SYLLABUS OF SEMESTER SYSTEM

FOR THE TRADE OF

SURVEYOR

Under

Craftsmen Training Scheme (CTS)

(One Year/Two Semesters)

Redesigned in

2014

By

Government of India

Ministry of Labour & Employment (DGE&T)

GENERAL INFORMATION

1.	Name of the Trade	: **SURVEYOR**
2.	NCO Code No.	: 842.10, 842.15
3.	Qualification Pack Code	:
4.	Duration of Craftsmen Training	: Two Semesters (1Year)
5.	Entry Qualification	: Passed 10^{th} Class under 10+2 system.
6.	Unit Strength	: 20
7.	Space Norms	: 64 Sqm
8.	Power Norms	: 3 KW (20000 lumen)
9.	Job Role	: To conduct survey of any type of land using chain, Compass, cross staff, plane table, level, theodolite and other survey instruments.
10.	Instructor's Qualification	: NTC/NAC in the surveying trade with 3 years' post Qualification experience OR Diploma/Degree in Civil Engg. with 2/1 years post qualification experience respectively.
11.	Desirable Qualification	: CITS

Week-wise Contents Index of First Semester

Sl. No.	Week No.	Topic		Duration (Weeks)
		Trade Theory	**Trade Practical**	
1	1-3	Tools &equipments, scales, Geometrical Construction	Tools &equipments, scales, Geometrical Construction	3
2	4-5	Classification of Survey, Signs & symbols	Classification of Survey, Signs & symbols	2
3	6-11	Chain Survey	Chain Survey	6
4	12-15	Compass Survey	Compass Survey	4
5	16-21	Plane table Survey	Plane table Survey	6
6	22-26	Project Work/Industrial Visit/Revision/Examination		5
			Total	**26**

Syllabus for the Trade of Surveyor under CTS

First Semester (Semester Code : SUR-01)

Duration : Six Months

Syllabus for TT & TP

Week No.	Trade Theory	Trade Practical
1	Importance of safety, general safety precautions-Introduction to Trade. Uses of different instruments & equipments used by Surveyor, their types and uses. Lettering using stencils.	Familiarization with Institute, importance of Trade training, instruments & equipments used, nature of job done by Surveyors. Drawing different types of lines, printing letters & figures.
2	Scales-different types, principles.	Construction of plane scales.
3	Geometrical construction-lines, angles, triangles, quadrilaterals and circles.	Geometrical drawing-problems on lines, angles triangles & quadrilaterals.
4-5	Classification of survey. Accuracy and speed in field & office work. Common terms used and definitions. Conventional signs and symbols. Use of legends.	Conventional signs & symbols used in survey. Topography and building drawing. Map reading practice, contours, drainage.
6	Linear measuring instruments, their description & uses. Types of chain.	Chain survey-Practice in unfolding & folding chain, errors & adjustments of chains, alignment, chaining lines, measurement of distances and booking.
7	Principles of chain survey. Instruments used & their description.	Practice in chaining, taking offset, use of optical square and cross staff. Setting out right angles and booking. Testing of chain, tape, optical square & cross staff.
8	Field book-types, methods of entry of check lines-its importance.	Procedure in conducting chain survey. Chain survey of small plots by triangulation, booking & plotting.
9	Types of offset and their limit, town survey traversing with chain, procedure in plotting.	Chain survey of built up plots, locating details, booking & plotting.
10	Care & maintenance of chain & accessories. Types of obstacles in chaining and methods of overcoming them.	Taking horizontal measurements on sloping ground, overcoming obstacles, measuring distance between two points invisible from each other.

11	Errors in chain survey & their remedies, problems in chain survey, degree of accuracy required procedure of inking & coloring.	Chain survey of an extensive area, locating details, plotting, finishing in ink & coloring.
12	Use of magnetic needles in survey, types of compass, description, constructional features & uses of compasses, their adjustments-Measurement of directions.	Surveying of a tank, a route or obstructed field by chain traverse, method of finding height of inaccessible objects.
13	Technical terms used in compass survey, difference between angles & bearings, magnetic & true meridians, declination and its variations, local attraction, its detection & elimination.	Practice in setting up a compass & checking its accuracy-taking bearings & calculating angles.
14	Locating details by bearings, compass survey methods, traversing methods, methods of determining true meridians & declination, methods of plotting closed compass traverse-adjustment of closing errors, limits of precision required, field book entries.	Determining the bearings of a given line and establishing lines of given bearings, laying out rectilinear & polygonal plots of ground using compass & tape.
15	Relaying of old service errors in compass survey. Testing & adjustment of compass.	Conducting closed traverse of built up fields and plotting the same.
16-17	Plane table survey-merits & demerits, equipments used, methods of plane tabling.	Setting up of plane table, leveling, centering & orientation. Surveying an area with plane table by radiation & intersection methods.
18-19	Errors in plane tabling & their elimination-other instruments used in combination with plane table, their construction & uses.	Traversing with plane table of built up areas, running an open traverse with plane table & fixing details.
20	Tangent clinometers, Dole sole's clinometers & telescopic alidade.	Inking, finishing, coloring & tracing of plane table maps done in previous weeks.
21	Survey maps-care & maintenance of plane table accessories, procedure of plane tabling.	Practice in finding the position of table by three point & two point problems. Use of tangent & Dole sole's clinometers-Abney level and telescopic alidade for finding heights of surrounding points.
22-26	Project work/Industrial visit (optional)/Revision/Preparatory test & Examination.	

Syllabus for the Trade of Surveyor under CTS

First Semester (Semester Code : SUR-01)

Duration : Six Months

Syllabus for Workshop Calculation & Science

Week No.	Workshop Calculation & Science
1	Addition & subtraction of decimal numbers and fractions.
2	Multiplication & division of decimal numbers and fractions. Conversion of decimals into fractions and vice versa.
3-5	Algebra-fundamental formulae, multiplication and factorization.
6-8	Simple equations & simultaneous equations.
9-10	Simple theory of indices.
11-12	Surds
13-15	Quadratic equations & applications.
16	Linear graph, Use of Logarithm tables
17-18	Properties of plane geometrical figures-triangles, rectangles & quadrilaterals.
19	Properties of regular polygons, circles & parallelograms.
20-21	Determination of sides & area of triangles, quadrilaterals & polygons.
22-26	Revision & Examination.

Week-wise Contents Index of Second Semester

Sl. No.	Week No.	Topic		Duration (Weeks)
		Trade Theory	**Trade Practical**	
1	1-9	Level Survey	Level Survey	9
2	10-12	Road Project	Road Project	3
3	13-15	Theodolite Survey	Theodolite Survey	3
4	16-19	Closed & Open Traverse	Closed & Open Traverse	4
5	20-21	Practice on Theodolite	Practice on Theodolite	2
6	22-26	Project Work/Industrial Visit/Revision/Examination		5
			Total	**26**

Syllabus for the Trade of Surveyor under CTS

Second Semester (Semester Code : SUR-02)

Duration : Six Months

Syllabus for TT & TP

Week No.	Trade Theory	Trade Practical
1	Leveling-parts, types-Cooks reversible level & dumpy level, types of diaphragm, types of staff, technical terms used in leveling, permanent adjustment of leveling instruments.	Practice in setting out a level & performing temporary adjustments-practice in reading staff, demonstration of permanent adjustment.
2-4	Methods of observation, booking, reduction of levels, types of field book, reciprocal leveling, effects of Earth's curvature & refraction in leveling, common errors and their elimination, degree of accuracy, introduction to contour.	Practice in differential leveling-reciprocal leveling, establishing bench marks, Height of collimation and Rise & Fall methods.
5	Working out problems on field book reduction, reciprocal leveling & permanent adjustments.	Performing permanent adjustment to various types of leveling instruments.
6	Purpose of sectioning, consideration of distance between points, precautions.	Establishing of alignment & grade for roads and drains. Method of entering in field book.
7-8	Steps in plotting sections, selection of scales, factors affecting selection of formation level- Prismoidal formula & its application, calculation of earthwork.	Carrying out route survey, longitudinal & cross-section of a road project-its plotting and calculation of earthwork.
9	Construction and use of boning rods and ghat tracer.	Practice in use of boning rods and ghat tracer for establishing grade lines for various types of work.

10-12	Types of surveys for the location of a road, points to be considered during reconnaissance, preliminary & final location surveys. Alignment of roads, relative importance of length of road, height of embankment and depth of cutting, road gradients, sub-grades, road foundations, drainage, camber, curves and super elevation, road surfaces such as earth road, WBM road cement concrete road bituminous road, etc.	Road project-reconnaissance, preliminary & final location survey including preparation of route map to scale, taking profile & section with level, plotting, marking formation levels, calculation of earthwork and other materials for laying road.
13	Introduction to theodolite, temporary adjustments, procedure in setting up, methods of measurement of horizontal angles, repetition & reiteration systems.	Practice in setting up a theodolite and taking readings.
14	Types of field book used in theodolite survey, adjustment of errors while laying a given angle by repetition, method of setting out straight lines, establishing lines at given angles with given lines.	Measurement of horizontal angles by repetition & reiteration methods, booking, setting out given angles.
15	Instrumental errors, their elimination, permanent adjustment, care & maintenance of theodolite. Method of running a traverse, different methods of measuring angles and bearings.	Practice in measuring vertical angles, setting out given vertical angles, booking. Demonstration of permanent adjustment of theodolite.
16-17	Methods of plotting traverses- Gales traverse system, checking of measurements of closed & open traverse, use of traverse tables, closing errors & its adjustment.	Setting out a straight line over & across obstacles, prolonging lines, establishing lines at given angles with given lines, setting out given rectilinear lines.
18	Omitted measurements and their calculation-Practice in working out problems.	Running a closed traverse over a given area, booking, calculating the ordinates and plotting the traverse.

19	Technical terms in connection with simple triangulation-base line measurements& its correction-procedure of measuring angles-methods of calculating sides from triangulation, data check, errors & precautions.	Running an open traverse, calculate & plot the same and fix the details with plane table, measuring a base line for triangulation.
20-21	Practice on theodolite and its adjustment.	
22-26	Project work/ Industrial visit (optional)/ Revision/ Preparatory Test & Examination.	

Syllabus for the Trade of Surveyor under CTS

Second Semester (Semester Code : SUR-02)

Duration : Six Months

Syllabus for Workshop Calculation & Science

Week No.	Workshop Calculation & Science
1	Determination of area of circles, sectors and segments.
2-3	Simpson's Rule.
4	Units of length, area & volume and their conversion.
5	Surface area and volume of cubes and cuboids.
6	Surface area and volume of spheres.
7	Surface area and volume of cylinders.
8-9	Surface area and volume of prisms. Prismoidal formula.
10	Surface area and volume of cones.
11-12	Revision.
13	Introduction to Trigonometry. Basic ratios such as sin θ, cos θ, tan θ and their reciprocals.
14	Solution of simple triangles.
15	Use of trigonometrical tables.
16-17	Problems on heights & distances.
18-19	More problems on mensuration.
20-21	More problems on trignometry.
21-26	Revision & Examination

List of Tools & Equipments for the trade of Surveyor under CTS

A. Trainee's Kit for 20 Trainees and One Instructor

Sl. No.	Description	Quantity
1	Engineering Instrument Box	21
2	Protractor 15 cm full circular	21
3	Card board/ plastic metric scale set- A to H	21
4	Diagonal scale, electroplated	10
5	Celluloid set square 45˚ & 60˚	21 each
6	Drawing board 1250 x 900 mm	21
7	T square 1250 mm/ Mini drafter	21
8	Erasing shield small size	10
9	Architect's & builder's template	10
10	Chisel- steel 80 mm blade	10
11	Drawing machine (Horizontal type)	21
12	French curve- set of 12	10
13	Metallic tape 15 m	21

B. General Outfit

Sl. No.	Description	Quantity
1	Abney level	1
2	Ammonia printing box	1
3	Box sextant	2
4	Boning rod	1
5	Binocular	4
6	Chalk board/White board	1
7	Cupboard (Big)	1
8	Celon ghat tracer	21 boxes
9	Scientific calculator	21
10	Computing scales two hectares	4
11	Computing scales five hectares	4
12	Card board scales-box of 8	4
13	Wooden cross staff- box type	2
14	Wooden cross staff- open type	2
15	Drawing board imperial size	2
16	Drawing machine table	4
17	Engineer's chain	21
18	Engineer's level	6
19	Dumpy level	6
20	Cokes reversible level	2
21	Tilting level	1

22	Ferro printing frame 450 x 600 mm	1
23	Ferro printing frame 800 x 600 mm	1
24	Fire extinguisher	1
25	Gunter's chain	2
26	Hand press for numbering & lettering	5
27	Canvass bag	1
28	Height indicators	8
29	Hold all canvas for instruments	8
30	Hones in case	8
31	Instructor's chair	1
32	Instructor's table	1
33	Tracing board with lamp	2
34	Leveling staff	5
35	Metric chain- 30 m & 20 m	6 each
36	Magnifying glass	6
37	Magnet bar (for magnetizing through compass needles)	2
38	Metal tubes for keeping drawings	2
39	Pen knife	8
40	Pentagraph	2
41	Prismatic compass	3
42	Planimeter (digital)	21
43	Proportionate compass	21
44	Plane table with stand & water proof cover	6
45	Alidade	5
46	Trough compass	5
47	Plumbing fork with bob	8
48	Telescopic alidade	8
49	Indian pattern clinometers	8
50	Ranging rod 4 m	10
51	Offset rod	40
52	Optical square	5
53	Railway curve	4
54	Steel almirah (Big)	2
55	Stool	21
56	Survey plating scale with offset bits	1
57	Stencil set	21
58	Substance bar	2
59	Tapes	10
60	Metallic tape 30 m	10
61	Metallic tape 60 m	10
62	Steel tape 30 m	10
63	Steel band 30 m & 20 m	3 each

64	T Square	2
65	Surveyor's umbrella	21
66	Theodolite transit	8
67	Micrometer Theodolite transit	5
68	Traverse staff	1
69	Rules ebonite plain for drawing lines	1
70	Zinc tray	21
71	Wooden set square, T square & Compass (for chalk board)	1 each
72	Computer & software	3 sets
73	Total station (Digital Theodolite)	1

List of Consumables for the Trade of Surveyor under CTS

Sl. No.	Consumables
1	Drawing sheet-A1 & A2 size
2	Tracing paper roll
3	Drawing pencil-HB, 2H, etc.
4	Eraser
5	Adhesive tape
6	Drawing pen/ Rotring pen
7	Drawing ink
8	Color pencil
9	Ammonia paper roll
10	Ammonia liquid
11	Machine made drawing paper
12	Xerox paper A4 size

Trade Testing and Certification

Same as for other Similar Engineering Trades.

Further Learning options

After successful completion of CTS Course in the trade of **Surveyor**, the trainees have the option to continue their further studies by joining the CITS Course in the same trade, which is of two semester's duration.

List of Trade Committee Members