


**Government of Karnataka**  
**Department of Technical Education**  
**Board of Technical Examinations, Bengaluru**

	Course Title: <b>SURVEYING – II</b>		
	Credits (L:T:P) : <b>4:0:0</b>	Total Contact Hours: <b>52</b>	Course Code: <b>15CE33T</b>
	Type of Course: <b>Lectures, and assignments and Student Activity</b>	Credit : <b>04</b>	Core/ Elective: <b>Core</b>
CIE- 25 Marks		SEE- 100 Marks	

**Prerequisite:** Knowledge of Surveying – I and Mathematics.

**COURSE OBJECTIVES :**

1. To provide knowledge of basic Principles and application of Theodolite surveying.
2. To develop the techniques of taking measurements using theodolite and Total Station plotting graph and drawings.
3. Setting out centre lines of Column footings of a Framed Structure by using Total Station and Theodolite.
4. Demarcation of boundary of the given land using Total station

**COURSE OUTCOMES :**

At the end of the course students should be able to

Course Outcome		CL	Linked PO	Teaching Hrs
<b>CO1</b>	Apply the knowledge of basic concepts and principles of Theodolite.	<i>R,U,Ap</i>	1,2,3,4,5	14
<b>CO2</b>	Understand the usage of Theodolite in any civil engineering projects before planning and during execution.	<i>R,U,Ap, E</i>	1,2,4,5,8	05
<b>CO3</b>	Understand the principles and use of Tacheometric survey in rough terrain.	<i>R,U,Ap</i>	1,2,3,4,8	05
<b>CO4</b>	Interpret data from Theodolite and Total Station in setting out curves.	<i>R,U,Ap</i>	1,2,4,5,8	12
<b>CO5</b>	Understand the knowledge of basic concepts and principles of GPS and GIS in Surveying.	<i>R,U</i>	1,2,5	04
<b>CO6</b>	Understand the usage and apply the knowledge of Total Station in different field activities.	<i>R,U,A</i>	1,2,3,4,5,8	12
<b>CO7</b>	Manage the suggested or identified constructional engineering problems, formulate and solve in teams, in order to improve future problem solving ability and able to present it.	<i>U/Ap/ Ay/E/C</i>	1,2,3,4,5,6,7, 8,9,10	*
<b>Total sessions</b>				<b>52</b>

Legend- R; Remember U:Understand Ap: Application Ay: Analysis C:Creation E: Evaluation

\* Related to Student activity beyond classroom hours.



## Programme outcome Attainment Matrix

Course	Programme Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
	Basic knowledge	Discipline knowledge	Experiments and practice	Engineering Tools	Engineer and society	Environment & Sustainability	Ethics	Individual and Team work	Communication	Life long learning
<b>SURVEYING-II</b>	3	3	3	3	3	1	1	3	1	1

**Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.**

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

If  $\geq 40\%$  of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3

If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2

If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1

If  $< 5\%$  of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

## DETAILED COURSE CONTENT

UNIT	COURSE CONTENTS	HOURS
1.0	<p><b>Theodolite Surveying.</b>                      Transit Theodolite and its essential parts, terms used in Theodolite surveying, Fundamental Axes and their relations. Temporary adjustments, Measurement of Horizontal angle by Repetition and Reiteration method, Measurement of Vertical angle. Measurement of Deflection angle, Errors in Theodolite surveying.                      Purpose of a Theodolite Traversing, Traversing by Deflection angle and Included angle method. Checks in Closed and Open Traverse. Traverse computations, Closing error, Balancing the traverse by Bowditch and Transit rules. Omitted measurements-problems (Bearing and distance of one side, length of two sides). Simple Problems on Bowditch and Transit rule, converting Deflection angles into Bearings and interior angles into deflection angles, Computing latitude and departure, given the co ordinates of two points, finding its length and bearing, area of Traverse by independent co-ordinate method.</p>	14
2.0	<p><b>Trigonometrical levelling</b>                      Applications, Elevations and distances of objects - base accessible and inaccessible single plane method and simple problems. Triangulation-Definition, principles, purpose and classification.</p>	05
3.0	<p><b>Tacheometry</b>                      Principles and purpose of Tacheometry, advantages and disadvantages, Instruments-Tacheometer, stadia rods &amp; Annalactic lense, Determination of Tacheometric constants. Fixed Hair method of Stadia system- Simple Problems.</p>	05



<b>4.0</b>	<p><b>Curves:</b> Curves- Elements of Curves, relation between Radius and Degree of a curve. Types of curves – Horizontal and vertical curves, Types of horizontal curves-simple, compound, reverse and transition curves. Setting out simple curves by Chord Produced and Rankine’s method. Definition and elements of a compound curve. Setting out Compound curve. Definition and elements of a reverse curve. Definition and elements of a Transition curves-objectives and requirements.</p>	12
<b>5.0</b>	<p><b>Modern Surveying</b> Remote sensing – definition, basic principles and its applications, Global Positioning System (GPS) - Fundamentals, working principles, receivers, advantages and disadvantages, working principles of GPS navigator. Introduction to GIS- Objectives, applications, comparison of GIS with CAD.</p>	04
<b>6.0</b>	<p><b>Total Station</b> Introduction – Component parts of a Total Station and Accessories - Summary &amp; characteristic Features of total station - Advantages and disadvantages of total station - Applications, - Setting up the Total Station - Measurement (Distance, Angle, Bearing, altitudes etc.)- Field procedure for co-ordinate measurement - Setting out Lines - Setting out Curve by Rankin’s method, to set building corners, to mark control and offset lines, to run a traverse survey &amp; adjustments – Areas of field (three or more points), Linking data files.</p>	12

**COURSE DELIVERY:** The course will be delivered through lectures and Power point presentations/ Video, demonstrations etc.



## SUGGESTED ACTIVITIES

The topic should be related to the course in order to enhance his knowledge, practical skill & and lifelong learning, communication, modern tool usage.

1. To set out sewer grades.
2. Compare the measured angles, Levels and Contours from Total station to other surveying instruments.
3. Setting out centre lines of Column footings of a Framed Structure by using Total Station and Theodolite.
4. Comparing Horizontal angles by both methods between same points.
5. Height of a building calculated by vertical angle method shall be verified by measuring the height with a tape taking BM as Plinth.
6. RL’s and heights of objects like chimneys and towers shall be compared by both single plane and Double plane methods.
7. Demarcation of boundary of the given land using Total station.
8. Formation of sites in a residential layout.
9. Conduct a closed Traverse and find out the area enclosed.
10. Plot the Curves executed on site (practicals) and compare the parameters from plotted drawings and site execution.



11. Determine the height of the elevated objects by trigonometrical levelling.
12. Transferring of Centre line alignment from Ground to inside of Tunnel using Total Station and Theodolite.
13. Geographic information system
14. Gis enabled study of artificial recharge structures
15. Creation of base map for water and sewage network for your town using remote sensing and geographic information system

**NOTE:**

1. Students should select any one of the above or other topics relevant to the subject approved by the concerned faculty, individually or in a group of 3 to 5. Students should mandatorily submit a written report and make a presentation on the topic. The task should not be repeated among students. Report will be evaluated by the faculty as per rubrics. Weightage for 5 marks Internal Assessment shall be as follows:

Unsatisfactory **1**, Developing **2**, Satisfactory **3**, Good **4**, Exemplary **5**.

2. Reports should be made available along with bluebooks to IA verification officer.

**Example of model of rubrics / criteria for assessing student activity**

Dimension	Students score				
	(Group of five students)				
	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 4	STUDENT 5
<b>Rubric Scale</b>	Unsatisfactory <b>1</b> , Developing <b>2</b> , Satisfactory <b>3</b> , Good <b>4</b> , Exemplary <b>5</b>				
1.Organisation	2				
2.Team's roles & duties	3				
3.Conclusion	4				
4.Conversions	5				
<b>Total</b>	14				
Average=(Total /4)	3.5=4				
<b>Note: Concerned faculty (Course coordinator) must devise appropriate rubrics/criteria for assessing Student activity for 5 marks One activity on any one CO (course outcome) may be given to a group of FIVE students</b>					

Note: Dimension should be chosen related to activity and evaluated by the course faculty.



Dimension	Rubric Scale				
	1 Unsatisfactory	2 Developing	3 Satisfactory	4 Good	5 Exemplary
1.Literature	Has not included relevant info	Has included few relevant info	Has included some relevant info	Has included many relevant info	Has included all relevant info needed
2. Fulfill team's roles & duties	Does not perform any duties assigned	Performs very little duties	Performs partial duties	Performs nearly all duties	Performs all duties of assigned team roles
3.Communication	Poor	Less Effective	Partially effective	Effective	Most Effective
4.Conventions	Frequent Error	More Error	Some Error	Occasional Error	No Error

### Course Assessment and Evaluation Scheme:

	What		To whom	When/Where (Frequency in the course)	Max Marks	Evidence collected	Course outcomes	
Direct Assessment meth	CIE	IA	Students	Thrice test (Average of three tests)	Test 1	20	Blue books	CO1, CO2
					Test 2			CO3, CO4
					Test 3			CO5, CO6
			Activities	05	Written Report	CO7		
	SEE	End Exam		End of the course	100	Answer scripts at BTE	1,2,3,4,5,6	
Indirect Assessment	Student Feedback on course		Students	Middle of the course		Feedback forms	1,2 & 3 Delivery of course	
	End of Course Survey			End of the course		Questionnaires	1,2,3, 4,5 & 6 Effectiveness of Delivery of instructions & Assessment Methods	

\*CIE – Continuous Internal Evaluation      \*SEE – Semester End Examination

**Note:** I.A. test shall be conducted for 20 marks. Average marks of three tests shall be rounded off to the next higher digit.



### Weightage of Marks and blue print of marks for SEE

Unit	Major Topics	Hours Allotted	Questions to be set for SEE			Marks weightage	weightage (%)	A*	B*
			Cognitive Levels						
			R	U	Ap				
1	Theodolite Surveying	14	25.00%	25.00%	50.00%	40	27	2	3
			<b>10</b>	<b>10</b>	<b>20</b>				
2	Trigonometric Levelling	5	20.00%	33.00%	46.66%	15	10	1	1
			<b>3</b>	<b>5</b>	<b>7</b>				
3	Tacheometric surveying	5	13.00%	20.00%	67.00%	15	10	1	1
			<b>2</b>	<b>3</b>	<b>10</b>				
4	Curves	12	12.50%	12.50%	75.00%	40	23	2	3
			<b>5</b>	<b>5</b>	<b>30</b>				
5	Modern Surveying	4	50.00%	50.00%	0.00%	10	8	0	1
			<b>5</b>	<b>5</b>	<b>0</b>				
6	Total Station	12	20.00%	40.00%	40.00%	25	23	3	1
			<b>5</b>	<b>10</b>	<b>10</b>				
<b>Total</b>		<b>52</b>	<b>20.1%</b>	<b>26.2%</b>	<b>53.2%</b>	<b>145</b>	<b>100</b>	<b>9</b>	<b>10</b>
			<b>30</b>	<b>38</b>	<b>77</b>				

Legend- R; Remember U: Understand Ap: Application Ay: Analysis C:Creation E: Evaluation  
**A\*-SEE questions to be set for (05marks) in Part – A**  
**B\*- SEE questions to be set for (10marks) in Part – B**

Questions for CIE and SEE will be designed to evaluate the various educational components such as:

Sl. No	Bloom's taxonomy	% in Weightage
1	Remembering and Understanding	<b>46</b>
2	Applying the knowledge acquired from the course	<b>52</b>
3	Analysis	<b>0</b>
4	Synthesis ( Creating new knowledge)	<b>0</b>
5	Evaluation	<b>1</b>

### FORMAT OF I A TEST QUESTION PAPER (CIE)

Test/Date and Time	Semester/year	Course/Course Code	Max Marks		
Ex: I test/6 <sup>th</sup> weak of sem 10-11 Am	I/II SEM		20		
	Year:				
Name of Course coordinator : CO's: _____			Units: __		
Q. no	Question	MARKS	CL	CO	PO
1					
2					



3					
4					

**Note: Internal choice may be given in each CO at the same cognitive level (CL).**

**MODEL Q.P FOR -CIE (TESTS)**

Test/Date and Time	Semester/year	Course/Course Code	Max Marks
Ex: I test/ 6 <sup>th</sup> week of sem 10-11 Am	III SEM	SURVEYING-II	20
	Year: 2015-16	Course code: 15CE33T	

Name of Course coordinator : \_\_\_\_\_ Course Outcomes : 1 & 2

Note: Answer all questions

Questions	M	CL	CO	PO																		
1 List the fundamental lines of a theodolite and Write the relationship between them.	4	R	1	1,2,4																		
2 Explain the procedure to find the RL of an elevated object whose base is inaccessible when the instrument axis are at the same level.	5	U	2	1,2,3,4,5																		
3 Define the following terms. a) Transiting b) Swinging. c) Changing face.	3	R	1	1,2,3																		
4 a) Calculate latitudes, departures and closing error for the following traverse and adjust the traverse using Bowditch rule. <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Line</th> <th>Length</th> <th>WCB</th> </tr> </thead> <tbody> <tr> <td>AB</td> <td>89.31</td> <td>45°10'</td> </tr> <tr> <td>BC</td> <td>219.76</td> <td>72°05'</td> </tr> <tr> <td>CD</td> <td>151.18</td> <td>161°52'</td> </tr> <tr> <td>DE</td> <td>159.1</td> <td>228°43'</td> </tr> <tr> <td>EA</td> <td>232.26</td> <td>300°42'</td> </tr> </tbody> </table> <p style="text-align: center;"><b>OR</b></p> b) An instrument was set up at P and the angle of elevation to a vane 4m above the foot of the staff held at Q was 9°30'. The horizontal distance between P & Q is 2000m. Determine the RL of the Staff station Q given that RL of the instrument axis is 2650.38m by single plane method	Line	Length	WCB	AB	89.31	45°10'	BC	219.76	72°05'	CD	151.18	161°52'	DE	159.1	228°43'	EA	232.26	300°42'	8	A	1,2	1,2,3,4,5
Line	Length	WCB																				
AB	89.31	45°10'																				
BC	219.76	72°05'																				
CD	151.18	161°52'																				
DE	159.1	228°43'																				
EA	232.26	300°42'																				



**REFERENCE TEXT BOOKS**

1. Surveying and Levelling Vol- I & II by B C Punmia
2. Surveying and Levelling by T P Kanetkar & S V Kulkarni
3. Surveying and Levelling by S S Bhavikatti
4. Surveying by Duggal
5. Surveying by R Agor



6. Fundamentals of Surveying by S K Roy
7. Sathesh Gopi, R.Sathikumar & N.Madhu, Advanced Surveying, (Total Station, GIS, Remote Sensing), Pearson Education, Chennai, 2007
8. Surveying and Levelling by N N Basak.

## **E-Learning**

<http://nptel.ac.in/video.php?subjectId=105104101>  
<http://media.sakshat.ac.in/NPTEL-IIT-Videos/>  
[http://nptel.iitk.ac.in/courses/Civil\\_Eng/IIT%20Roorkee/Surveying.htm](http://nptel.iitk.ac.in/courses/Civil_Eng/IIT%20Roorkee/Surveying.htm)  
<http://nptel.iitk.ac.in/>  
<http://www.usouthal.edu/geography/allison/GY301/Total%20Station%20Setup%20and%20Operation.pdf>  
<http://www.pentaxsurveying.com/en/pdfs/R400-MANUAL-PTL-EN.pdf>  
<https://www.youtube.com/watch?v=QtEkZPEeeZk>  
<https://www.youtube.com/watch?v=KQgq5xqSTUw>

**MODEL QUESTION PAPER**  
**DIPLOMA IN CIVIL ENGINEERING**  
**III SEMISTER**  
**COURSE: SURVEYING II**

**Time : 3Hrs**

**Max. Marks : 100**

**PART A**

**Answer any SIX questions each carries 5 marks**

1. List the Fundamental lines and their relation of a theodolite.
2. Differentiate between Bowditch rule and Transit rule.
3. Explain the procedure to find the RL of an elevated object whose base is inaccessible when the instrument axes are at the same level.
4. List the advantages and disadvantages of Tacheometric Surveying.
5. Explain briefly different types of Curves with a neat sketch.
6. What is Transition Curve and what are its objects.
7. Explain the principles of Electronic Theodolite & EDM.
8. List the advantages of Total station.
9. What is a Total station? Explain the working principle of Total Station.

**PART B**

**Answer any SEVEN questions each carries 10 marks**

1. Calculate latitudes, departures and closing error for the following traverse and adjust the traverse using Bowditch rule.

<b>Line</b>	<b>Length</b>	<b>WCB</b>
<b>AB</b>	89.31	45 <sup>0</sup> 10'
<b>BC</b>	219.76	72 <sup>0</sup> 05'
<b>CD</b>	151.18	161 <sup>0</sup> 52'
<b>DE</b>	159.1	228 <sup>0</sup> 43'
<b>EA</b>	232.26	300 <sup>0</sup> 42'





2. The following data were recorded in running a traverse, the length of AB and CD have been omitted:

Line	Length in mts	Bearing
AB	?	33°45'
BC	300	86°23''
CD	?	169°23'
DE	450	243°54'
EA	268	317°30'

Determine the omitted quantities.

3. Define the following terms.
- Vertical axis
  - Trunnion axis
  - Line of Collimation
  - Plate level axis and
  - Altitude level axis
4. An instrument was set up at P and the angle of elevation to a vane 4m above the foot of the staff held at Q was 9°30'. The horizontal distance between P & Q is 2000m. Determine the RL of the Staff station Q given that RL of the instrument axis is 2650.38m by single plane method.
5. The following Tacheometric observations were made with an anallatic telescope having a multiplying constant 100 on a vertically held staff.

Instrument station	HI	Staff station	Vertical angle	Stadia readings		
A	1.48	BM	-1°54'	1.02	1.72	2.42
A	1.48	P	+2°36'	1.22	1.825	2.43
Q	1.5	P	+3°6'	0.785	1.61	2.435

If the RL of BM is 100.0m, find the RL's of stations A, P & Q.

- Explain the procedure of setting out a simple circular curve by using Total station.
- Two tangents intersect at a chainage of 1190m, the deflection angle being 36°. Calculate the necessary data for setting out a curve with the radius of 300m by Rankines/Deflection angle method. The peg interval is 30m
- Two straights BA & AC are intersected by a line EF. The angles BEF and EFC are 140° & 145° respectively. The radius of the first arc is 600m and that of the second arc is 400m. Find the chainage of the tangent points and point of Compound curvature. The chainage of intersection point A is 3415m.
- What is meant by Remote sensing and What are its basic Principles.
- Explain the process of transferring the Data collected from Total station to Computer and plot drawing using Auto CAD.

## Model Questions Bank

### Unit 1- Theodolite Surveying



**Cognitive level –Remember**

11. List the different purposes for which the theodolite can be used.
12. List the different parts of a Transit theodolite and mention their functions.
13. Draw a neat sketch of the Theodolite and mention the parts.
14. Write the relation between Fundamental lines of a Theodolite.
15. Explain the Temporary adjustments of a Transit Theodolite.
16. What is meant by Theodolite Traversing and list their purposes.
17. Differentiate between Bowditch rule and Transit rule.
18. Differentiate between Consecutive co-ordinates and Independent co-ordinates.
19. What is meant by Balancing the Traverse and Closing error.

**Cognitive level –Understand**

20. Define the following terms.
  - d) Transiting
  - e) Swinging.
  - f) Face left observation.
  - g) Face right observation.
  - h) Changing face.
  - i) Telescope normal.
  - j) Telescope inverted.
21. Define the following terms.
  - f. Vertical axis
  - g. Trunnion (Horizontal) axis
  - h. Line of Collimation
  - i. Plate level axis and
  - j. Altitude level axis
22. Differentiate between
  - a. Face left and Face right observation
  - b. Plunging and swinging the Telescope
  - c. Tribach and Trivet stage
23. Explain the method of ‘Repetition and Reiteration’ for measuring the horizontal angle.
24. Explain the principle of a Closed Traverse.
25. Write the procedure for the measurement of Deflection angles.
26. Briefly explain the Theodolite traversing by Included angle method.
27. Briefly explain Theodolite traversing by Deflection angle method.



**Cognitive level –Application**

28. Calculate latitudes and departures for the following traverse ABCDE.

Line	Length	WCB
AB	82.50	45°10'
BC	200.00	72°05'
CD	150.30	161°52'
DE	162.52	228°43'
EA	234.5	300°42'

29. Calculate latitudes, departures and closing error for the following traverse and adjust the traverse using Bowditch rule.

Line	Length	WCB
AB	89.31	45°10'
BC	219.76	72°05'
CD	151.18	161°52'
DE	159.1	228°43'
EA	232.26	300°42'

30. Find the Latitude and Departure. And Adjust the following traverse by Transit rule.

Line	Length	WCB
AB	89.31	45°10'
BC	219.76	72°05'
CD	151.18	161°52'
DE	159.1	228°43'
EA	232.26	300°42'

31. The following data were recorded in running a traverse, the length of AB and CD have been omitted:

Line	Length in mts	Bearing
AB	?	33°45'
BC	300	86°23''
CD	?	169°23'
DE	450	243°54'
EA	268	317°30'

Determine the omitted quantities.

## Unit 2- Trigonometric Levelling

**Cognitive level –Remember**

1. Explain the basic principles of Trigonometrical Levelling.
2. Differentiate between Trigonometrical levelling and Ordinary levelling.
3. What is trigonometrical levelling? Where it is employed?



**Cognitive level –Understand**

3. What are the practical applications of Trigonometrical levelling.
4. Explain the procedure to find the RL of an elevated object whose base is inaccessible when the instrument axes are at the same level.
5. Explain the procedure to find the RL of an elevated object whose base is accessible by single plane method.
6. Explain briefly the method of determining the height of an object by double plane method.

**Cognitive level –Application**

7. An instrument was set up at P and the angle of elevation to a vane 4m above the foot of the staff held at Q was  $9^{\circ}30'$ . The horizontal distance between P & Q is 2000m. Determine the RL of the Staff station Q given that RL of the instrument axis is 2650.38m by single plane method.
8. Find the RL of the church Spire C from the following observations taken from two stations A and B, 50m apart,  
Angle BAC=  $60^{\circ}$   
Angle ABC=  $50^{\circ}$   
Angle of elevation from A to top of Spire=  $30^{\circ}$   
Angle of elevation from B to top of spire=  $29^{\circ}$   
Staff reading from A on BM= 2.5m  
Staff reading from B on BM= 0.5m  
RL of BM= 20m.
9. A transit theodolite was set up at a distance of 200m from a chimney and angle of elevation to its top was  $10^{\circ}48''$ . The staff reading on a BM of RL 70.250m with the telescope horizontal was 0.977. Find the RL of top of Chimney.

**Unit 3- Tacheometry**

**Cognitive level –Remember**

1. Explain the Principle of Tacheometry.
2. What are the purpose of Tacheometry.
3. What is Anallatic lense.
4. What is a Stadia Rod.

**Cognitive level –Understand**

5. List the advantages and disadvantages of Tacheometry.
6. Determine the Tacheometric constants by Fixed hair method

**Cognitive level –Application**

7. The following readings were taken with a Tacheometer.

Stadia readings	Reading on Staff
Top hair	1.215m
Middle hair	1.650m
Bottom hair	2.085m

If the tacheometric constants K & C as 100 & 0.3m respectively , find the horizontal distance between the staff and instrument and also determine the RL of staff station. Take RL of the instrument station =99.5m & height of the inst above ground =1.220m.

**Unit 4- Curves**



**Cognitive level –Remember**

1. Draw a neat sketch of a circular Curve and show its elements.
2. Define degree of a Curve and mention its relation with the radius of curve.
3. Explain briefly different types of Curves with a neat sketch.
4. With a neat sketch define Compound curve and show its elements.
5. Sketch the elements of Reverse curve.
6. What is Transition Curve and what are its objects.
7. What are the requirements of an ideal Transition curve.
8. Explain briefly setting out of a Compound Curve.

**Cognitive level –Understand**

9. Describe the method of setting out Simple circular curve by deflection angle method (Rankine's method) by using Theodolite.
10. Describe the method of setting out Simple circular curve by deflection angle method (Rankine's method) by using Total Station.
11. Under what circumstances Reverse Curves are provided.
12. What are the points to be considered while setting out a Reverse curve.

**Cognitive level –Application**

13. Two straights intersect at chainage 2056.44m and the angle of intersection is  $120^{\circ}$ . If the radius of simple curve is to be introduced is 600m. Find the following,
  - a. Tangent distances
  - b. Chainage of the point of Commencement.
  - c. Chainage of point of Tangency.
  - d. Length of the Long Chord.
14. Two tangents intersect at a chainage of 1190m, the deflection angle being  $36^{\circ}$ . Calculate the necessary data for setting out a curve with the radius of 300m by Rankine's/Deflection angle method. The peg interval is 30m
15. Two straights meet at an apex angle  $126^{\circ} 48'$  and are to be joined by a circular curve of 300m radius. Calculate the data necessary to set out the curve using a 30m chord by Rankine's method.
16. Two straights BA & AC are intersected by a line EF. The angles BEF and EFC are  $140^{\circ}$  &  $145^{\circ}$  respectively. The radius of the first arc is 600m and that of the second arc is 400m. Find the chainage of the tangent points and point of Compound curvature. The chainage of intersection point A is 3415m.

**Unit 5- Modern Surveying****Cognitive level –Remember**

1. What is meant by Remote sensing and what are its basic Principles.
2. Explain briefly the Fundamental principles of GPS
3. What are GPS Receivers and List the advantages and disadvantages.
4. What is meant by GIS and list their objectives and applications.

**Cognitive level –Understand**

5. List the applications of Remote sensing.
6. Explain the working principle of GPS.
7. Explain the working principle of GPS navigator.
8. Compare GIS with Auto CAD.

**Unit 6- Total Station.**

**Cognitive level –Remember**

1. Explain the principles of Electronic Theodolite.
2. Explain the principles of EDM.
3. Write a short note on Electronic Theodolite and EDM.
4. What is a Total station? Explain the working principle of Total Station.
5. What is the function of prism reflectors in total station?
6. List the advantages of Total station.
7. Write a note on Prism.

**Cognitive level –Understand**

8. List the various application of total station
9. Mention any two total station characteristics.
10. List the component parts and functions of a Total Station.
11. What are the points should be kept in mind while using Total station during the operation of,
  - a. Levelling
  - b. Measuring distances
  - c. Measuring angles.
  - d. Contouring.
12. Mention any one Linking software used, to transfer data files in Total station.
13. Briefly write the field procedure for co-ordinate measurement, using Total station.  
What is electronic note book?

**Cognitive level –Application**

14. Explain the procedure of setting out Building corners by Total station.
15. Explain the procedure to mark control points and offset lines by total station.

