Model Answer: Summer-2022

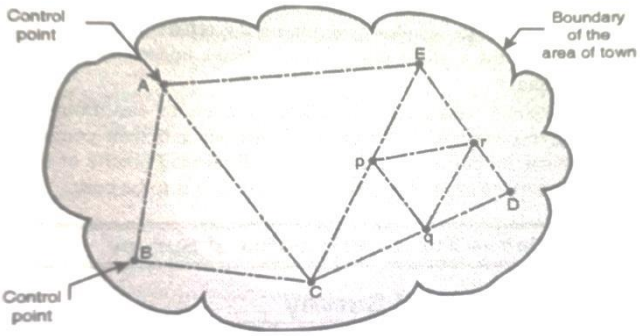
Subject: Basic Surveying | **Sub. Code: 22205**

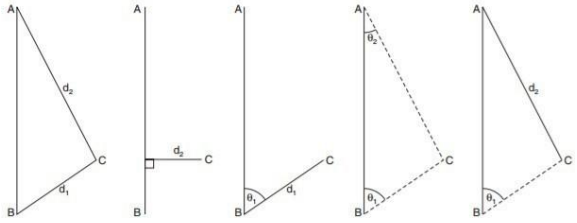
Important Instructions to Examiners:

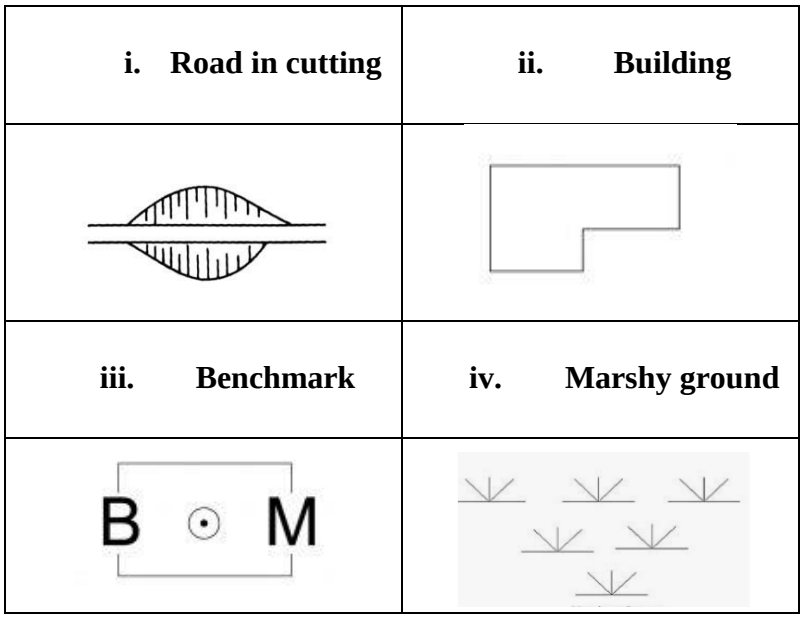
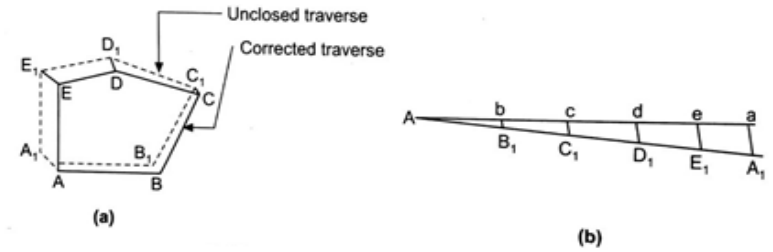
1) The answers should be examined by key words and not as word-to-word as given in the model answer scheme.
2) The model answer and the answer written by candidate may vary but the examiner may try to assess the understanding level of the candidate.
3) The language errors such as grammatical, spelling errors should not be given more Importance (Not applicable for subject English and Communication Skills.)
4) While assessing figures, examiner may give credit for principal components indicated in the figure. The figures drawn by candidate and model answer may vary. The examiner may give credit for anyequivalent figure drawn.
5) Credits may be given step wise for numerical problems. In some cases, the assumed constant values may vary and there may be some difference in the candidate's answers and model answer.
6) In case of some questions credit may be given by judgement on part of examiner of relevant answer based on candidate's understanding.
7) For programming language papers, credit may be given to any other program based on equivalent concept.
8) As per the policy decision of Maharashtra State Government, teaching in English/Marathi and Bilingual (English + Marathi) medium is introduced at first year of AICTE diploma Programme from academic year 2021-2022. Hence if the students in first year (first and second semesters) write answers in Marathi or bilingual language (English +Marathi), the Examiner shall consider the same and assess the answer based on matching of concepts with model answer.

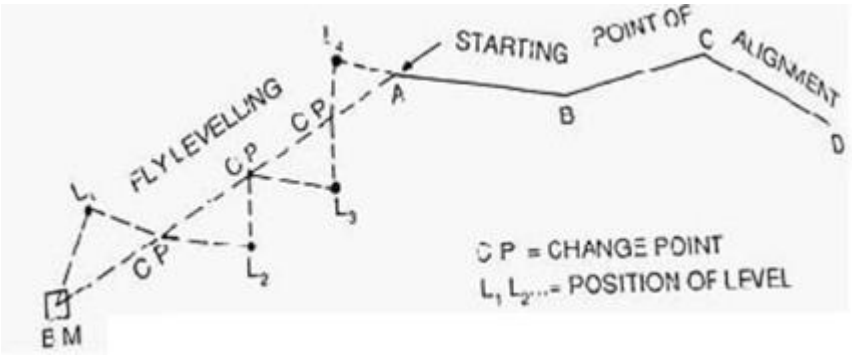
Que. No.	Sub. Que.	Model Answer	Marks	Total Marks
Q.1		**Attempt any FIVE of the following:**		**(10)**
	a)	**State any two purposes of survey.**		
	Ans.	**The purposes of survey are as follows:** 1. To determine relative positions of existing features of ground. 2. To determine areas, volume and other related quantities. 3. To prepare map of country and detailed out locations of cities, towns and major roads. 4. To prepare topographical maps showing details of hills, valley and rivers.	**1 each (any two)**	**2**
	b)	**Define Base line and Tie line.**		
	Ans.	**Base line**: The longest line running roughly through the middle of survey area is called base line. **Tie Line**: The line joining some fixed points as tie stations on main chain line is called as tie line.	**1** **1**	**2**
	c)	**List the types of meridian.**		
	Ans.	**Types of meridian:** 1. True Meridian 2. Magnetic Meridian 3. Arbitrary Meridian 4. Grid Meridian	**1 each (any two)**	**2**

Que. No.	Sub. Que.	Model Answer	Marks	Total Marks
Q.1	d)	**Define line of collimation.**		
	Ans.	**Line of collimation**: It is line joining the intersection of the cross hairs of diaphragm to the optical center of object glass and its continuation.	2	2
	e)	**State the uses of contour map.**		
	Ans.	**The uses of contour map:** 1. To know nature of ground or general shape of ground. 2. For location of highway, railways, roadways, canals, pipelines etc. 3. For the location of structures such as buildings, bridges etc. 4. For determination of most economical site for dams, reservoirs, maximum flood line, embankments in grading. 5. To calculate reservoir capacity. 6. For determining indivisibility of two given points. 7. A route of given grade line can be traced on the map. 8. For estimating volume of water to be impounded in reservoir, volume of cutting and embankment grading.	1 each (any two)	2
	f)	**State any two advantages of digital planimeter.**		
	Ans.	**Advantages of digital planimeter:** 1. Measuring the area of irregular figure. 2. Measuring the area of plot on drawing. 3. Measuring area of contour. 4. Measuring capacity of reservoir on contour maps.	1 each (any two)	2
	g)	**Enlist types of surveying.**		
	Ans.	**Types of surveying:** 1. Plane survey 2. Geodetic survey 3. Topographic survey 4. Cadastal survey 5. Engineering survey 6. Geological survey 7. Military survey 8. Archeological survey 9. Mine survey 10. Astronomical survey 11. Marine survey 12. Triangulation survey 13. Plane table survey 14. Tacheometric survey 15. Photographic survey 16. Aerial survey	1 each (any two)	2

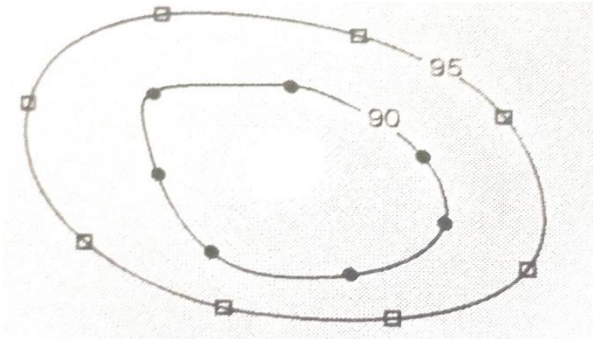
Que. No.	Sub. Que.	Model Answer	Marks	Total Marks
Q.2		**Attempt any THREE of the following:**		(12)
	a) Ans.	**Define dip of needle and magnetic declination.** **Dip of the needle:** It is the upward or downward movement of magnetic needle in vertical plane due to earth's gravitational force is known as dip of needle. **Magnetic declination:** It is the deviation or shifting magnetic needle from true or geographical north direction, hence the horizontal angle made by magnetic north with true north direction is known as Magnetic declination.	2 2	4
	b) Ans.	**Explain the principles of surveying.** **Principle of surveying are as follows:** **1. To work from whole to part.** This principle states that it is essential to first establish control points with high precision and then establish minor control points. Any inner details can further be located within the minor control points. To work from whole to the part means that entire area or a very large area from the area to be surveyed is first considered and then its smaller parts are considered. Working by this method by this procedure enables to prevent the accumulation of possible errors in the surveying work of larger area.  The principle to work from whole to part can be well understood by following example: Consider a very large area like town to be surveyed as shown in figure. First of all control points A, B, C, D and E are fixed or located with great care within the boundry of the area of town as shown in figure. The area which is obtained from these control points is divided into number of triangles which are further sub divided into small triangles by the method of triangulation; eg. Triangle CED is further divided into small triangle pqr as shown in figure. The details within these triangles are surveyed with less accuracy. By this principle, accumulation of possible errors in the surveying work can be	2	

Que. No.	Sub. Que.	Model Answer	Marks	Total Marks
Q.2	b)	prevented. It is noted that, if we start from small areas and then cover large area then mistakes may go on accumulating and finally affects the surveying work resulting in less accuracy. **ii. To locate a new station by at least two measurement from fixed reference points.** The new stations should always be fixed by at least two measurements from fixed reference points. Linear measurements refer to horizontal distance measured by chain or tape. Angular measurements refer to the magnetic bearing or horizontal angle taken by a prismatic compass or theodolite. The new station or ground point is located using linear measurement or angular measurement or both measurements. 	**2**	**4**
	c) Ans.	**State the types of benchmark used in surveying.** **Types of Benchmark:** 1. GTS Benchmark 2. Permanent Benchmark 3. Arbitrary Benchmark 4. Temporary Benchmark	**1 each**	**4**
	d) Ans.	**Convert the following bearing into relevant bearings:** **i) S 52˚32' E ii) 215˚15' iii) 46˚45' iv) N 21˚30' W** **i) RB = S 52˚32' E** WCB = 180˚ - 52˚32' WCB = 127˚28' **ii) WCB = 215˚15'** RB = 215˚15' - 180˚ = 35˚15' RB = S 35˚15' W **iii) WCB = 46˚45'** RB = N 46˚45' E **iv) N 21˚30' W** WCB = 360˚ - 21˚30' WCB = 338˚30'	**1** **1** **1** **1**	**4**

Que. No.	Sub. Que.	Model Answer	Marks	Total Marks
Q.3		**Attempt any THREE of the following:**		(12)
	a)	**Draw Conventional symbols of the following:** i. **Road in cutting** ii. **Building** iii. **Benchmark** iv. **Marshy ground**		
	Ans.		1 each	4
	b)	**Describe the procedure of adjustment of closing error of a traverse using graphical method.**		
	Ans.		1	
		1. To distribute the closing error AA_1 (Fig. a), draw one horizontal line of length equal to perimeter of traverse with some reduced scale. 2. Now mark the survey stations on it proportionally (Fig. b) and transfer closing error of same length using roller scale to point a. 3. Join the point A and A_1 with straight line. Also draw parallel lines at point b, c, d and e. 4. Transfer B_1b, C_1c, D_1d and E_1e to point B_1, C_1, D_1 and E_1 respectively in compass traverse. 5. Finally join new points to get corrected traverse ABCDEA after graphical adjustment of closing error.	4 3	4

Que. No.	Sub. Que.	Model Answer	Marks	Total Marks
Q.3	c) Ans.	**Discuss the process of Fly leveling with neat sketch.** **Procedure of Fly leveling:** 1. Set up the level at a point from where BM is visible and perform temporaryadjustments. 2. Position of the level should be approximately midway between the BS and FSstations. 3. Rotate the telescope towards the leveling staff on BM, observe and record the staff readings in the BS columns of the level book. 4. Take a FS on the point towards working site. This point would be change point(CP). 5. Shift the instrument to new position. First reading from the new instrumentposition is the BS on change point. 6. Continue the procedure till the readings on the suitable station at working site isrecorded. 7. Return back by shortest route to the B.M and take the last reading on B. M 8. Find the elevations of the points by HI or rise and fall method. Last reading taken on B. M should have same R. L of B. M.  	3 1	4
	d) Ans.	**Explain the following terms:** **i) Datum** **ii) Height of instrument** **Datum:** It is an arbitrary level surface from which elevations of points may be referred. Vertical distances of the points are measured with respect to this datum. In India mean sea level at Karachi is considered as datum of elevation zero. **Height of instrument:** It is Elevation (R.L.) of the plane of collimation with respect to the datum when instrument is correctly leveled. It does not mean the height of the center of telescope above the ground where level stands. Height of Instrument = R.L of Benchmark + Back sight Reading.	2 2	4

Que. No.	Sub. Que.	Model Answer	Marks	Total Marks
Q.4	a) Ans.	**Attempt any THREE of the following:** **List the types of levels and describe any one in detail.** **Types of levels:** 1. Dumpy Level 2. Auto Level 3. Tilting Level 4. Digital Level **1. Dumpy Level:** The dumpy level is simple, compact and stable instrument consists of leveling head and telescope. The head consists of two parallel plates with three foot screws, which bring the instrument in proper level by bringing the bubble in its center of its run. The telescope is rigidly fixed to its supports Hence it cannot be rotated about its longitudinal axis. **2. Auto Level:** It is also known as self-aligning level. The difference between the auto level and the other level is that the leveling is not done manually using tabular spirit level but is leveled automatically. Automatic levels have two principal adjustments 1) Circular bubble 2) Line of sight. It should be checked that the compensator is functioning properly. It is achieved by inclination compensating device called till compensator suspended like a pendulum. It is inserted in the path of light rays through the telescope. When parallel plate micrometer is fitted in it, it becomes a precision level. **3. Tilting Level:** The telescope of tilting level is not rigidly fixed to the axis of vertical spindle. The telescope can be tilted on pivot about horizontal axis in the vertical plane upwards or downwards through a small angle by means of tilting screw. The bulls eye or circular level is fixed to upper plate of leveling head for approximate leveling by foot screws. The exact leveling of the instrument is done using tilting screw before taking every reading. Tilting screw is usually graduated to set out gradient lines. The tilting levels are more, compact and accurate than dumpy level. These have shorter and lighter telescope. Tilting arrangement saves time required for temporary adjustments. Tilting level is most useful when only few readings are to be taken from one setting of the instrument.	**1** **4** **3 (any one)**	**(12)**

Que. No.	Sub. Que.	Model Answer	Marks	Total Marks
Q.4	a)	**4. Digital Level:** It is an automatic level consisting of pendulum compensator. It is capable for normal optical leveling with rod graduated in meter or feet. Digital level has a provision to take readings automatically by using barcode. It has digital and electronic image processing features which can be used to determine the heights and distances with the automatic reading of data which can further be transferred to computer database. Length of the rod is 4.050 m and this rod is graduated in bar code on one side or on the both side. After capturing and processing the image of the bar code rod, this processed image of the rod reading is then compared with the image of the complete rod which is permanently stored in memory module of level so as to determine elevation i.e. height or distances.		
	b) Ans.	**Discuss in detail method of direct contouring.** **Method of direct contouring:** In the direct method, the contour to be plotted is actually traced on the ground. These points are plotted on the ground and contours are marked through them. This method is followed where great accuracy is required **Procedure:** 1. Consider an area as shown in figure below which is to be surveyed for contouring. 2. The work started from B. M and level is set up at the center of the area. 3. Suppose it is required to find out the contour of 90.00 m on ground then the staff should be moved to various positions on plot where the reading on staff should give RL of 90.00 m on ground. When all the points are located they are marked on ground directly. 4. Similar process is followed for locating the contour of 95.00 m and the other contours.  **Fig: Direct Method of Contouring**	**3** **1**	**4**

Que. No.	Sub. Que.	Model Answer	Marks	Total Marks
Q.4	c)	**Describe the process of measurement of volume of reservoir from contour map.**		
	Ans.	Reservoirs are made for water supply and for power or irrigation projects. A contour map is very useful to study the possible location of a dam and the volume of water to be confined. All the contours are closed lines within the reservoir area. The areas A_1, A_2, A_3…..A_n between successive contour lines can be determined by a planimeter and if h is the contour interval, the capacity of the reservoir can be estimated by the application of either the trapezoidal or the prismoidal formula.	2	4
		(a) Trapezoidal formula Volume, $V = h\left[\frac{A_1 + A_n}{2} + A_2 + A_3 + \ldots + A_{n-1}\right]$	1	
		(b) Prismoidal formula Volume, $V = \frac{h}{3}[A_1 + A_n + 4(A_2 + A_4 + \ldots + A_{n-1}) + 2(A_3 + A_5 + \ldots + A_{n-2})]$	1	
	d)	**Describe the procedure for measuring the area using digital planimeter.**		
	Ans.	**The procedure of measurement of an area using digital planimeter:** 1. Take the area on the plane surface of table and fix it with clips sothat while measurement it does not move. 2. Start the planimeter by pressing on button on key pad of it. Screenwill be displayed. 3. Set the scale by pressing scale button on key pad. 4. Mark one starting point on boundary of that area and place thepoint of magnifier of tracing arm of digital planimeter. 5. Press the start button and move tracing arm on boundary of areaand end it again at its starting point. Press the end button. 6. The area of given figure is displayed in digital display of digital planimeter.	4	4

Q.4 e) **The following staff reading were taken with a level. The instrument having been shifted after 4th, 7th and 10th reading. The B.M. is 150.000 m. Rule out a page of a level book and enter the following readings. Calculate the reduced levels of the points by rise and fall method and apply the usual checks.**

1.655, 2.740, 3.050, 3.800, 0.375, 1.555, 0.890, 0.640, 2.840, 3.215, 1.280, 2.825.

Ans.

Station	BS	IS	FS	Rise	Fall	RL	Remark
1	1.655					150.00	B.M.1
2		2.740			1.085	148.915	
3		3.050			0.31	148.605	
4	0.375		3.800		0.75	147.855	CP-1
5		1.550			1.175	146.68	
6	0.640		0.890	0.66		147.34	CP-2
7		2.840			2.20	145.14	
8	1.280		3.215		0.375	144.765	CP-3
9			2.825		1.545	143.22	
Sum	3.95		10.73	0.66	7.44		

3

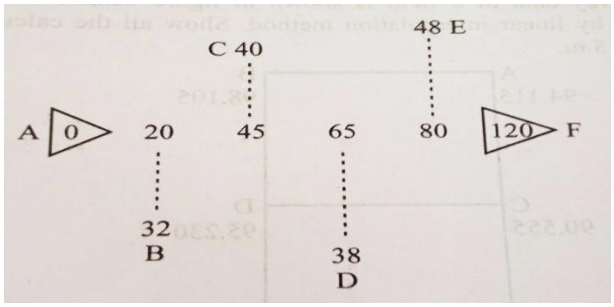
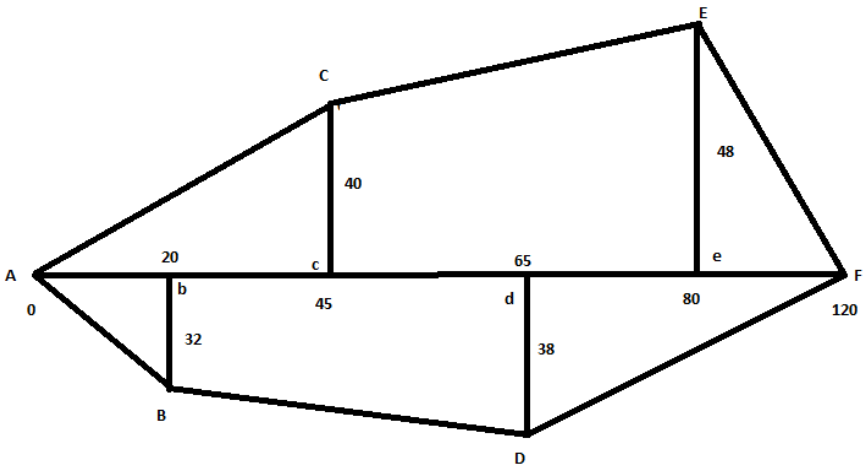
Check: | Σ B.S.-Σ F.S. | = | Σ Rise -Σ Fall | = | Last R.L. – First R.L. |

| 3.95 – 10.73 | = | 0.66 - 7.44 | = | 143.22 – 150.000 |

| - 6.78 | = | - 6.78 | = | - 6.78 |

1

4

Que. No.	Sub. Que.	Model Answer	Marks	Total Marks
Q.5	a)	**Attempt any TWO of the following:** **Plot the following cross - staff survey of field and calculate its area in m^2 as shown Fig. -1**		(12)
		 		
		Fig.-1		
	Ans.	 	1	
		Sr. No. | Figure | Chainage | Base | Offset | Mean Offset | Area (Mean Offset X Base) 1 | Δ AbB | 0-20 | 20 | 32 & 0 | 16 | 320 2 | □ BbdD | 20-65 | 45 | 32 & 38 | 35 | 1575 3 | Δ DdF | 65-120 | 55 | 38 & 0 | 19 | 1045 4 | Δ EeF | 80-120 | 40 | 48 & 0 | 24 | 960 5 | □ EecC | 45-80 | 35 | 40 & 48 | 44 | 1540 6 | Δ AcC | 0-45 | 45 | 0-40 | 20 | 900 **Total Area** | **6340 m^2**	4	6
			1	

Que. No.	Sub. Que.	Model Answer	Marks	Total Marks
Q.5	b)	**The Following observations were taken while conducting a close traverse with a compass in a place where local attraction was suspected.**		

Line	FB	BB
PQ	$48^0$25'	$230^0$00'
QR	$177^0$45'	$356^0$00'
RS	$104^0$15'	$284^0$55'
ST	$165^0$15'	$345^0$15'
TP	$259^0$30'	$79^0$00'

At what stations do you suspect local attraction? Find the corrected bearing of close traverse.

Ans.

Line	FB	BB	Difference	Corrected		Correction
				FB	BB	
PQ	$48^0$25'	$230^0$00'	$181^0$35'	$48^0$55'	$228^0$55'	$-1^0$5'
QR	$177^0$45'	$356^0$00'	$178^0$15'	$176^0$40'	$356^0$40'	$0^0$40'
RS	$104^0$15'	$284^0$55'	$180^0$40'	$104^0$55'	$284^0$55'	--
ST	$165^0$15'	$345^0$15'	180^0	$165^0$15'	$345^0$15'	--
TP	$259^0$30'	$79^0$00'	$180^0$30'	$259^0$30'	$79^0$30'	$0^0$30'

On examining the values of the observed bearings of the lines, we find that the fore bearings and back bearings of the line ST differ exactly by 180^0.
Stations S and T are, therefore, free from local attraction. **1**
At station P, Q, and R local attraction is suspected. Consequently, the observed a FB of TP iscorrect i.e. $259^0$30'
Hence, corrected B.B of TP = $259^0$30 '– 180^0 = $79^0$30'
Correction at P = $79^0$30' - $79^0$00' = + $0^0$30'
Corrected F.B of PQ = $48^0$25' + $0^0$30' = $48^0$55' **1**
Corrected B.B of PQ = $48^0$55' + 180^0 = $228^0$55'
Correction at Q = $228^0$55' - $230^0$00' = $-1^0$5' **1**
Corrected F.B of QR = $177^0$45 -$1^0$5' = $176^0$40' **6**
Corrected B.B of QR = $176^0$40' + 180^0 = $356^0$40' **1**
Correction at R = $356^0$40' - $356^0$00' = $0^0$40' **1**
Corrected F.B of RS = $104^0$15'+ $0^0$40' = $104^0$55' **1**
Therefore the B.B of RS = $104^0$55'+ 180^0 = **$284^0$55'**, which agrees with the back bearing of CD observed at a station D, which is free from local attraction and hence it is verified.

Que. No. Q.5 | **Sub. Que. c)** | **Marks 6** | **Total Marks 6**

The following consecutive readings were taken with a level and a 4.0m staff on continuously sloping ground as a common interval of 30 m : 0.460, 1.285, 1.730, 2.695, 1.200, 2.055, 2.740, 3.485, 3.820, 0.620, 1.530, 1.860 and 3.580.

The reduced level of the first point A was 450.65 m enter the readings in level field book. Calculate reduced level by line of collimation method and gradient of line joining the first and last point.

Ans.

Station	Chainage	BS	IS	FS	HI	RL	Remark
1	0	0.460			451.110	450.650	First point
2	30		1.285			449.825	
3	60		1.730			449.38	
4	90		2.695			448.415	
5	120		1.200			449.91	
6	150		2.055			449.055	
7	180		2.740			448.37	
8	210		3.485			447.625	CP-1
9	240	0.620		3.820	447.910	447.29	
10	270		1.530			446.38	
11	300		1.860			446.05	
12	330			3.580		444.33	Last Point
		Σ BS = 1.08		**Σ FS = 7.4**			

4

Check: | Σ B.S.-Σ F.S. | = | Last R.L. – First R.L. |

| 1.08 – 7.4 | = | 444.33 – 450.650 |

| - 6.32 | = | - 6.32 |

1

Gradient = (Last RL – First RL) / Chainage

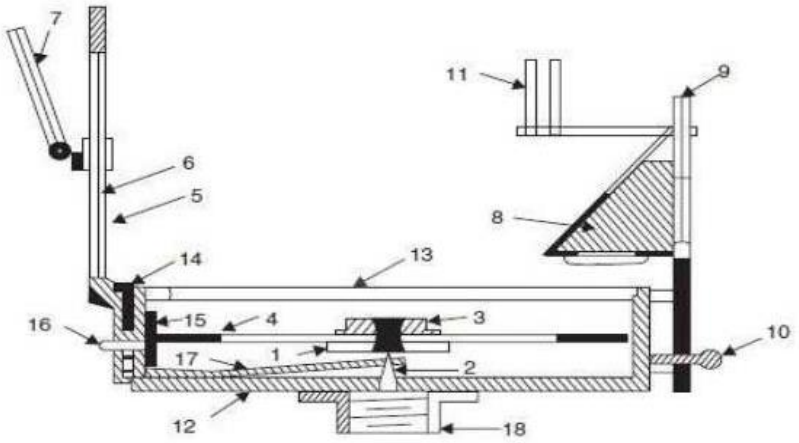
Gradient = (444.33 – 450.650) / 330

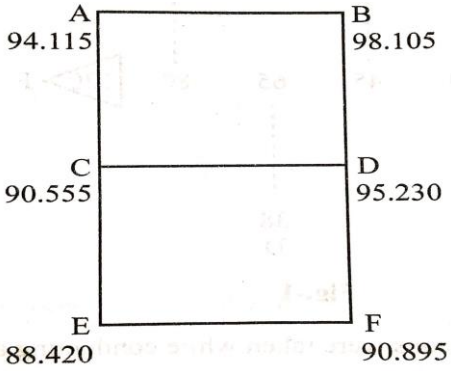
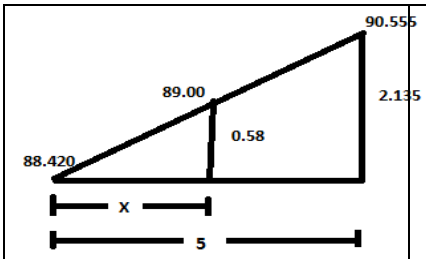
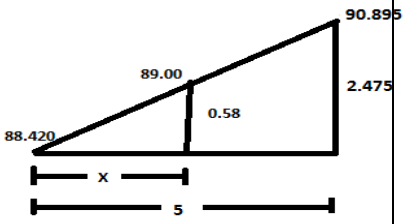
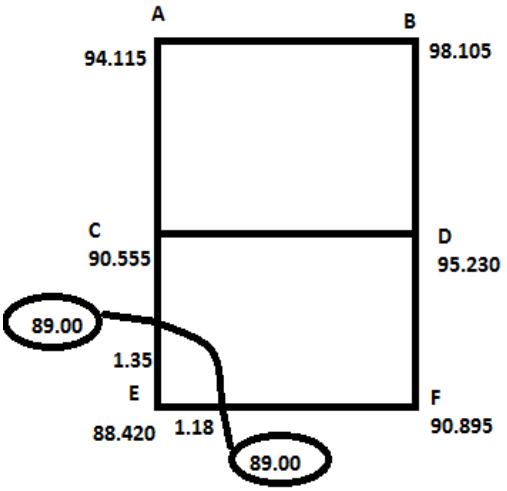
Gradient = - 6.32 / 330

Gradient = - 0.01915

1

Gradient = 1 in 52.21 Falling Gradient

Que. No.	Sub. Que.	Model Answer	Marks	Total Marks
Q. 6		**Attempt any TWO of the following:**		(12)
	a)	**(i) Draw a neat sketch of prismatic compass and label the parts.** **(ii) Describe the temporary adjustment of the prismatic compass.**		
	Ans.	**i) Sketch of prismatic compass:** ***(NOTE: According to curriculum, sketch should not be asked.)***  1. Needle 2. Pivot 3. Agate cap 4. Graduated disc 5. Slit metal frame 6. Horse hair 7. Mirror 8. Reflecting prism with cap 9. Eye vane 10. Focussing stud 11. Dark sunglasses 12. Box 13. Glass cover 14. Lifting pin 15. Light spring 16. Brake pin or knob 17. Lifting lever 18. Support to fit on tripod	3	6
		ii) Temporary adjustments of prismatic compass: **1. Fixing the compass to the tripod:** The compass is fixed on a tripod by rotating screw head of tripodstand. **2. Centering the compass:** The prismatic compass is centered over a survey station correctly by means of a plumb bob or by dropping a pebble from the center of the instrument and moving tripod legs accordingly. **3. Levelling the compass:** The compass is quickly levelled by ball and socket arrangement by eye judgment. It should be levelled in such a way that dial moves freely and does not touch the rim of the compass. **4. Focusing the prism:** The triangular prism is moved using focusing stud so that readings on graduated ring will be seen clearly.	3	

Que. No.	Sub. Que.	Model Answer	Mark	Total Marks
Q. 6	b)	**Contour survey data of a field is shown in figure below. Draw 89.00 m contour line by linear interpolation method. Show all the calculations. Grid size is 5 m x 5 m.**		
		 **Fig.**		
	Ans.	 $\frac{90.555-88.420}{5}=\frac{89.000-88.420}{X}$ $\frac{2.135}{5}=\frac{0.580}{X}$ $\boxed{X=1.36m}$	2	
		 $\frac{90.895-88.420}{5}=\frac{89.000-88.420}{X}$ $\frac{2.475}{5}=\frac{0.580}{X}$ $\boxed{X=1.17m}$	2	6
			2	

Que. No.	Sub. Que.	Model Answer	Marks	Total Marks
Q. 6	c)	**Calculate the missing reading and reduced levels. Apply the usual checks.**		

Stations	BS	IS	FS	Rise	Fall	RL	Remark
1	3.000						B.M.
2		X			0.840	99.160	
3		2.340		X			
4		X		1.000			
5	1.850		2.185		X		CP-1
6		1.575					
7		X					
8	X		1.895		1.650		CP-2
9			2.870				

Ans.

1. IS at Station 2

Fall at station 2 = BS at Station 1 – X

- 0.840 = 3.000 – X

X = 3.840

2. RL of BM

RL of station 2 = RL of BM – Fall at Station 2

99.160 = RL of BM – 0.840

RL of BM = 100.00 m — **1**

3. Rise at Station 3

Rise at Station 3 = IS at station 2 - IS at station 3

Rise at Station 3 = 3.840 – 2.340

Rise at Station 3 = 1.500

4. RL of Station 3

RL at station 3 = RL of station 2 + Rise at Station 3

RL at station 3 = 99.160 + 1.500

RL at station 3 = 100.66 m — **1**

5. IS at Station 4

IS at station 3 – IS at station 4 = Rise at station 4

2.340 - IS at station 4 = 1.000

IS at station 4 = 1.340

6. RL of Station 4

RL of Station 4 = RL at station 3 + Rise at Station 4

RL of Station 4 = 100.66 + 1.000

RL of Station 4 = 101.66 m — **1** — **6**

Que. No.	Sub. Que.	Model Answer	Marks	Total Marks
Q. 6	c)	**7. Fall at Station 5** Fall at station 5 = IS at station 4 – FS at station Fall at station 5 = 1.340 – 2.185 Fall at station 5 = 0.845 **8. RL of Station 5** RL at Station 5 = RL at Station 4 – Fall at station 5 RL at Station 5 = 101.66 – 0.845 RL at Station 5 = 100.815 m **9. Rise at Station 6** Rise at Station 6 = BS at Station 5 – IS at station 6 Rise at Station 6 = 1.850 – 1.575 Rise at Station 6 = 0.275 **10. RL of Station 6** RL of Station 6 = RL at Station 5 + Rise at station 6 RL of Station 6 = 100.815 + 0.275 RL of Station 6 = 101.09 m **11. IS at Station 7** Fall at Station 8 = IS at Station 7 – FS at station 8 - 1.650 = X – 1.895 X = 0.245 **12. Rise or Fall at Station 7** Rise or Fall at Station 7 = IS at Station 6 – IS at station 7 Rise or Fall at Station 7 = 1.575 – 0.245 Rise at Station 7 = 1.330 **13. RL at Station 7** RL at Station 7 = RL at station 6 + Rise at station 7 RL at Station 7 = 101.09 + 1.33 RL at Station 7 = 102.42 m **14. RL at Station 8** RL at Station 8 = RL at station 7 - Fall at station 8 RL at Station 8 = 102.42 - 1.650 RL at Station 8 = 100.77 m	**1** **1** **1**	

Que. No.	Sub. Que.	Model Answer	Marks	Total Marks
Q. 6	c)			

Station	BS	IS	FS	Rise	Fall	RL	Remark
1	3.000					**100.00**	B.M.
2		**3.840**			0.840	99.160	
3		2.340		**1.500**		**100.66**	
4		**1.340**		1.000		**101.66**	
5	1.850		2.185		**0.845**	**100.815**	CP-1
6		1.575		**0.275**		**101.09**	
7		**0.245**		**1.330**		**102.42**	
8	**X**		1.895		1.650	**100.77**	CP-2
9			2.870	*	*	*	

(*NOTE: The given data is insufficient to solve the problem completely. BS of station 8, Rise or fall of station 9, RL of station 9 and arithmetic check cannot be calculated. Hence marks distribution is done as per data available.)