GOVERNMENT OF TAMILNADU

DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI

STATE PROJECT COORDINATION UNIT

(Established Under Canada India Institutional Cooperation Project)

CURRICULUM

Course Name	**SURVEY USING TOTAL STATION**
Course Code	CE / 2020 / 010
Course Duration	40 Hours
Minimum Eligibility Criteria and Pre-requisites (if any)	10th /+2/ ITI /Diploma/Graduate Basic knowledge in Landscape
Course Objectives	Training Module has been designed for the Participants to • Measure vertical and horizontal angles • Measure the altitude of objects • Understand the stakeout principles • Perform layout of buildings • Calculate the area and volume of surfaces
Course Outcomes	At the end of the training, participants will be able to . . . • Apply the knowledge of total station in different operations in Civil Engineering • Use Total Station in the field Civil Engineering Land Survey • Identify the construction problem and solve in order to improve future problems.
Expected Job Roles	• Land surveyor • Total station surveyor

TEACHING AND SCHEME OF EXAMINATION						
Course Code	**Course Name**	**Hours**		**Assessment Marks**		**Duration of Examination**
				Min	**Max**	
CE / 2020 / 010	**SURVEY USING TOTAL STATION**	Theory	10	10	20	**3 Hours**
		Practical	30	40	80	
		Total	**40**	**50**	**100**	

DETAILED SYLLABUS

Unit No	Modules	No. of Hours	
		Theory	Practical
1	**INTRODUCTION**	02	---
1.1	Surveying – Classification of Surveying – Principles of Surveying – Instrument Used for Surveying		
1.2	Highlight of Total Station – Applications – Precautions regarding safety – Usage precautions.		
2	**BASIC OPERATION OF TOTAL STATION**	02	----
2.1	Component Parts of Total Station – Accessories Used – Precautions – Functions of Total Station – Unpacking and packing – Removing and attaching battery		
3	**PREPARATION OF TOTAL STATION FOR SURVEYING**	01	01
3.1	Centering and Leveling of instrument – Eyepiece adjustments – Target sighting – Turning power on and off.		
4	**MEASUREMENT OF ANGLE AND DISTANCE**	---	02
4.1	Determination of horizontal angle between two given points		
4.2	Determination of horizontal distance between two targets		
5	**FIELD APPLICATIONS OF TOTAL STATION**	04	23
5.1	Determination of Co-ordinates		
5.2	Determination of distance between consecutive points		
5.3	Measurement of Altitude/ Height of Elevated Point		
5.4	Traversing using Total Station		
5.5	Calculation of Area and Volume		
5.6	Road design by building block method and Intersection method		
5.7	Setting out Curve – Stake Out		
5.8	Topographic Surveying – Layout Preparation.		

6	**FILE MANAGER AND DATA TRANSFER**	01	01
6.1	Creation of a new job – Selection of job – Deletion of job – Transfer of data to PC		
7	**WORKING ON PC**		
7.1	Work on AutoCAD – Plotting – Layout preparation	---	03
	TOTAL THEORY AND PRACTICAL HOURS	**10**	**30**
	TOTAL HOURS	**40**	

PRACTICAL EXERCISES (30 HOURS)	
S.NO.	**List of Experiments**
1.	Determination of angles& distance between two points
2.	Determination of altitude/height of an object
3.	Determination of coordinates of a location
4.	Determination of area and volume of an irregular polygon
5.	Setting works for buildings and pipelines
6.	Traversing using Total Station
7.	Topo survey: Preparing a layout
8.	Contour surveying for a lake / valley
9.	Determine Remote Height of an object
10.	Calculate Distance, Gradient, Difference in Height between 2 inaccessible Points
11.	Curve Setting
12.	Stake Out under various methods

HARDWARE REQUIREMENT

SL. NO.	LIST OF TOOLS / EQUIPMENTS / MATERIALS
1.	Total station with its accessories
2.	Tripod
3.	Prism with stand and its accessories

SOFTWARE REQUIREMENT

SL. NO.	NAME OF THE SOFTWARE
1.	SOFTWARE WILL BE PROVIDED WITH THE TOTAL STATION INSTRUMENT

REFERENCE BOOKS

SL. NO	NAME OF THE BOOK	AUTHOR	PUBLISHER
1.	Advanced surveying : Total Station, GIS and Remote Sensing	SatheeshGopi	Pearson Education 2006
2.	Surveying	NN Basak	Tata McGraw Hill 2014
3.	Instructional Manual		Supplied along with the Instrument

ASSESSMENT AND CERTIFICATION

S.No	Criteria for Assessment
1.	A trainee will be assessed based on the performance in End Examination for Theory and Practical conducted internally in the CIICP Project Polytechnic College for a duration of 3 hours
2.	A trainee must have 75% of attendance to appear for End examination in Theory and Practical.
3.	The assessment for theory part will be based on the marks scored in the end examination on the knowledge bank of questions (1 Word/ Objective type questions).
4.	The assessment for practical part will be based on the marks scored in the end examination conducted by the CIICP Project Polytechnic and assessed by the Examiners approved by Strategic Plan Implementation Committee (SPIC) of the project polytechnic.
5.	The passing criteria for successful completion of training is every trainee should score 50% of marks in the End Theory and Practical examination.
6.	On successful completion of training, Certificate will be issued to the participants by the Directorate of Technical Education through the Project Polytechnics.

END EXAMINATION

ALLOCATION OF MARKS

S. No.	Description	Maximum Marks
1.	THEORY EXAM	20
2.	PRACTICAL EXAM	
	a. PROCEDURE	15
	b. FIELD WORK	15
	c. CALCULATION	15
	d. RESULT / OUTPUT	15
	e. RECORD	20
	Total	**100**

THEORY MODEL QUESTION PAPER - I

CE / 2020 / 010 – SURVEY USING TOTAL STATION
(Maximum Marks: 20)

(N.B: Answer any **Twenty** Questions) **20 x 1 = 20 Marks**

1. Which programme is used to find the polygon area?
2. Which program is used to create a parallel line with respect to a base line?
3. What is the unit of angle in total station?
4. What is ENH in input parameters of total station?
5. Which programme is used to find the horizontal distance?
6. What is total station?
7. What is EDM?
8. Which direction is best to orient total station?
9. How did total station is always carried in a?
10. Which methods of collecting data isenable in total station?
11. How bubbles are centred in a total station?
12. Where the saved data in a total station can be transferred?
13. Which unit in total station processes the data collected?
14. What is the latest development in a total station?
15. Total station can be used in meteorology. say true or false
16. List any two function of total station.
17. State any one use of coordinate programme.
18. How the total station reads a point?
19. Can total station be used after sunset?
20. How to hold the prism while taking readings?
21. Name some programs that total station can do
22. State any one disadvantage of total station
23. How many persons are required for handling total station?
24. What is the unit of area measurement?
25. Minimum how many points are required to calculate area?

THEORY MODEL QUESTION PAPER - II

CE / 2020 / 010 – SURVEY USING TOTAL STATION
(Maximum Marks: 20)

(N.B: Answer any **Twenty** Questions) **20 x 1 = 20 Marks**

1. Which instrument is the combination of electronic theodolite and electronic distance meter?

a) Digital theodolite b) Total station

c) Tacheometer d) Telemeter

2. What is EDM?

a) Electronic distance metre b) Electronic laser distance measurement

c) Electronic distometre d) Electric data measurement

3. Which direction is best to orient the total station for obtaining best output?

a) East b) West c) South d) North

4. What is ENH in input parameters of tatal station?

a) Easting, northing, R.L of the instrument

b) Easting, Northing, Height of the instrument

c) Easting, Northing, Height of the tripod

d) Easting, Northing, Height of the reflector

5. Which program is used to find the horizontal distance.

a) Stake out b) Tie distance

b) Reference line d) Resection

6. Where the saved data in a total station can be transferred?

a) Drawing sheet b) Personal computer

c) Scanner d) EDM

7. In total station data is stored in.....

a) Pendrive b) Data card

c) Microprocessor d) External hardware

8. For taking reading over a point using total station.....is needed

a) Prism b) Ranging rod

c) Levelling staff d) Scale

9. What function is used for column marking in field

a) Distance b) Stake out

c) Coordinates d) Horizontal angle

10. Minimum how many points are needed to calculate an area of closed plot?

a) 1 b) 2 c) 3 d) 4

11. To plot a contour for an area, what function is needed?

a) Coordinates b) Distance

c) Area d) Volume

12. In what type of file the data are stored in total station

a) Excel b) Word

c) Drawing d) Pdf

13. How many persons needed to work with total station

a) 1 b) 2 c) 3 d) 4

14. What function is needed to prepare the layout of the building?

a) Coordinates b) Distance

c) Volume d) Setting out

15. What is REM?

a) Remote electronic measurement

b) Remote elevated measurement

c) Road elevation measurement

d) Read elevated measurement

16. Using REM function .....is calculated

a) Height of object b) Area

b) Volume d) Distance

17. To calculate the distance between two points.....function is used in sokkia instrument

a) Dist b) MLM

c) Tie distance d) Horizontal angle

18. Which software is used for preparing layout of building

a) Autocad b) Excel

c) 3ds max d) Staad pro

19. Total station can be used for

a) Angular measurement b) Linear measurement

c) Elevation measurement d) All the above

20. Which program is used to locate the instrument station with respect to two known points

a) Tie distance b) Free station

c) Remote height d) Resection

21. Compensator can make complete adjustments in Total Station

a) True

b) False

22. Which of the following indicates the correct set of combination of Total Station?

a) Theodolite, compass
b) Theodolite, EDM
c) Electronic theodolite, EDM
d) EDM, GPS

23. The formula for difference in elevation can be given as …….

a) D= V+(I-R)
b) D= V+(I+R)
c) D= V-(I-R)
d) D= V*(I-R)

24. What is the use of optical plummets in optical devices?

a) Focusing
b) Orientation
c) Precise Leveling
d) Precise centering

25. How bubbles in a Total Station are centered?

a) Tripod legs
b) Tangents screws
c) Focusing screws
d) Keys
