TED (21) – 2011 REVISION 2021

SECOND SEMESTER DIPLOMA EXAMINATION IN ENGINEERING AND TECHNOLOGY

BASIC SURVEYING

MODEL QUESTION PAPER – SET-1

Time: 3 hours Maximum Marks: 75

PART A

I. Answer all the following questions in one word or sentence.

II. (9 x 1 = 9 Marks)

1	The survey line used for verification of survey work _____	M 1.02	Understanding
2	Define Plane surveying.	M 1.01	Understanding
3	Meridean passing through north and south poles is called _____	M 2.01	Understanding
4	Define the term Dip	M 2.01	Understanding
5	Any influence which prevents a magnet from pointing to North is called_____	M 2.02	Understanding
6	The surface to which elevations are referred to is called_____	M 3.01	Understanding
7	A permanent point whose reduced level is known is called _____	M 3.01	Understanding
8	Define differential levelling	M 4.01	Understanding
9	Setting the essential parts of a level into their true position is called_____	M 4.03	Understanding

PART B

II. Answer any eight questions from the following. Each question carries 3 marks

(8 x 3 = 24 Marks)

1	List the principles of surveying	M 1.01	Understanding
2	Explain temporary adjustments of a plane table	M 1.04	Understanding

3	List the instruments used for chain survey	M 1.02	Understanding
4	Convert the following whole circle bearings to quadrantal bearings: a.320˚, b. 140 ˚, c.30˚	M 2.02	Understanding
5	Briefly explain local attraction	M 2.02	Understanding
6	RL of the floor is 100m .Staff reading when staff is held at floor is 1.52m and staff reading when staff is held inverted with bottom touching the ceiling is 2.48m.Find the height of the room	M 3.03	Applying
7	Describe the temporary adjustments of a dumpy level	M 3.02	Understanding
8	Explain the difference between permanent bench mark and temporary bench mark	M 3.01	Understanding
9	Identify and explain the type of levelling which can be adopted when stations are widely separated.	M 4.01	Understanding
10	List the uses of profile levelling3*8 = 24 marks	M 4.02	Understanding

PART C

Answer all questions. Each question carries seven marks

(6 x 7 = 42 Marks)

III	Explain with neat sketch the method of radiation in plane table survey. **OR**	M 1.04	Understanding
IV	Compute the area of the field ABCDE given below 500C 400 200E D100 300 200 50 C 0A	M 1.03	Applying
V	The fore bearing of one outside boundary of a football court is 45˚ 20'.Calculate fore bearings and back bearings of other three boundary lines taken in clock wise direction **OR**	M 2.02	Applying
VI	The following bearings were observed during a traverse survey for a closed traverse. Compute the included angles, sketch the traverse and check if the survey was affected by local attraction.	M 2.03	Applying

	<table><tr><td>Line</td><td>Fore bearing</td></tr><tr><td>AB</td><td>140˚30’</td></tr><tr><td>BC</td><td>80˚30’</td></tr><tr><td>CD</td><td>340˚00’</td></tr><tr><td>DE</td><td>290˚30’</td></tr><tr><td>EA</td><td>230˚30’</td></tr></table>		
VII	Explain balancing of traverse. List the different methods of balancing traverse **OR**	M 2.04	Understanding
VIII	Explain closing error and adjustment of traverse	M 2.04	Understanding
IX	List the different types of levelling instruments. Explain any two. **OR**	M 3.02	Remembering
X	The staff reading was observed for a levelling survey work as follows 1.820,2.150, 1.230,1.460, .905,2.345, 1.995,1.860. The level was shifted after 4 thstaff reading. Reduced level of 5th staff point Is 100.000. Calculate reduced levelof all other staff points by collimation method	M 3.03	Applying
XI	The following readings were taken with a dumpy revel on a continuouslysloping road at a common interval of 30m 0.500, 1.300, 1.125, 2.935,3.800, 0.725, 2.205,3.200 and 4.025. Find the gradient of the road betweenfirst and last point. The RL of the first point is 150.00m use rise and fall system. **OR**	M 3.03	Applying
XII	With the help of figures, explain the terms. (i) Simple levelling (ii) Differential levelling	M 4.01	Understanding
XIII	Explain the different permanent adjustments of a dumpy level. **OR**	M 4.03	Understanding
XIV	Draw the Longitudinal section of road between chainage 0 and 100. The following details are given Reduced level at chainage 0 is 50.050 Staff reading at chainage 0 is 1.250 Staff readings at 20m, 40m , 60m, 80m and 100m are 1.340,1.425, 1.495,1.230 and 1.195 respectively.	M 4.02	Applying

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SECOND SEMESTER DIPLOMA EXAMINATION IN ENGINEERING AND TECHNOLOGY

BASIC SURVEYING

MODEL QUESTION PAPER – SET-2

Time: 3 hours Maximum Marks: 75

PART A

I. Answer all questions in one word or one sentence. Each question carries one mark.

(9 x 1 = 9 Marks)

1	The biggest survey line is called _____	M 1.02	Understanding
2	Define Geodetic surveying.	M 1.01	Understanding
3	The angle which lines of force of earth's magnetic field makes with the surface of earth_____	M 2.01	Understanding
4	Define the term bearing of a line	M 2.01	Understanding
5	While observing bearings using a compass the difference between back bearing and fore bearing the difference was not equal to 90 degree. List any one reason.	M 2.02	Applying
6	The reading taken to a point of known elevation.	M 3.01	Understanding
7	List any two types of levelling instruments.	M 3.02	Remembering
8	Define fly levelling	M 4.01	Understanding
9	List any one permanent adjustment of a dumpy level.	M 4.03	Understanding

PART B

II. Answer any eight questions from the following. Each question carries 3 marks

(8 x 3 = 24 Marks)

1	Describe reference sketch for selection of a survey station	M 1.01	Understanding
2	Explain any one method to orient a plane table	M 1.04	Understanding
3	Explain the classification of surveying based on the	M 1.02	Understanding

	purpose		
4	Convert the following whole circle bearings to quadrantal bearings: a.270˚, b. 120 ˚, c.˚ 330	M 2.02	Understanding
5	List the reasons for local attraction	M 2.03	Understanding
6	Explain the different types of benchmarks .	M 3.03	Understanding
7	Explain the terms Back sight, Intermediate sight and Fore sight	M 3.01	Understanding
8	Describe the temporary adjustments of a dumpy level	M 3.02	Remembering
9	Explain reciprocal levelling	M 4.01	Understanding
10	Identify and explain the type of levelling to be adopted initially if the bench mark is far away from the work site.	M 4.01	Understanding

PART C

Answer all questions. Each question carries seven marks

(6 x 7 = 42 Marks)

III	Explain with neat sketch the method of intersectioning in plane table survey. **OR**	M 1.04	Understanding
IV	A chain line AB is obstructed by a pond and the point A and B are on either side of the pond. At A a line DAC was ranged out. The distance AD = 320m, AC : 280m, DB : 530m and CB : 485m. Compute the distance AB.	M 1.03	Applying
V	A chain line PQR crosses a river. Points Q and R are located on the near and the distant banks respectively. The length of line PQ = 80m. A line QS 160m is set at right angles to the chain line at Q. The WCB of R and P taken at S are 310˚ and 220˚ respectively. Find the width of the river **OR**	M 2.03	Applying
VI	The following bearings were observed during a traverse survey for a closed traverse. Compute the included angles, sketch the traverse and check if the survey was affected by local attraction. Line: AB — Fore bearing: N 45˚10’ E Line: BC — Fore bearing: N 60˚40’ E	M 2.03	Understanding

	CD: N 09˚50’ E DA: N 80˚40’ E		
VII	Differentiate between Prismatic compass and Surveyors compass **OR**	M 2.01	Understanding
VIII	Explain the procedure for the adjustment of closing error of a compass traverse by graphical method	M 2.04	Understanding
IX	While constructing a ramp a level survey was undertaken to check if the slope of the ramp is within the permissible limit. The permissible maximum slope is 1 in 20. The reading taken to the bench mark of RL 100M is 1.540 and readings taken to the top and bottom of the ramp are 1.755 and 2.205 respectively. If the length of the ramp is 10m check if the slope is within permissible limit. **OR**	M 3.03	Applying
X	The following staff readings were taken on a uniformly slopping ground with a dumpy level and a 4m levelling staff: 0.350, 0.955, 1.830, 3.255, 1.125, 2.560,3.655, 0.750, 1.450 and 2.000. Rule out a page of level field book and enter the readings accordingly. Determine the elevation of the points if the first staff reading was taken on the point whose elevation is +80.000m by rise and fall method.	M 3.03	Applying
XI	The following staff readings were observed successively with a level. The instrument was shifted after the third, sixth and eighth reading. Det-ermine the level difference between the first and last stations using rise and fall method. The first reading was taken on a staff held on BM 100.00 3.865, 3.345, 2.930, 1.950, 0.855, 3.795, 2.640, 1.54, 1.935, 0.865 and 0.665. **OR**	M 3.03	Applying
XII	Explain the different axes of a dumpy level and specify their relationship.	M 4.03	Understanding
XIII	Explain profile levelling and its applications **OR**	M 4.02	Understanding
XIV	Draw the cross section of road at chainage 100. The following details are given	M 4.02	Applying

	Reduced level at chainage 100 is 50.050 Staff reading at chainage 100 is 1.250 Left side Staff readings at 3m, 6m and 9m are 1.340,1.425 and 1.495 Right side Staff readings at 3m, 6m and 9m are 1.230,1.195 and 1.150		

BASIC SURVEYING

MODEL QUESTION PAPER SET - 1

ANSWER KEY

PART A

I. Answer all questions in one word or one sentence.

1. The survey line used for verification of survey work _____
   Check line
2. Define Plane surveying.
   In plane surveying all survey lines are assumed to be straight and all triangles are assumed to be plane.
3. The meridean passing through north and south poles is called _____
   True meridean
4. Define the term Dip
   The *magnetic dip* is defined as the angle made with the horizontal by the earth's magnetic field lines.
5. Any influence which prevents a magnet from pointing to North is called_____
   Local attraction
6. The surface to which elevations are referred to is called_____
   Datum
7. A permanent point whose reduced level is known is called _____
   Bench mark
8. Define differential levelling
   Differential leveling is the process of measuring vertical distances from a known elevation point to determine elevations of unknown points.
9. Setting the essential parts of a level into their true position is called_____
   Permanent adjustment

   9 x 1 mark

PART B

II. Answer any eight questions from the following, Each question carries 3 marks.

1. List the principles of surveying

- Location of a point by measurement from two points of reference
- Working from whole to part

2 x1.5 mark

2. Explain temporary adjustments of a plane table

- Centring: Centring is the process of ensuring that the point on the ground is exactly represented on the paper
- Levelling: Levelling is done to ensure that the drawing board remains exactly parallel to the ground surface
- Orientation:Keeping the position of board parallel at every station

3 x 1mark

3. List the instruments used for chain survey

- **Chain**-Measure distance
- **Tape**-Measure distance
- **Ranging Rod**-For ranging lines
- **Arrows**-Mark end of chain length
- **Cross staff**-To set out perpendiculars to survey lines

Any 3 x 1mark

4. Convert the following whole circle bearings to quadrantal bearings: a.320˚, b. 140 ˚, c. 30˚
   a. $N40^0E$
   b. $S50^0W$
   c. $N30^0W$

3x 1mark

5. Briefly explain local attraction

Local attraction is the phenomenon by which the magnetic needle is constantly prevented to point towards the magnetic north at a place. ... The occurrence of **local attraction** can be detected by observing the difference between the fore and back bearings. If the fore and back bearings of the line differ exactly by 180°, there is no local attraction at either station provided instrumental and observational errors are

eliminated. But if this difference is not equal to 180°, then local attraction exists there either at one or at both ends of the line.

3mark

6. RL of the floor is 100m .Staff reading when staff is held at floor is 1.52m and staff reading when staff is held inverted with bottom touching the ceiling is 2.48m.Find the height of the room .

   Height from floor to instrument line of sight =1.52 ***1mark***

   Height from instrument line of sight to ceiling=2.48 ***1mark***

   Total height of room =1.52+2.48=3.00m ***1mark***

7. Describe the temporary adjustments of a dumpy level

Setting up of Dumpy Level

The instrument is fixed to the tripod stand using clamp screws. Spread the tripod legs and position the instrument at convenient height. Firstly fix the two legs in the ground at a point and centering of bubble in the bubble tubes is done by adjusting third leg.

Leveling up

The leveling up of an instrument is done using foot screws or leveling screws.

Focusing

Focusing is done by adjusting eye piece and focusing screw. Eye piece is adjusted until the cross hairs of diaphragm are clearly visible. To eliminate the parallax error, a white paper is used to obtain sharp vision of cross hairs. Focusing screw is adjusted to view the clear image of the objective or staff.

3 x 1 mark

8. Explain the difference between permanent bench mark and temporary bench mark

   Permanent benchmarks are established with reference to GTS benchmarks. They are established by local state government agencies or railways at railway stations, public buildings, at bridges etc. Permanent benchmarks are useful for future references also.***(1.5 mark)***

   Temporary benchmarks are created by the surveyors in the field to mark the point in the field up to which the survey is completed. Then, it is easier to continue the survey from that point after large gap or on the next day of work. ***(1.5 mark)***

9. Identify and explain the type of levelling which can be adopted when stations are widely separated.

   Differential leveling is performed when the distance between two points is more. In this process, number of inter stations are located and instrument is shifted to each station and observed the elevation of inter station points. Finally difference between original two points is determined

   1mark for identifying

   2 mark for explaining

10. List the uses of profile levelling

    Profile leveling is generally adopted to find elevation of points along a line such as for road, rails or rivers etc. In this case, readings of intermediate stations are taken and reduced level of each station is found. From this cross section of the alignment is drawn

    Any 3 uses x 1mark

3*8 = 24 marks

PART C

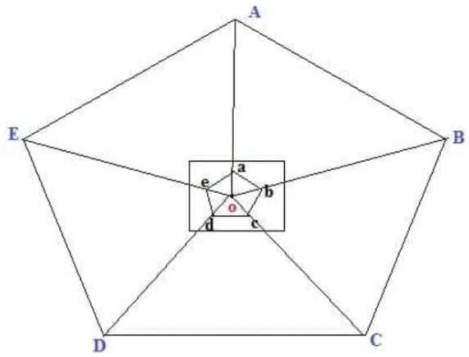
Answer ALL questions. Each question carries 7 marks.

III. Explain with neat sketch the method of radiation in plane table survey.

Radiation

1. In this method, plane table is located at one point "o" as shown in fig. and perform the whole from that point. From point O, sight the points A,B,C,D and E using alidade, locate and plot the points as a,b,c,d and e in the drawing sheet.
2. Center and level the plane table over O
3. Mark the direction of the North on the sheet by using compass
4. Locate instrument station p on the sheet by using plumbing fork, such that o on sheet is exactly over O on ground
5. Centering the alidade on point p sight various details step by step and draw a ray from each detail along the fiducial edge of the alidade
6. Let the details be named as A, B, C, D, E etc.

7. Now measure the distances of each point from O i.e. OA, OB, OC, OD, OE and plot them to scale on the sheet as oa, ob, oc, od, oe respectively
8. Joint a, b, c, d, and e to give the outline of the details



5mark for explaining 2 mark for figure

OR

IV. Compute the area of the field ABCDE given below

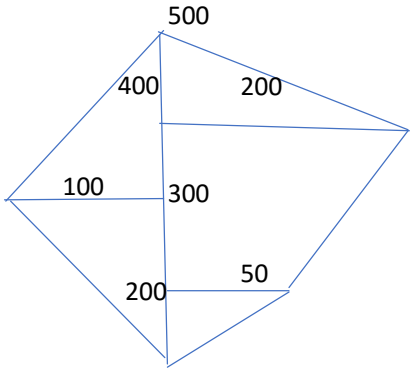
500C

400 200E

D100 300

200 50 C

0A



Area = ½ x50x200+ ½ x100x300+ ½ x100x200 + ½ x200 x100+ (200+50)/2 x 200

=65000 sqm

2mark for figure 5 mark for area calculation

V. The fore bearing of one outside boundary of a football court is 45˚ 20'.Calculate fore bearings and back bearings of other three boundary lines taken in clock wise direction

Fore bearing of one outside boundary = 45º 20'

Fore bearing of 2ND side of boundary in clockwise direction = 45º 20' + 90º = 135º 20'

Corresponding back bearing = 180 º - 135º 20' = 44º 40'

Fore bearing of 3rd boundary in clockwise direction = 135º 20' + 90º = 225º 20'

Corresponding back bearing = 225º 20'- 180 º = 45º 20'

Fore bearing of 4th side of boundary in clockwise direction = 225º 20'+ 90º = 315º 20'

Corresponding back bearing = 315º 20'- 180 º = 135º 20'

1mark for identifying the included angles as 90 degree
2 mark each for BS and FS calculation of other 3 boundaries

OR

VI. The following bearings were observed during a traverse survey for a closed traverse. Compute the included angles, sketch the traverse and check if the survey was affected by local attraction.

Line	Fore bearing
AB	140˚30'
BC	80˚30'
CD	340˚00'
DE	290˚30'
EA	230˚30'

Line	Fore bearing	Back bearing	Included angles
AB	140˚30'	320˚30'	90
BC	80˚30'	260˚30'	120^0
CD	340˚00'	160^0	$79^0$30'
DE	290˚30'	$110^0$30'	$130^0$30'
EA	230˚30'	50˚30'	120^0

Sum of included angles =540=(n-2) x 180

3 mark for Calculating BS

3 mark for calculating included angles

1 mark for check

VII. List the different methods of balancing a traverse. Explain the method to be used when linear and angular measurements are of equal precision

Methods:

1. Bowditchs method
2. Transit method
3. Graphical method
4. Axis method ***4 mark***

Identify the method as bowditch method 1 mark

Explain (2 mark)

OR

VIII. Explain closing error and adjustment of traverse.

While plotting a closed traverse, the end point coincides exactly with the starting point provided that work is correct.

But due to errors in the field measurements of angles and distances, the traverse if plotted according to the field measurements will not close on the starting point. The distance by which the end point of a survey fails to meet with the starting one is called the closing error or error of closure.

If traversing is done by taking bearings of the lines, the closing error in bearing may be determined by comparing the back and fore bearings of the last line of the closed traverse as observed at the first and last stations of the traverse respectively. When the traverse ends on a line of known bearing, the error in bearing may be determined by finding the difference between its observed bearing and known bearing.

3.5 mark for closing error

3.5 mark for adjustment of traverse

IX. List the different types of levelling instruments . Explain any two .

Dumpy level

Wye level

Titlting level

Auto level

4 x ½ 2 marks

1. Dumpy Level

Dumpy level is the most commonly used instrument in leveling. In this level the telescope is restricted against movement in its horizontal plane and telescope is fixed to its support. A bubble tube is provided on the top of the telescope. But however, the leveling head can be rotated in horizontal plane with the telescope.

2. Y Level

Y level or Wye-level consists y-shaped frames which supports the telescope. Telescope cane be removed from the y-shaped supports by releasing clamp screws provided. These y-shaped frames are arranged to vertical spindle which helps to cause the rotation of telescope. Compared to dumpy level, adjustments can be rapidly tested in y- level. But, there may be a chance of frictional wear of open parts of level.

2.5mark x 2 for explaining

OR

X. The staff reading was observed for a levelling survey work as follows 1.820, 2.150, 1.230,1.460, .905,2.345, 1.995,1.860. The level was shifted after 4 th staff reading. Reduced level of 5th staff point Is 100.000. Calculate reduced level of all other staff points by collimation method

BS	IS	FS	RISE	FALL	RL
1.820					99.640
	2.150			0.330	99.310
	1.230		0.920		100.23
0.905		1.460		0.23	100.00
	2.345			1.440	98.560
	1.995		0.350		98.910
		1.860	0.135		99.045

1mark for correct tabulation

1 mark for calculation of rl of each point

XI. The following readings were taken with a dumpy revel on a continuously sloping road at a common interval of 30m 0.500, 1.300, 1.125, 2.935, 3.800, 0.725, 2.205,3.200 and 4.025. Find the gradient of the road between first and last point. The RL of the first point is 150.00m use rise and fall system.

Distance	BS	IS	FS	RISE	FALL	RL
0	0.500					150.000
30	1.125		1.300		0.800	149.200
60		2.935			1.810	147.390
90	0.725		3.800		0.865	146.525
120		2.205			1.480	145.045
150		3.200			0.995	144.05
180			4.025		0.825	143.225

Slope =6.775/180=0.038

1mark for calculation of rl of each point

1mark for slope

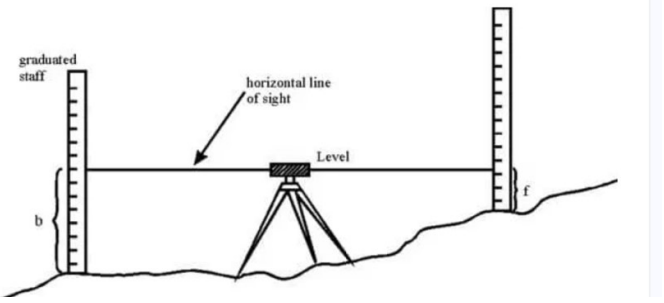
OR

XII. With the help of figures, explain the terms.

(i) Simple levelling (ii) Differential levelling

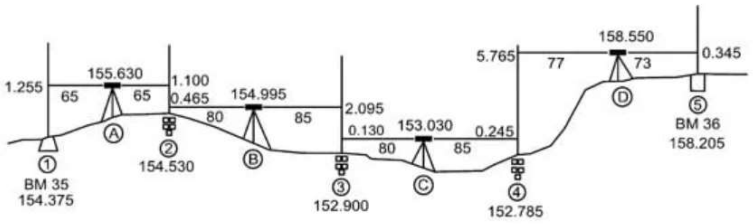
Simple Leveling

It is a simple and basic form of leveling in which the leveling instrument is placed between the points which elevation is to be find. Leveling rods are placed at that points and sighted them through leveling instrument. It is performed only when the points are nearer to each other without any obstacles.



Differential Leveling

Differential leveling is performed when the distance between two points is more. In this process, number of inter stations are located and instrument is shifted to each station and observed the elevation of inter station points. Finally difference between original two points is determined.



2x 2.5mark for explaining

2x1mark for figure

XIII. Explain the different permanent adjustments of a dumpy level.

An instrument is said to be in perfect if its various parts maintain their true positions relative to each other.

Required permanent adjustments in dumpy level.

a) The bubble axis should be perpendicular to the vertical axis
b) The line of collimation and the optical axis of the telescope should coincide with one another.
c) The line of collimation should be parallel to the bubble axis.

Adjustment of level tube

Adjustment of cross hair ring

Adjustment of line of sight/collimation

Explain in detail 7 marks

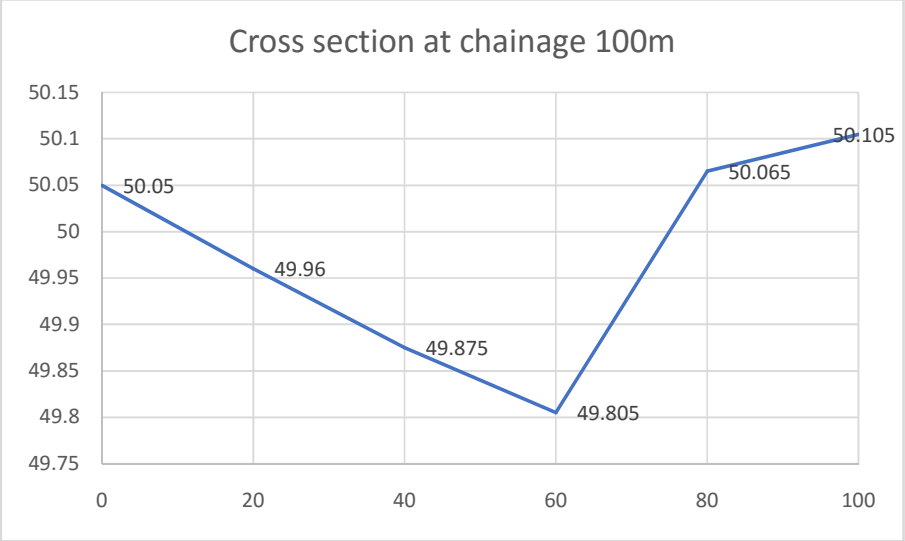
OR

XIV. Draw the Longitudinal section of road between chainage 0 and 100. The following details are given

Reduced level at chainage 0 is 50.050

Staff reading at chainage 0 is 1.250

Staff readings at 20m, 40m , 60m, 80m and 100m are 1.340,1.425 ,1.495,1.230 and 1.195 respectively.



3 mark for calculating RL

4 mark for plotting LS

BASIC SURVEYING

MODEL QUESTION PAPER – SET 2

ANSWER KEY

PART A

I. Answer all questions in one word or one sentence.

1. The biggest survey line is called _____
   Base line
2. Define Geodetic surveying.
   Earths curvature is accounted for
3. The angle which lines of force of earth's magnetic field makes with the surface of earth_____
   Dip
4. Define the term bearing of a line
   Angle measured from either the north or south end of a reference meridian.
5. While observing bearings using a compass the difference between back bearing and fore bearing the difference was not equal to 90 degree. List any one reason.
   Presence of electric lines near by
6. The reading taken to a point of known elevation.
   Back sight
7. List any two types of levelling instruments.
   Y level,Dumpy level
8. Define fly levelling
   It is a levelling that is done toconnect benchmark to the starting point of the survey line
9. List any one permanent adjustment of a dumpy level.
   The line of collimation should be parallel to the axis of the bubble tube.(or any other)
   9 x 1mark

PART B

II. Answer any eight questions from the following, Each question carries 3 marks.

1. Describe reference sketch for selection of a survey station

   After marking the station should be referenced i.e. located by measurement called ties taken from 3 permanent points which are easily identified

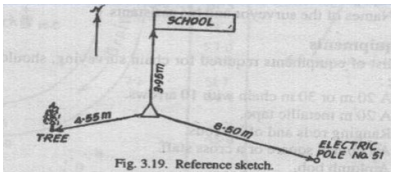


Fig. 3.19. Reference sketch.

   a. mark for explaining and 1.5 mark for figure

2. Explain any one method to orient a plane table

Orientation by Compass

For rough mapping at a small scale, you can use a magnetic compass to orient the plane table. If the compass is fixed to the table, you orient by rotating the table about its vertical axis until the established bearing (usually magnetic north) is observed. If the compass is attached to the alidade, you first place the straightedge along a previously drawn line that represents a north-south line. The table is then oriented by rotating it until the compass needle points north.

3mark

3. Explain the classification of surveying based on the purpose

   • Land surveying : To determine the boundaries and areas of parcels of land, also known as property survey, boundary survey or cadastral survey.

   • Topographic survey : To prepare a plan/ map of a region which includes natural as well as and man-made features including elevation.

   • Engineering survey : To collect requisite data for planning, design and execution of engineering projects.

   3 x 1 mark(This or other relvant types based on purpose)

4. Convert the following whole circle bearings to quadrantal bearings: a.270˚, b. 120 ˚, c.˚ 330

   a. $S90^0W$

   b. $S30^0E$

   c. $N30^0W$

   3 x 1mark

5. List the reasons for local attraction

   List any 3 reasons

6. Explain any two types of benchmarks .

   1. Great Trigonometrical Survey Benchmarks

   Great trigonometrical bench mark or shortly GTS benchmarks are very accurate, and. These are generally established by higher survey authorities of particular country in all points of the country.

   2. Permanent Benchmarks

   Permanent benchmarks are established with reference to GTS benchmarks. They are established by local state government agencies or railways at railway stations, public buildings, at bridges etc. Permanent benchmarks are useful for future references also.

   1.5 mark x2

7. Explain the terms Back sight, Intermediate sight and Fore sight

   3 x 1mark for explaining each

8. Describe the temporary adjustments of a dumpy level

   Temporary adjustments are a set of operations which are performed on a theodolite to make it ready for taking observations. ***1mark***

   These include its initial setting up on a tripod or other stand, centering, levelling up and focusing of eyepiece and objective. ***2mark***

9. Explain reciprocal levelling

   In the case of a river or valley, it is not possible to set up the level midway between two points on the opposite bank. In such a case, the method of reciprocal levelling is adopted.

   In reciprocal levelling, the level is set up on both bank of the river or valley and two sets of staff reading is taken by holding the staff on both banks in this case it is found that error is completely eliminated and true difference of level is equal to the mean of the two apparent difference of level.

3 mark

10. Identify and explain the type of levelling to be adopted initially if the bench mark is far away from the work site.

    Fly leveling is conducted when the benchmark is very far from the work station. In such case, a temporary bench mark is located at the work station which is located based on the original benchmark. Even it is not highly precise it is used for determining approximate level.

    Fly levelling is a very approximate form of levelling in which sights are taken as large. as possible.

    1mark for identifying 2 mark for explaining

3*8 = 24 marks

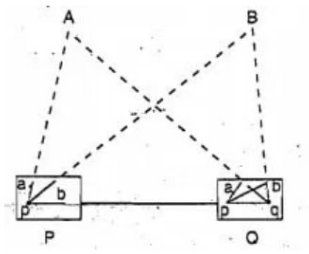
PART C

Answer ALL questions. Each question carries 7 marks.

III. Explain with neat sketch the method of intersection in plane table survey.

Intersection

In this method we can locate the point by plotting two rays from two known stations. As shown in figure, P and Q are the known station. First the equipment is placed on P and plot the lines by sighting the stations A, B and Q. then shift the equipment to station Q and plot the lines by sighting stations A, B and P. Finally, the intersection of A and B rays is the required location of point of intersection.



5 mark for explaining 2 mark for procedure

OR

IV. A chain line AB is obstructed by a pond and the point A and B are on either side of the pond. At A a line DAC was ranged out. The distance AD = 320m, AC : 280m, DB : 530m and CB : 485m. Compute the distance AB.

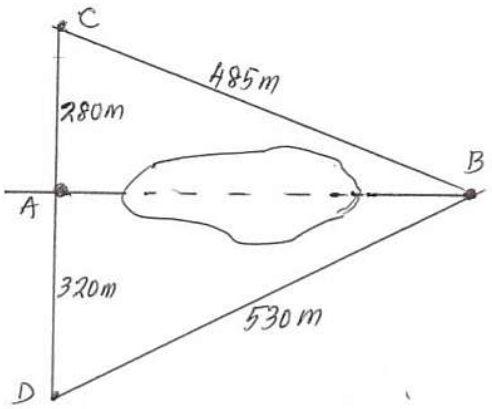
Let angle DCB=α

$DB^2= DC^2+ CB^2-2DC\ CB\ Cos\ \alpha$

From this put DC =600,DB=530 and CB=485,We get Cos α=0.54 ***3mark***

$AB^2= CA^2+ CB^2-2CA\ CB\ Cos\ \alpha$

Put CA =280,CB=485, Cos α=0.54,. We get AB=408.60m ***3mark***



1mark

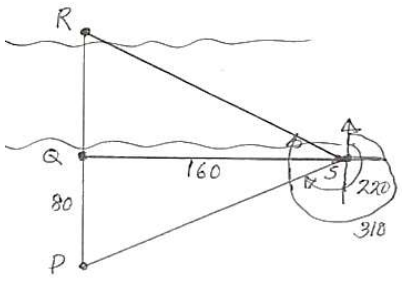
V. A chain line PQR crosses a river. Points Q and R are located on the near and the distant banks respectively. The length of line PQ = 80m. A line QS 160m is set at right angles to the chain line at Q. The WCB of R and P taken at S are 310˚ and 220˚ respectively. Find the width of the river

Angle PSR =310-220=90 ***1.5Mark***

Angle PSQ $=Tan^{-1}(80/160)=26^0 34' 54"$ ***1.5 mark***

Angle RSQ $=90-26^0 34' 54"= 63^0 25' 6"$ ***1.5 mark***

Width of river =RQ=160 x $Tan 63^0 25' 6"$=319.76m ***1.5 mark***



1mark

OR

VI. The following bearings were observed during a traverse survey for a closed traverse. Compute the included angles, sketch the traverse and check if the survey was affected by local attraction.

Line	Fore bearing
AB	N 45˚10’ E
BC	N 60˚40’ E
CD	N 09˚50’ E
DA	N 80˚40’ E

Plot traverse by using given bearings

Included angle < B = 45° 10′ + 60° 40′ = 105° 50′

Included angle < C = 180° - (60° 40′ + 9° 50′) =104° 00′

Included angle < D = 9°50′ + 80°40′ = 90°30′

Included angle < A = 180° - (80°40′ + 45° 10′) = 54° 10′

Sum = 360° 00′ computation of included angles – 5 marks

Check (2n-4) x90 = 360° 00′ - 1 marks

1 mark for ploting traverse

VII. Differentiate between Prismatic compass and Surveyors compass

Prismatic Compass	Surveyor's Compass
The Graduated ring attached to the magnetic needle.	The Graduated ring and needle are free to move independently wrt each other
Graduated ring remains stationary while box is prism and object vane rotates as the ring attach with needle is not attach with the box	Graduated ring rotates with rotation of box ,eye vane & object vane as the ring is attach with the box of the compass & only needle remains stationary
Prism is provided to take reading	The graduated ring is graduated with ejected figures and no prism is provided to take the reading
Graduation are marked 0 to 360 in clockwise direction	Graduations are marked 0 to 90 in each quadrant
Tripoid may or may not be provided.	The instrument cannot be used without tripoid
It measures or gives WCB of a line	It measures or gives Q.B. of a line.

Any four points on each

OR

VIII. Explain the procedure for the adjustment of closing error of a compass traverse by graphical method

5 mark for explanation 2 mark for figure

IX. While constructing a ramp a level survey was undertaken to check if the slope of the ramp is within the permissible limit. The permissible maximum slope is 1 in 20. The reading taken to the bench mark of RL 100M is 1.540 and readings taken to the top and bottom of the ramp are 1.755 and 2.205 respectively. If the length of the ramp is 10m check if the slope is within permissible limit.

Height of collimation of instrument =100+1.54=101.54m ***1mark***
RL of the bottom level of ramp=101.54-2.205=99.335m ***1mark***
RL of the top level of ramp=101.54-1.755=99.785 ***1mark***
Level difference=0.45m ***1mark***
Slope=0.45/10=0.045 ***1mark***
Permissible slope maximum =1/20=0.05 *1mark*
Slope of the ramp is within ***1mark***

OR

X. The following staff readings were taken on a uniformly slopping ground with a dumpy level and a 4m levelling staff: 0.350, 0.955, 1.830, 3.255, 1.125, 2.560,3.655, 0.750, 1.450 and 2.000. Rule out a page of level field book and enter

the readings accordingly. Determine the elevation of the points if the first staff reading was taken on the point whose elevation is +80.000m by rise and fall method.

BS	IS	FS	RISE	FALL	RL
0.350					80.000
	0.955			0.605	79.395
	1.830			0.875	78.520
1.125		3.255		1.425	77.095
	2.560			1.435	75.66
0.750		3.655		1.095	74.565
	1.450			0.700	73.865
		2.000		0.550	73.315

1 mark each for calculating RL

XI. The following staff readings were observed successively with a level. The instrument was shifted after the third, sixth and eighth reading. Det-ermine the level difference between the first and last stations using rise and fall method. The first reading was taken on a staff held on BM 100.00

3.865, 3.345, 2.930, 1.950, 0.855, 3.795, 2.640, 1.54, 1.935, 0.865 and 0.665.

BS	IS	FS	RISE	FALL	RL
3.865					100.000
	3.345		0.520		100.520
1.950		2.930	0.415		100.935
	0.855		1.095		102.030
2.640		3.795		2.940	99.090
1.935		1.540	1.100		100.190
	0.865		1.070		101.260
		0.665	0.200		101.460

Level difference =1.460m

1mark each for calculating Rl

OR

XII. Explain the different axes of a dumpy level and specify their relationship.

There are three fundamental lines in a level instrument . These are

- Vertical axis
- Axis of the level tube
- Line of sight

3 x 1mark

- Axis of the level tube is perpendicular to the Vertical axis
- Horizontal cross hair should lie in a plane perpendicular to the Vertical axis, so that it will lie in a Horizontal plane when the instrument is properly leveled.
- The Line of sight is parallel to the axis of the level tube.
- Also, the optical axis, the axis of the objective lens and the line of sight should coincide.

4 x 1mark

XIII. Explain profile levelling and its applications

3 mark for explanation

4 mark for any 4 applications

OR

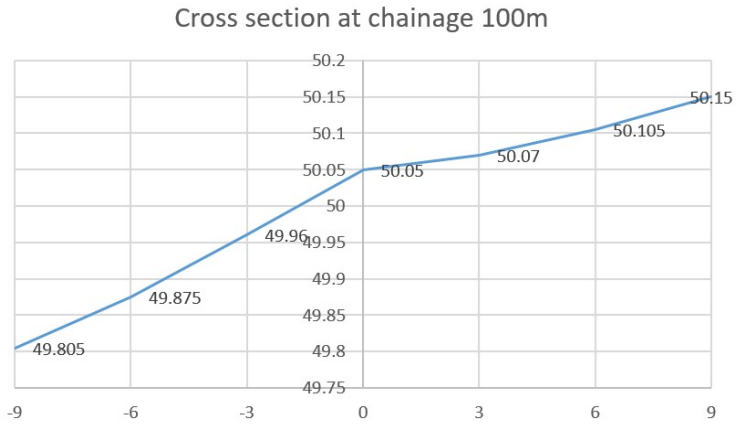
XIV. Draw the cross section of road at chainage 100. The following details are given

Reduced level at chainage 100 is 50.050

Staff reading at chainage 100 is 1.250

Left side Staff readings at 3m, 6m and 9m are 1.340,1.425 and 1.495

Right side Staff readings at 3m, 6m and 9m are 1.230,1.195 and 1.150



3mark for calculating RL

4 mark for plotting CS