INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal, Hyderabad- 500043

CIVIL ENGINEERING

TUTORIAL QUESTION BANK

Course Name	:	**SURVEYING**
Course Code	:	ACE002
Class	:	B. Tech III Semester
Branch	:	CIVIL ENGINEERING
Year	:	2018-19
Course Coordinator	:	Mr. B. Suresh, Assistant Professor, Civil Engineering
Course Faculty	:	Mr. B. Suresh, Assistant Professor, Civil Engineering Mr. P Vinay kumar, Assistant Professor, Civil Engineering

COURSE OBJECTIVES:

The course should enable the students to:

I	Evaluate the basic principles of surveying and its classification.
II	Identify, formulate and solve the problems in the field of advanced surveying.
III	Determine the contour points and their importance in surveying.
IV	Analyze survey data and design the civil engineering projects

COURSE LEARNING OUTCOMES:

Students, who complete the course, will have demonstrated the ability to do the following:

CACE002.01	Analyze the sources of errors in linear measurements.
CACE002.02	Evaluate the corrections for true length, true area and true volumes of calculated data.
CACE002.03	Determine the errors in chain and tape length .
CACE002.04	Obtain directions of a surveying line with a prismatic compass.
CACE002.05	Determine the bearing angles by a prismatic compass.
CACE002.06	Draw a traverse and calculate area enclosed within the traverse.
CACE002.07	Measure the corrected bearing angles without local attraction.
CACE002.08	Differentiate the whole circle and quadrant bearing systems.
CACE002.09	Draw cross section and prepare a contour maps for road works, rail works, canals etc.
CACE002.10	Predict Reduced Levels with reference to a common assumed datum.
CACE002.11	sketch the profile the of land from the reduced levels.
CACE002.12	Differentiate the basic concepts in leveling such as datum and bench mark etc.
CACE002.13	Calculate the volume of earth work, the sectional areas of the cross- section.
CACE002.14	Compute an area of filed which is surrounded by irregular boundaries
CACE002.15	Calculate an area by latitudes and departures of a closed traverse.
CACE002.16	Explain the importance of theodolite and the principle of measuring angles in horizontal and vertical plains.
CACE002.17	Understand the components of theodolite and errors in elimination of parallax.
CACE002.18	Calculate the error of closure in a closed traverse.
CACE002.19	Differentiate the advantages of global positioning system and geographical information.

CACE002.20	Analyze the basic principle of total station in recording the field data.
CACE002.21	Derive an equation for calculation of heights and distances using principles of tachometry survey.
CACE002.22	Derive an equation for calculation of heights and distances using principles of triangulation survey.
CACE002.23	Posses the knowledge and skills for employability and to succeed in national and international level competitive examinations.

UNIT – I			
INTRODUCTION, LINEAR AND ANGULAR MEASUREMENTS			
Part - A (Short Answer Questions)			
1	Define Surveying and explain chain surveying	Understand	CACE002.1
2	State the Principle of surveying.	Understand	CACE002.1
3	State the two primary division of surveying.	Remember	CACE002.1
4	What are the different types of chains?	Remember	CACE002.1
5	Define True Bearing and explain with a neat sketch.	Remember	CACE002.1
6	What are the different types of tapes?	Remember	CACE002.2
7	Define magnetic Dip in compass surveying	Remember	CACE002.4
8	What is meant by Magnetic Bearing?	Understand	CACE002.4
9	State the types of errors in chain.	Understand	CACE002.5
10	Define Arbitrary Bearing and what is an arbitrary constants.	Remember	CACE002.5
11	State Magnetic Meridian and type of meridians	Remember	CACE002.4
12	Define local attraction and causes for local attraction.	Remember	CACE002.7
13	What are the different types of compasses?	Understand	CACE002.7
14	What are the causes of local Attraction?	Understand	CACE002.8
15	Define magnetic Declination and explain types of declinations	Understand	CACE002.7
Part - B (Long Answer Questions).			
1	What is the Principle of surveying?	Understand	CACE002.1
2	Give the classification of surveying in brief based up on Nature of field.	Understand	CACE002.1
3	Give the classification of surveying in brief based up on Purpose / objectives.	Remember	CACE002.1
4	Give the classification of surveying in brief based up on Instruments used.	Remember	CACE002.2
5	A 20m chain used for a survey was found to be 20.10 m at the beginning and 20.30 m at the end of the work. The area of the plan drawn to a scale of 1cm= 8m was measured with the help of a planimeter and was found to be 32.56 sq.cm find the true area of the field.	Understand	CACE002.2
6	A 30m chain used for a survey was found to be 20.10 m at the beginning and 20.50 m at the end of the work. The area of the plan drawn to a scale of 1cm= 6m was measured with the help of a planimeter and was found to be 32.56 sq.cm find the true area of the field.	Understand	CACE002.2
7	A 20m chain was found to be 10cm too long after chaining a distance of 1500m. It was found to be 18 cm too long at the end of the day's work after chaining a total distance of 2900m. Find the true distance if the chain was corrected before the commencement of the work.	Understand	CACE002.2
8	A line was measured with a steel tape which is exactly 30m long at 18^0C and found to be 452.343 m. The temperature during measurement was 32^0C. find the true length of the line .Take coefficient of thermal expansion of tape ^{0}C= 0.0000117	Remember	CACE002.2

<table>
<tr><td>9</td><td>The area of the field was found to be 4000m^2 we measured with a chain of 30m length if the length of the chain was 0.11m short. Determine the correct area.</td><td>Remember</td><td>CACE002.2</td></tr>
<tr><td>10</td><td>The area of the field was found to be 6000m^2 we measured with a chain of 20m length if the length of the chain was 0.21m short. Determine the correct area.</td><td>Remember</td><td>CACE002.2</td></tr>
<tr><td>11</td><td>The distance between the points measured along a slope is 428m find the horizontal distance between them if
i) The angle of slope between the points is 8^0
ii) The difference in level is 62m
iii) The slope is1 in 4</td><td>Understand</td><td>CACE002.1</td></tr>
<tr><td>12</td><td>A steel tape 20 m long standardized at 55^{0}F with a pull of 10Kg was used for measuring a base line. Find the correction per tape length, if the temperature at the time of measurement was 80^0 F and the pull exerted was 16Kg Take weight of tape as 0.8 Kg and E = 2.109*X10^6 Kg/Cm^2 coefficient of thermal expansion per 1^0 F= 6.2X10^{-6} and area of tape was 0.051sq cm.</td><td>Understand</td><td>CACE002.2</td></tr>
<tr><td>13</td><td>The following bearings were observed with a compass. Calculate the interior angles
<table><tr><th>Line</th><th>Fore Bearing</th></tr><tr><td>AB</td><td>61^0 12’</td></tr><tr><td>BC</td><td>123^0 24’</td></tr><tr><td>CD</td><td>41^0 02’</td></tr><tr><td>DA</td><td>200^0 14’</td></tr><tr><td>EA</td><td>300^0 30’</td></tr></table></td><td>Remember</td><td>CACE002.7</td></tr>
<tr><td>14</td><td>The following bearings were observed in running a closed traverse. Determine the corrected magnetic bearing of the line.
<table><tr><th>Line</th><th>Fore Bearing</th><th>Back Bearing</th></tr><tr><td>AB</td><td>71^0 05’</td><td>250^0 20’</td></tr><tr><td>BC</td><td>110^0 20’</td><td>292^0 35’</td></tr><tr><td>CD</td><td>161^0 35’</td><td>341^0 45’</td></tr><tr><td>DA</td><td>220^0 50’</td><td>40^0 05’</td></tr><tr><td>EA</td><td>300^0 50’</td><td>121^0 10’</td></tr></table></td><td>Understand</td><td>CACE002.8</td></tr>
<tr><td>15</td><td>The following observations are observed fore-bearing of the line in whole circular bearing system AB 12^0 24’, BC 119^0 48’, CD 266^0 30’, and DE 354^0 18’ convert into reduced bearing system and the bearings PQ N18^0 00’ E , QR S 12^0 24’ E, RS S 59^0 18’ W and ST N 86^0 12’ W are in reduced bearing system convert them into whole circular bearing system</td><td>Understand</td><td>CACE002.8</td></tr>
<tr><td colspan="4">Part - C (Problem Solving and Critical Thinking Questions).</td></tr>
<tr><td>1</td><td>The length of a line measured with a 20m.chain was found to be 3,200 links. The same, when measured with a 30 m chain was found to be 640 m. If the 20 m chain was ¼ links too long, what was the error in the 30 m chain?</td><td>Remember</td><td>CACE002.1</td></tr>
<tr><td>2</td><td>The fore and back bearings of the lines of a traverse are given below. Correct the bearings and check the geometrical condition of interior angles
<table><tr><th>Line</th><th>Fore Bearing</th><th>Back Bearing</th></tr><tr><td>AB</td><td>61^0 12’</td><td>241^0 12’</td></tr><tr><td>BC</td><td>153^0 24’</td><td>333^0 24’</td></tr><tr><td>CD</td><td>201^0 02’</td><td>21^0 02’</td></tr><tr><td>DA</td><td>280^0 14’</td><td>100^0 14’</td></tr><tr><td>EA</td><td>20^0 30’</td><td>200^0 20’</td></tr></table></td><td>Remember</td><td>CACE002.7</td></tr>
</table>

3	From the traverse data given below , find closing error if any and its bearing Line | Length in m | Bearing PQ | 340.2 | 70^0 30' QR | 350.6 | 120^0 45' RS | 440.8 | 223^0 30' SP | 423.2 | 320^0 47'	Remember	CACE002.8
4	To find out the included angles in a closed traverse PQRSTP, the following observations were made with compass. Calculate the included angles after correcting for local attractions Line | FB | BB PQ | N $62^0$45'E | S $62^0$15'W QR | N $21^0$00'E | S $20^0$45'W RS | N$71^0$30'W | S $71^0$30'E ST | S $39^0$00'W | N $38^0$00'E TP | S $54^0$30'E | N $53^0$15'W	Remember	CACE002.7
5	A 20 –m tape was tested before starting the day's work and found to be 0.02 m short. At the end of the day it was tested again and found to be 0.06 m too long. If the total length measured during the day was 1243.5, find the true length.	Understand	CACE002.2
6	A chain line ABC crosses a river, B and C being on the near and distant banks respectively. The respective bearings of C and A taken at D, a point 60 m measured at right angles to AB from B are 280^0 and 190^0 , AB being 32 m. Find the width of the river.	Understand	CACE002.7
7	A survey line PQ intersects a pond at M and H on opposite sides. A line MC, 1000 m long is set out on the left of MH, and second line MD 1200 m long is laid on the right of MH, the points C, H and D being in the same line. CH and HD were then measured and found to be 600 m and 650 m respectively. Calculate the length of MH.	Remember	CACE002.2
8	P and Q lie on the opposite sides of the river. A line PA, 90 m long is erected perpendicular to PQ. B is fixed on QP produced such that QAB is 90^0. PB is measured and found to be 30m. Determine the distance PQ.	Remember	CACE002.2
9	Explain the following terms : a)Base line b) check line c) Tie line d) swing offset e) oblique offset f) random line	Understand	CACE002.3
10	Explain in a tabular form the differences between a prismatic compass and surveyors compass.	Understand	CACE002.4

UNIT - II

LEVELING & CONTOURING

Part – A (Short Answer Questions)

1	What is Leveling?	Understand	CACE002.9
2	State any two methods of leveling.	Understand	CACE002.10
3	Define horizontal plane.	Remember	CACE002.9
4	What are the checks in height of instrument method?	Remember	CACE002.9
5	What is the angle of intersection between a ridge line and contours?	Understand	CACE002.9
6	State Datum and its importance in surveying	Understand	CACE002.12
7	Define Bench Mark and its importance in surveying	Understand	CACE002.12
8	List out the checks in Rise and Fall method.	Remember	CACE002.12
9	What is contour Gradient?	Understand	CACE002.11

10	Define Mean Sea level what is the need of mean sea level in surveying	Understand	CACE002.11
11	How contours are helpful for finding different elevations?	Remember	CACE002.12
12	Define line of collimation.	Remember	CACE002.10
13	What is contour interval?	Understand	CACE002.9
14	Define contours and explain the characteristics of contours	Understand	CACE002.9
15	Define level surface and what are level lines	Remember	CACE002.9
	Part - B (Long Answer Questions).		
1	Eight readings were taken with a level in sequence as follows: 1.585, 1.315, 2.305, 1.225, 1.325, 1.065, 1.815 and 2.325. The level was shifted after the third and sixth readings. The second change point was a bench mark of elevation 186.975. Find the reduced levels of the remaining stations. Use the rise and fall method.	Remember	CACE002.11
2	The following staff readings were obtained during a leveling work with the instrument being shifted after the 4^{th}, 7^{th} and 10^{th}. Readings: 2.305, 0.940, 0.865, 1.325, 2.905, 1.185, 1.205, 2.015, 1.365, 0.985 and 1.785. Find the reduced levels of the remaining points if the RL of the second turning point is 100.00.	Understand	CACE002.11
3	The following ten readings were taken with a level, the instrument being shifted after the fifth and eighth readings: 1.315, 0.965, 2.345, 1.1.05, 0.875, 1.155, 1.305, 1.675, 1.345 and 1.875. The RL of the first turning point is 100.000. Find the reduced levels of the remaining points by the height of collimation method.	Remember	CACE002.11
4	Define the terms. Level surface, Datum, Bench mark and Mean sea level	Remember	CACE002.11
5	Explain briefly about the different types of levelling instruments.	Remember	CACE002.11
6	The following staff readings were observed successively with a level, the instrument having been moved after third, sixth and eight readings 2.228, 1.606, 0.988, 2.090, 2.864, 1.262, 0.602, 1.982, 1.044, 2.684 meters. Enter the above readings in a page of a level book and calculate the R L of points if the first reading was taken with a staff held on a bench mark of 432.384m.	Understand	CACE002.10
7	Classify the different type of errors in levelling.	Remember	CACE002.10
8	The following staff readings were observed successively with level, the instrument having moved after the second, fourth and eight readings 0.875, 1.235, 2.310, 1.385, 2.930, 3.125, 4.125, 0.120, 1.875, 2.030, 3.765 The first reading was taken with the staff held upon a benchmark of elevation 132.135 remember usual checks.	Remember	CACE002.11
9	Write the temporary adjustments of a level.	Understand	CACE002.10
10	The following ten readings were taken with a level, the instrument being shifted after the fifth and eighth readings: 1.315, 0.965, 1.345, 1.1.05, 0.875, 1.155, 1.305, 1.675, 1.345 and 1.875. The RL of the first turning point is 100.000. Find the reduced levels of the remaining points by the Rise and fall method.	Understand	CACE002.10
11	Write a note on interpolation of contours.	Remember	CACE002.9
12	Write a note on Uses and advantages of contours.	Remember	CACE002.9
13	Write a note on characteristics of contours.	Remember	CACE002.9
14	Write a note on uses of contour maps.	Understand	CACE002.9
15	Explain different methods of contour plotting	Remember	CACE002.9
	Part – C (Problem Solving and Critical Thinking).		

1	Eight readings were taken with a level in sequence as follows: 1.585, 1.315, 2.305, 1.225, 1.325, 1.065, 1.815 and 2.325. The level was shifted after the third and sixth readings. The second change point was a bench mark of elevation 186.975. Find the reduced levels of the remaining stations. Use the rise and fall method.	Remember	CACE002.11
2	The following staff readings were obtained during a levelling work with the instrument being shifted after the 4^{th}, 7^{th} and 10^{th}. Readings: 2.305, 0.940, 0.865, 1.325, 2.905, 1.185, 1.205, 2.015, 1.365, 0.985 and 1.785. Find the reduced levels of the remaining points if the RL of the second turning point is 0.000.	Understand	CACE002.11
3	The following ten readings were taken with a level, the instrument being shifted after the fifth and eighth readings: 1.315, 0.965, -2.345, 1.1.05, 0.875, 1.155, 1.305, 1.675, 1.345 and 1.875. The RL of the first turning point is 100.000. Find the reduced levels of the remaining points by the height of collimation method.	Remember	CACE002.11
4	Two stations A and B are 1200 m apart. A level was set up between the two stations 100 m away from A. the readings observed were 1.375 m on A and 2.465 on B. Find the true difference in elevation between A and B.	Remember	CACE002.11
5	What are contour? Explain uses and characteristics of contours.	Understand	CACE002.9
6	Describe with the help of sketches, the characteristics of contours.	Understand	CACE002.9
7	Describe the various methods of indirect contouring.	Understand	CACE002.9
8	Explain various methods of interpolation of contours.	Understand	CACE002.9
9	What is cross-sectioning? What is its importance? How would you draw a Longitudinal section and a cross section?	Understand	CACE002.9

UNIT-III

COMPUTATION OF AREAS AND VOLUMES

Part - A (Short Answer Questions).

1	What is a well conditioned triangle?	Understand	CACE002.13
2	Write the formula for an area using mid-ordinate rule.	Remember	CACE002.15
3	What is an equilateral conditioned triangle?	Remember	CACE002.13
4	Define Base line and why they are used in surveying?	Remember	CACE002.14
5	What is a tie line and advantages of tie line	Understand	CACE002.14
6	Define check line and state its importance.	Remember	CACE002.14
7	What is a ill conditioned triangle?	Remember	CACE002.14
8	State the formula for an area using average ordinate rule.	Remember	CACE002.14
9	Write the formula for an area using trapezoidal rule.	Understand	CACE002.14
10	Write the formula for an area using Simpson's rule.	Remember	CACE002.14
11	Write the formula to calculate volume using Meridian distance method.	Understand	CACE002.15
12	Write the formula to calculate volume using Double Meridian distance method.	Understand	CACE002.15
13	Write the formula to calculate volume using Departure and total latitude method.	Remember	CACE002.15
14	Write the formula to calculate volume using Co-Ordinates method.	Understand	CACE002.15
15	Write the formula to calculate volume using trapezoidal rule.	Remember	CACE002.15

Part – B (Long Answer Questions).

<table>
<tr><td>1</td><td>A series of offsets were taken from a chain line to a curved boundary line at intervals of 5metres the following order 0,2.65,3.80,3.75,4.65,3.60,4.95,5.85m compute the area between the chain line, the curved boundary line and the end offsets by
i) Average - ordinate rule
ii) Trapezoidal rule</td><td>Understand</td><td>CACE002.14</td></tr>
<tr><td>2</td><td>The following perpendicular offsets were taken at 10m intervals from a survey line to an irregular boundary line 3.25,5.60,4.20,6.65,8.75,6.20,3.25,4.20,5.65 calculate the area enclosed between the survey line , the irregular boundary line , and the first and last offsets, by the application of
i) Trapezoidal rule
ii) Simpson’s rule</td><td>Remember</td><td>CACE002.14</td></tr>
<tr><td>3</td><td>A series of offsets were taken from a chain line to a curved boundary line at intervals of 15m in the following order 0,2.65,3.80,3.75,4.65,3.60,4.95,5.85m compute the area between the chain line, the curved boundary line and the end offsets by
i) Trapezoidal rule
ii) Simpsons rule</td><td>Understand</td><td>CACE002.14</td></tr>
<tr><td>4</td><td>The following offsets were taken from a chain line to hedge Compute the area included between the chain line, the hedge and offset by Simpson’s rule.
<table><tr><td>distance</td><td>0</td><td>20</td><td>40</td><td>60</td><td>80</td><td>120</td><td>160</td><td>220</td><td>280</td></tr><tr><td>offset</td><td>6.4</td><td>10.8</td><td>18.6</td><td>21.2</td><td>9.6</td><td>6.4</td><td>7.5</td><td>3.3</td><td>9.6</td></tr></table></td><td>Understand</td><td>CACE002.14</td></tr>
<tr><td>5</td><td>The following offsets were taken from a chain line to hedge compute the area included between the chain line, the hedge and offset by trapezoidal rule.
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<tr><td>7</td><td>The following perpendicular offsets were taken from a chain line to a hedge. Compute the area included between the chain line, the hedge and offset by Simpson’s rule.
<table><tr><td>Chainage</td><td>0</td><td>15</td><td>30</td><td>45</td><td>60</td><td>70</td><td>80</td><td>100</td><td>120</td><td>140</td></tr><tr><td>offset</td><td>7.6</td><td>8.5</td><td>10.7</td><td>12.8</td><td>10.6</td><td>9.5</td><td>8.3</td><td>7.9</td><td>6.4</td><td>4.4</td></tr></table></td><td>Remember</td><td>CACE002.15</td></tr>
<tr><td>8</td><td>The following perpendicular offsets were taken from a chain line to a hedge. Compute the area included between the chain line, the hedge and offset by Trapezoidal rule
<table><tr><td>Chainage</td><td>0</td><td>15</td><td>30</td><td>45</td><td>60</td><td>70</td><td>80</td><td>100</td><td>120</td><td>140</td></tr><tr><td>offset</td><td>7.60</td><td>8.5</td><td>10.7</td><td>12.8</td><td>10.6</td><td>9.5</td><td>8.3</td><td>7.9</td><td>6.4</td><td>4.4</td></tr></table></td><td>Remember</td><td>CACE002.15</td></tr>
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<tr><td>9</td><td>Determine the area of the closed traverse ABCDA by the M.D. method
<table><tr><th>Line</th><th>Latitude</th><th>Departure</th></tr><tr><td>AB</td><td>+108</td><td>+4</td></tr><tr><td>BC</td><td>+15</td><td>+249</td></tr><tr><td>CD</td><td>-123</td><td>+4</td></tr><tr><td>DA</td><td>0</td><td>-257</td></tr></table></td><td>Understand</td><td>CACE002.15</td></tr>
<tr><td>10</td><td>Determine the area of the closed traverse ABCDA by the D.M.D. method
<table><tr><th>Line</th><th>Latitude</th><th>Departure</th></tr><tr><td>AB</td><td>+108</td><td>+4</td></tr><tr><td>BC</td><td>+15</td><td>+249</td></tr><tr><td>CD</td><td>-123</td><td>+4</td></tr><tr><td>DA</td><td>0</td><td>-257</td></tr></table></td><td>Remember</td><td>CACE002.15</td></tr>
<tr><td>11</td><td>Determine the area of the closed traverse ABCDA by Departure and total latitude method.
<table><tr><th>Line</th><th>Latitude</th><th>Departure</th></tr><tr><td>AB</td><td>+108</td><td>+4</td></tr><tr><td>BC</td><td>+15</td><td>+249</td></tr><tr><td>CD</td><td>-123</td><td>+4</td></tr><tr><td>DA</td><td>0</td><td>-257</td></tr></table></td><td>Remember</td><td>CACE002.13</td></tr>
<tr><td>12</td><td>Determine the area of the closed traverse ABCDA by Co- ordinate method.
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<tr><td>13</td><td>A railway embankment is 10m wide with side slope 1.5 to1 assume the ground to be level in a direction traverse to the centre line, calculate the volume contained in a length of 120 m, the centre height at 20 m intervals being in meters 1.2, 4.7, 3.8, 4.0, 1.8, 2.8, 2.5 solve using Prismoidal rule.</td><td>Understand</td><td>CACE002.13</td></tr>
<tr><td>14</td><td>A railway embankment is 10m wide with side slope 1.5 to1 assume the ground to be level in a direction traverse to the centre line, calculate the volume contained in a length of 120m, the centre height at 20m intervals being in meters 2.2, 3.7, 3.8, 2.0, 3.8, 3.8, 2.5 solve using Trapezoidal rule.</td><td>Remember</td><td>CACE002.13</td></tr>
<tr><td>15</td><td>A railway embankment is 10m wide with side slope 1.5 to1 assume the ground to be level in a direction traverse to the centre line, calculate the volume contained in a length of 120m, the centre height at 20m intervals being in meters 1.8, 3.7, 4.8, 4.0, 2.8, 2.8, 3.5 solve using Prismoidal rule.</td><td>Understand</td><td>CACE002.13</td></tr>
<tr><td colspan="4">Part – C (Problem Solving and Critical Thinking).</td></tr>
<tr><td>1</td><td>Draw the sketch of a two level section, and derive an expression for the area of cross-section.</td><td>Understand</td><td>CACE002.14</td></tr>
<tr><td>2</td><td>Explain the method of computation of volume by the
(i) Trapezoidal rule
(ii) Prismoidal rule</td><td>Understand</td><td>CACE002.13</td></tr>
<tr><td>3</td><td>How would you determine the capacity of a reservoir from the contour plan?</td><td>Understand</td><td>CACE002.23</td></tr>
</table>

<table>
<tr><td>4</td><td>Calculate the side widths and cross-sectional area of an embankment having the following dimensions.
Formation width = 22 m
Side slope = 2 to 1
Centre height = 10 m
Transverse slope = 11 to 1</td><td>Remember</td><td>CACE002.15</td></tr>
<tr><td>5</td><td>A road having a formation width of 36m with side slopes of 1 to1 is to be constructed. The details of the two cross-sections A and B, 30 m apart are shown in table. Determine the volume of excavation by trapezoidal rule.
<table>
<tr><th>Section</th><th>Depth of cutting at the centre line</th><th>Side width(W_1)</th><th>Side width(W_2)</th></tr>
<tr><td>A</td><td>10.0 m</td><td>35 m</td><td>25 m</td></tr>
<tr><td>B</td><td>6.0 m</td><td>30 m</td><td>22 m</td></tr>
</table></td><td>Remember</td><td>CACE002.13</td></tr>
<tr><td>6</td><td>Calculate the volume of embankment of which the cross sectional areas at 20 m intervals are as shown in table use Prismoidal rule.
<table>
<tr><td>Distance (m)</td><td>0</td><td>20</td><td>40</td><td>60</td><td>80</td><td>100</td></tr>
<tr><td>Area (m^2)</td><td>10</td><td>40</td><td>64</td><td>72</td><td>160</td><td>180</td></tr>
</table></td><td>Understand</td><td>CACE002.14</td></tr>
<tr><td>7</td><td>An embankment is formed on ground which is level transverse to the embankment but has a longitudinal slope of 1 in 30. Three cross-sections 30 m apart have centre line heights of 5.0, 6.0 and 7.0 m, respectively. If side slopes of 2 to1 are used and formation width is 10 m, calculate the volume of the fill by the trapezoidal formula and by the Prismoidal formula. Also calculate the Prismoidal correction.</td><td>Remember</td><td>CACE002.13</td></tr>
<tr><td>8</td><td>A road has a formation width of 12 m and side slopes of 1 to 1 in cut and 2 to 1 in filling. The transverse slope of the ground is 6 to 1. If the depths of excavation at the centre lines of two sections 20 m apart are 0.50 m and 0.80 m respectively, find the volumes of cut and fill. Also determine the Prismoidal correction and the corrected volumes.</td><td>Understand</td><td>CACE002.13</td></tr>
<tr><td>9</td><td>Given below are the areas of cut and fill at various chainages of road partly in filling and partly in cutting compute the volumes of cut and fill in the transitional area from chain age 100.00 to136.0
<table>
<tr><th>Chainage in m</th><th>Area of cut (m^2)</th><th>Area of fill(m^2)</th></tr>
<tr><td>100.0</td><td>-</td><td>175.50</td></tr>
<tr><td>109.0</td><td>-</td><td>40.15</td></tr>
<tr><td>120.5</td><td>12.45</td><td>9.64</td></tr>
<tr><td>128.0</td><td>55.14</td><td>-</td></tr>
<tr><td>136.0</td><td>185.25</td><td>-</td></tr>
</table></td><td>Remember</td><td>CACE002.13</td></tr>
<tr><td>10</td><td>Given below are the areas of cut and fill at various chainages of road partly in filling and partly in cutting. Compute the volumes of cut and fill in the transitional area from chainage 100.00 to 136.0.
<table>
<tr><th>Chainage in m</th><th>Area of cut m^2</th><th>Area of fill m^2</th></tr>
<tr><td>100.0</td><td>-</td><td>225.50</td></tr>
<tr><td>109.0</td><td>-</td><td>70.15</td></tr>
<tr><td>120.5</td><td>22.45</td><td>12.64</td></tr>
<tr><td>128.0</td><td>75.14</td><td>-</td></tr>
<tr><td>136.0</td><td>285.25</td><td>-</td></tr>
</table></td><td>Understand</td><td>CACE002.13</td></tr>
<tr><td colspan="4">UNIT-IV</td></tr>
<tr><td colspan="4">THEODOLITE & TRAVERSE SURVEYING</td></tr>
<tr><td colspan="4">Part – A (Short Answer Questions)</td></tr>
<tr><td>1</td><td>Define transit theodolite.</td><td>Understand</td><td>CACE002.16</td></tr>
</table>

2	What is meant by Non-transit theodolite?	Understand	CACE002.17
3	Define vertical axis of theodolite	Understand	CACE002.17
4	Define horizontal axis of theodolite	Understand	CACE002.17
5	What is line of sight or line of collimation?	Remember	CACE002.17
6	Define axis of level tube in theodolite	Remember	CACE002.17
7	What is centering and its importance in surveying	Remember	CACE002.17
8	Define transiting in theodolite	Understand	CACE002.17
9	What is swinging of telescope?	Understand	CACE002.17
10	What are the uses of a theodolite?	Remember	CACE002.18
11	Define face Right observation.	Remember	CACE002.18
12	List the essential parts of a theodolite.	Remember	CACE002.18
13	Define telescope inverted.	Understand	CACE002.18
14	What is vertical circle of a telescope?	Remember	CACE002.18
15	Define trigonometric leveling.	Understand	CACE002.18
Part – B (Long Answer Questions)			
1	Draw neat sketch of a vernier theodolite. Describe its main parts and their functions	Understand	CACE002.16
2	Explain the temporary adjustments of theodolite.	Remember	CACE002.17
3	Explain the procedure for the reiteration method of measuring horizontal angles	Understand	CACE002.17
4	Explain briefly the methods used to locate details with a theodolite.	Understand	CACE002.16
5	Explain the steps involved in measuring horizontal angle with a theodolite	Understand	CACE002.18
6	Explain briefly the possible instrumental errors in theodolite work and the precautions that should be taken to eliminate them.	Remember	CACE002.18
7	What is mean by face left and face right of theodolite? How would you change face? What instrumental errors are eliminated by face left and face right observations?	Remember	CACE002.18
8	Define the terms transit theodolite, Non-transit theodolite, vertical axis and horizontal axis	Understand	CACE002.24
9	Define the following terms Transiting, swinging of telescope, face left observation and face Right observation	Understand	CACE002.16
10	Define triangulation method in detail.	Understand	CACE002.16
11	Derive the equation for heights and distances using trigonometric leveling When bases are accessible and inaccessible.	Remember	CACE002.18
12	Derive the equation for heights and distances using trigonometric leveling when bases are inaccessible.	Understand	CACE002.18
UNIT-V			
TACHEOMETRIC & ADVANCED SURVEYING			
Part - A (Short Answer Questions)			
1	Define Tacheometric survey and its applications	Understand	CACE002.19
2	Mention the formula for to calculate horizontal distance if staff held vertical.	Understand	CACE002.21
3	What is backward tangent?	Understand	CACE002.22
4	Define simple curve and explain the components in it	Remember	CACE002.19
5	What is meant by compound curve?	Understand	CACE002.20
6	Define reverse curve and what are the advantages of reverse curve	Understand	CACE002.21

7	What is forward tangent?	Remember	CACE002.21
8	Write the formula for to calculate vertical distance if staff held vertical.	Remember	CACE002.19
9	What is long cord in a curve?	Remember	CACE002.20
10	Define point of tangency.	Remember	CACE002.21
11	Write about point of intersection.	Understand	CACE002.22
12	What is the main function of a total station?	Understand	CACE002.21
13	What are the demerits in a total station?	Remember	CACE002.20
14	Write brief notes on Geographical Information System.	Understand	CACE002.19
15	Define the segments in Global Positioning System.	Remember	CACE002.19
Part - B (Long Answer Questions)			
1	Write short notes on electronic theodolite.	Remember	CACE002.20
2	Explain briefly the working principle of electronic theodolite.	Remember	CACE002.20
3	Describe briefly the advantages of electronic theodolite.	Remember	CACE002.20
4	Describe briefly the salient features of total station.	Remember	CACE002.20
5	Explain functioning and capabilities of a total station.	Remember	CACE002.20
6	Describe briefly the advantages of total station.	Remember	CACE002.20
7	Write a brief note on Global Positioning System.	Remember	CACE002.19
8	Explain briefly how GPS works to determine the position coordinates.	Remember	CACE002.19
9	Write briefly about the applications of Geographical Information System.	Remember	CACE002.23
10	Write short notes on Geographical Information System.	Understand	CACE002.24
11	State the type of curves and explain the components of a simple curve.	Understand	CACE002.22
12	What are the merits and demerits of total station?	Understand	CACE002.20
13	State the advantages of Global Positioning System.	Remember	CACE002.19
14	State the any two techniques followed in advantage surveying.	Remember	CACE002.19
15	What are the applications of advance surveying?	Understand	CACE002.23
18	Write a brief note on curves.	Remember	CACE002.20
19	Derive angle of elevation and depression formulae for staff held inclined position using the stadia diaghpram of tacheometry.	Remember	CACE002.21
20	Derive angle of elevation and depression formulae for staff held in vertical position using the stadia diaghpram of tacheometry.	Remember	CACE002.21

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