	Prismatic compass Most convenient and portable form of magnetic compass The magnetic needle is of broad needle type Graduations are in W.C.B system The graduations are engraved inverted Object vane consist of metal vane with vertical hair Eye vane consist of small metal vane with slit Readings are taken with the help of prism provided at eye slit		7	7

	 Prismatic Compass Listing the parts and explanation – 4 Figure – 3	4 3		
III. 5	<A = BB of EA – FB of AB = 120° – 60°30′ = 59°30′ <B = BB of AB – FB of BC = 240°30′ – 122° = 118°30′ <C = BB of BC –FB of CD = 302°- 46° = 256° <D = BB of CD –FB of DE = 226°- 205°30′ = 256° <E = BB of DE –FB of EA = 25°30′- 300°+360° = -274°30′+360° = 85°30′ Check Sum of interior angle of closed traverse = (2n – 4) x 90 = 540° <A+<B+<C+<D+<E = 540°	1 1 1 1 1 1 1	7	7
III. 6	Bearing of AB = 60° Bearing of BC = BB of AB – Included angle at B = 240 - 90°8′ = 149°52′ Bearing of CD = BB of BC– Included angle at C = 329°52′ - 60°22′ = 269°30′ Bearing of DA = BB of CD – Included angle at D = 89°30′ - 69°20′ = 20°10′ Bearing of AB = BB of DA – Included angle at A = 200°10′ - 40°10′ = 60°	1 1.5 1.5 1.5 1.5	7	7

III. 7	Station	B.S	I.S	F.S	Rise	Fall	R.L	Remarks	7	7
	1	2.228					432.384	B.M		
	2		1.606		0.622		433.006			
	3	2.090		0.988	0.618		433.624	T.P 1		
	4		2.864			0.774	432.850			
	5	0.602		1.262	1.602		434.452	T.P 2		
	6	1.044		1.982		1.380	433.072	T.P 3		
	7			2.684		1.640	431.432			
	∑	5.964		6.916 - 5.964	2.842	3.794- 2.842	432.384 - 431.432			
	Check		Fall	0.952	Fall	0.952	0.952			

III. 8	Station	B.S	I.S	F.S	HI	RL	Remarks	7	7
	P	1.622			84.820	83.198			
		1.874		0.354	86.340	84.466			
		2.032		1.780	86.592	84.560			
	Q		2.362			84.230			
		0.984		1.122	86.454	85.470			
		1.906		2.824	85.539	83.630			
				2.036		83.500	BM		
	Check	8.418- 8.116		8.116		83.500- 83.198	Checked		
	Rise	0.302				0.302			

III. 9

Station	Distance	BS	IS	FS	Rise	Fall	RL	Remarks
A	0	0.385					200.00	Stn A
	20		1.030			0.645	199.355	
	40		1.925			0.895	198.460	
	60		2.825			0.900	197.560	
	80		0.625		2.200		199.760	
	100		2.005			1.380	198.380	
B	120			3.110		1.105	197.275	Stn B
∑		0.385		3.110	2.200	4.925		
Check	∑BS - ∑FS = -2.725 ∑RISE- ∑FALL = -2.725 Last RL – First RL = -2.725							Checked

7 7

III. 10

True difference in level between A and B = $\frac{(3.810-2.165)+(2.355-0.910)}{2}$ 2 7 7

= 1.545 m

Error due to curvature = 0.07849 d^2 = 0.184 m

When level is at A, corrected staff reading on B = 3.810 – $(C_c - C_r + C_l$ 1

$C_c -$ *correction due to curvature*

$C_r -$ *correction due to refraction* 1

$C_l -$ *correction due to collimation* $= \frac{0.004}{100} * 1530 = 0.0612\,m$ 1

Corrected staff reading on B = 3.810 – (0.184 - C_r) +0.0612 =3.6872 + C_r 1

True difference in level between A and B = 3.6872 + C_r -2.165 1

= 1.5222+ C_r

= 1.545

<table>
<tr><td></td><td>Therefore , $C_r = 0.0228$</td><td></td><td></td><td></td></tr>
<tr><td>III. 11</td><td>An instrument is said to be in perfect adjustment if its various parts maintain their true positions relative to each other
Required permanent adjustments in dumpy level
1) Axis of the bubble tube should be perpendicular to the vertical axis
2) The horizontal cross hair should lie in a plane perpendicular to the vertical axis
3) The line of sight (line of collimation) should be parallel to the axis of bubble tube
Adjustment of level tube
Adjustment of cross hair ring
Adjustment of line of sight / collimation (Explain in detail)</td><td>1
2
2
2</td><td>7</td><td>7</td></tr>
<tr><td>III. 12</td><td><table>
<tr><th>S.No .</th><th>B.S.</th><th>I.S.</th><th>F.S.</th><th>H.I.</th><th>R.L.</th><th>Remarks</th></tr>
<tr><td>1</td><td>3.480</td><td></td><td></td><td>553.480</td><td>550.000</td><td>BM</td></tr>
<tr><td>2</td><td></td><td>2.695</td><td></td><td></td><td>550.785</td><td></td></tr>
<tr><td>3</td><td></td><td>1.440</td><td></td><td></td><td>552.040</td><td></td></tr>
<tr><td>4</td><td>2.115</td><td></td><td>0.855</td><td>554.740</td><td>552.625</td><td>CP1</td></tr>
<tr><td>5</td><td></td><td>1.640</td><td></td><td></td><td>553.100</td><td></td></tr>
<tr><td>6</td><td>3.465</td><td></td><td>0.750</td><td>557.455</td><td>553.990</td><td>CP2</td></tr>
<tr><td>7</td><td></td><td>2.110</td><td></td><td></td><td>555.345</td><td></td></tr>
<tr><td>8</td><td></td><td>1.110</td><td></td><td></td><td>556.345</td><td></td></tr>
<tr><td>9</td><td></td><td></td><td>0.655</td><td></td><td>556.800</td><td>Last point</td></tr>
<tr><td colspan="7">$\sum BS - \sum FS = 6.8$
Last RL – First RL = 6.8</td></tr>
</table></td><td></td><td>7</td><td>7</td></tr>
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