

SYLLABUS FOR THE TRADE OF SURVEYOR UNDER CRAFTSMEN TRAINING SCHEME

Period of Training: 2 Years

Week No.	Practical Work	Trade Theory	Workshop Calculation and Science
1.	Familiarization with Institute and importance of the trade training. Instruments and equipments used in the trade, type of work done by the trainees in the institute, nature of job done by the trainees of the Surveyor Trade.	Importance of safety and general precautions observed in the institute and in the section. Importance of the trade in development of industrial economy of the country. Related instruction, subjects to be taught - Achievement to be made. Recreational and medical facilities and other extra curricular activities of the institute (All necessary guidance to be provided to the new comers to become familiar with the working of industrial training institute, system of including store procedure.)	-----
2	Drawing different types of lines, lettering different types.	Uses of Instrument box, Board, Tee-Square, Set Square, Protractors and other instrument	

		used for survey drawing, their types and uses.	
3	Printing of letters and figures of different types.	Printing of letters and figures by different methods of inking of letters using stencil, coloring.	Addition, subtraction of decimal fraction.
4&5.	Construction of plain, comparative diagonal and venire scales.	Scales – different types, their principle method of construction and reading calculating least counts.	Multiplication and division of decimal and fraction. Conversion of decimal into vulgar fraction and vice-versa.
6 ,7 & 8	Geometrical drawing problems on lines, angles, triangles, quadrilateral etc. drawing conic section.	Geometrical construction – lines, angles, and triangles, quadrilateral's polygons, circles, ellipse, parabola & hyperbola.	Fundamental algebraic formulae for multiplication.
9 & 10	Drawing of conventional signs used in Engineering survey, cadastral survey. Topography and building drawing practice in map reading including contours and drainage.	Surveying their classifications, plane survey, geodetic survey, and different purpose of survey instruments used in survey... Nature of surveyors works importance of system, Accuracy and speed in field and office work. Common terms and definitions used in surveying	Fundamental algebraic formulae for factorization.

		conventional signs used in field book and survey maps.	
11.	Practice in unfolding and folding chain alignment of lines – measurements of distance between given points and their booking.	Linear measuring instrument used by surveyors, their description and uses. Types of chain.	Simple and simultaneous equations.
12 & 13	Practice in chaining and taking offset, use of optical square and cross staff setting out right angles booking of measurement s testing of chain, tape, optical square and cross staff.	Chain survey and principles location of points off sets and instrument used for the same, their description testing of the chains, tapes, cross staff and optical square.	Simple theory of indices, simple and simultaneous equations.
14.	Procedure in conducting chain survey reconnaissance preparation of rough sketch selection of base lines and station points fixing of stations etc.	Procedure in conducting chain survey – preliminary steps – conditions to be satisfied by survey lines.	Surds, simple and simultaneous equation of the first degree.
15.	Chain survey of small plots by triangulation, booking and plotting the same.	Field book types – method of entry of check lines – its importance.	----do----
16.	Chain survey of built up plots, locating details, booking and plotting the same.	Locations of details – types of off sets and their limit-town survey traversing with chain procedure in	Quadratic equation and its applications.

		plotting chain lines skeleton, its check and filling in details.	
17	Taking horizontal measurements on sloping ground over coming obstacles in chaining and aligning measuring distance between two points one of which is invisible or inaccessible from the other.	Measurements on undulated sloppy ground types of obstacles in chaining and method of overcoming them. Care and maintenance of chain and its accessories.	Quadratic equations and its applications.
18	Chain survey of an extensive area, locating details plotting and finishing the same in ink and colour.	Errors in chain survey and their remedies, problems in chain survey-degree of accuracy required in chain survey and it's relevant to field work. In field work – procedure in inking and colorings.	-----do-----
19	Surveying of a tank, a route or obstructed field by chain traverse, method of finding height of inaccessible objects by using chain and its accessories.	Use of magnetic needle in survey works types of compasses description constructional features and uses of surveyor's compass and prismatic compasses and their adjustment measurement of directions.	Linear graph. Use of common logarithm tables.
20	Achievement test in chain survey.	Discussion of evaluation scripts.	

21	Practice in setting up a compass and checking its accuracy – taking bearings and calculating angles.	Technical terms used in compass survey, difference between angles and bearings-magnetic and true meridians-declination and its variations, local attraction, its detection, and elimination.	---do---
22	Determining the bearings of a given lines and establishing lines of given bearings-laying out a rectilinear and polygonal plots of ground using a compass and a tape.	Method of locating details by bearings, method of survey with compass- traversing methods.	Linear graph. Uses of common logarithmic tables.
23	Determining meridian by shadow and watch methods – carrying out a closed traverse of a given field with chain & compass and plotting the same.	Method of determine true meridians and declination- methods of plotting closed compass traverse-adjustment of closing errors- limits of precision required-field book entries.	Properties of plain geometrical figures- triangles, rectangle and.
24	Conducting closed traverse of built up fields and plotting the same.	Relaying of old service errors in compass survey. Testing and adjustment of compass.	Properties of plain geometrical figures- triangles, rectangle and quadrilaterals.
25&26	Surveying an extensive built up area with compass booking plotting finish in ink and	Plane table survey advantage and disadvantages of plane table	-----do-----

	colour.	survey-equipment in place table surveying,	
		<u>PLANE TABLE</u>	
27.	Setting up of plane table leveling, centering and orientation.	Methods of plane tabling- radiation-intersection-traversing-resection.	Properties of regular polygons, circles, parallelogram, parabola and ellipse.
28.	Surveying an area with plane table of built up areas.	Two point and three point problems triangle of error and its elimination-Lehman's rule-mechanical and graphical method.	-----do-----
29&30.	Traversing with plane table of built up areas.	Errors in plane tabling and their elimination instruments used in combination with plane tabling, their construction and use.	Determination of sides, area of triangle, quadrilateral & polygons.
31.	Running and open traverse with plane table and fixing details.	Tangent clinometers (Indian pattern clinometers). Delescles clinometers telescopic alidade.	-----do-----
32.	Inking, finishing, coloring and tracing of plane table maps done in previous weeks.	-----do-----	-----do-----

33. & 34.	Practice in finding the position of the table by three point and two point problems and locate. Use of tangent clinometers-Dolesole's clinometers-Abney level for finding height of various surrounding points-use of telescopic alidade in fixing heights of surrounding points.	Preparation of field books from plane table Survey maps-care and maintenance at plane tabling accessories, procedure of plane tabling.	-----do-----
35.	Practice in setting out a level and performing temporary adjustments practice in reading staff.	Leveling-the level parts, dints-types of levels-Cook's reversible level and dumpy level-their construction land parts-types of diaphragm. Types of leveling staff, their description and use-technical terms used in leveling.	Determination of area of circles, sectors, segments and el-lapse, Simpson's Rule.
36	Demonstration of permanent adjustment of level (at this stage, the students need not practice but only watch)	Permanent adjustment of various leveling instruments, repeating the same with precautions.	-----do-----
37. to 40	Practice in differential leveling. Including reciprocal leveling and establishing bench marks, reading of inverted staff practice in booking, and reduction checking level reading in height of collimation and rise and	Methods of observation, booking and reduction of levels, forms of levels, forms of field books for leveling and methods of entry rules for checking up readings and	Surface area and volumes of rectangular parallel opoids, cylinders, prisms, pyramids and spheres. Units of force and weight. Equation of

	fall systems.	calculation. Reciprocal leveling-effect of earth's curvature and refraction in leveling. Common sources in leveling and their elimination-degree of accuracy in leveling. Introduction to contour.	motion.
41 to 42	Performing permanent adjustment to various types of leveling instruments.	Working out problems on field book, reduction, reciprocal leveling and permanent adjustments.	Magnet and magnetism. Laws of magnetic attraction and repulsion.
43.	Establishing of alignment and grade for roads and drains. Method of centering in the field books.	Classification of leveling staffs, purpose of sectioning, consideration of distance between points, precautions.	Magnetic substance-permanent magnet.
44. to 46.	Carrying out route survey longitudinal & cross section of a road project it's plotting and calculation of earth work.	Steps in plotting sections-selection of scales factors affecting selection of formation level prismoidal formulae and its application, calculation of earth work.	Magnetic field and line of force proportion, or magnetic lines of force.
47.	Practice in use of boning rods and ghat tracer for establishing grade lines for various types of work.	Construction and use of boning rods and ghat tracer.	Magnetism and its natural ore.

48 to 50.	Road project reconnaissance, preliminary and final location survey including preparation of route map to scale, taking profile and section with level plotting, marking formation levels calculation of earth work and other material for laying road includes estimation of earth work.	Types of surveys for the location of a road, points to be considered during reconnaissance, preliminary and final location surveys. Alignment of roads relative importance of length of road height of cutting road gradients sub grades and road foundations, drainage camber, curves and super elevation road surfaces, such as earth road, water bound macadam cement concrete payment.	Kinds of magnet and system of magnetization. Revision on magnetism. Trigonometrically ratios and functions of multiple angles functions of sub-multiple angle and compound angles radian measurement and relation between system of measurement o angles formula connection sides , angles and areas of triangles.
51 to52	Practice in setting up a theodolite and taking readings.	Introduction to theodolite. Temporary adjustment of theodolite-procedure in setting up-methods of measurement of horizontal angles repetition and reiteration systems.	Solution of simple triangles.
53-54.	Measurement of horizontal angles by repetition, reiteration methods-methods of entering the same in the field book. Setting out given angles.	General forms of field notes used in theodolite surveys adjustment of errors while laying a given angle by repetition. Method of setting out straight line through	Solution of simple triangles.

		obstacles procedure in prolonging straight lines establishing lines at given angles with given lines.	
55.	Practice in measuring vertical angles, setting out given vertical angles and entering in the field books.	Instrumental errors and its elimination permanent adjustments of theodolite care and maintenance of theodolite.	Problems on height and distance.
56.	Demonstration of permanent adjustment of theodolite (at this stage the student need not practice but only watch.)	Method of running traverse different methods of angles and bearings.	-----do-----
57. & 58.	Setting out a straight line over and across obstacles prolonging straight lines establishing lines at given angles with given lines setting out on ground given recti-linear figures.	Methods of plotting traverses gales traverse system checking of measurements of closed and open traverse use of traverse tables (chambers and boilean) closing errors and its adjustment.	Use of mathematical tables.
59.	Running a closed traverse over as given area, booking calculating the coordinates and plotting the traverse.	Omitted measurements and their calculation practice in working out problems.	Revision of trigonometry.
60	Running an open traverse, calculate and plot the same and fix the details with plane table measuring a base line for triangulation.	Technical terms in connection with simple triangulation base line measurements and its correction	Surface area and volumes of cylinders.

		procedure of measuring angles methods of calculating sides from triangulation date check, errors and precautions.	
61.	Practice in performing permanent adjustment of theodolite.	Methods of calculating area of a closed traverse from coordinates.	Surface area and volumes of prisms. Prisomoidal formulae.
62.	Finding height and distances of accessible and inaccessible objects with theodolite and chain and calculation the same use of box sextant.	Working out problems on finding out area of closed traverses, height and distances box sextant, its description and use. Abney's level and its description.	Surface area and volumes of pyramids, prisomoidal formulae.
63.	Revision of 53 to 62.		
64.	Contouring by spot level method including interpolations.	Topographic survey and principle instruments and accessories used in topographic survey contours and their characteristics.	Surface area and volumes of sphere
65.	Contouring by cross section method including interpolation of contours (Grid method).	Vertical intervals horizontal equivalents methods of determining contours comparison of different method and their application.	Surface area and volumes of cone.

66.	Direct contouring using level for vertical control, plane table and telescopic alidade for horizontal control.	Interpolation of contours by different methods and preparing contour maps preparation of field record for topographic surveys height book height tracing and color trace.	Revision of whole menstruation work.
67-68.	Conducting topographic survey of undulated area by theodolite triangulation and plane table resection and intersection method using Indian pattern clinometers.	Different methods of finding area of irregular-plan meter-its principle, construction, use of precaution-working out problems of areas by using planimeter enlarging and reducing of plans use of proportions, compass and pantographs and their parts.	Elementary theory of light.
69. `	Carrying out topographical survey with the help of a site of reservoir cross sectional drawing of different canals.	Irrigation : types of supply of water-rain fall attachment areas, run off over best site for construction a reservoir, water spread area factors affecting the consideration of the height of dam and capacity of reservoir	Laws of reflection, refraction mirrors and lens.
70-72.	Survey camp : In any suitable hilly place-3 week. Carrying out contour survey of a small area by	-----do-----	Properties of mirrors and lenses, aromatics combination of lenses,

	tachometer working out proposed alignment on contoured maps (project work) on various curves and calculation, marking of alignment of road on it.		description and use of optical instruments such as telescopic sextants etc,
73.	Setting out of simple curves by chain and taps with different methods setting out of curves by deflection methods with and without obstacles.	Working problems on simple curves by chain and tape offset method and successive by section of arch.	Properties of mirrors and lenses, aromatics combination of lenses, description and use of optical instruments such as telescope sextants etc.
74.	Setting out of compound curves, transition curves with theodolite.	Compound curves working problems on compound curves and types of transition curves.	-----do-----
75.	Setting out of vertical curves.	Different types of vertical curves and its working problems.	-----do-----
76.	Reducing and enlarging the plan by pantograph and area by planimeter.	Parts of pantographs and planimeter with their uses.	As week no. 75.
77. to 78.	Measurements off set of obstructed lines, measurement of field both in the triangle and off set system base line system, fixing, missing, land demarcation.	Methods of taking off sets on obstructed lines and offset lines, field measurement in triangle and offset system, method of fixing survey maps on boundaries.	Some common terms from astronomy essential for surveyor.

79 to 81	To find the true north by observing stars and sun (current) with the help of Nautical Almanac.	Astronomical surveying introduction. Definition of spherical triangle astronomical triangle. Observation of sun and stars. Calculation for Azimuth and time. Coordinate system and its conversion of mean Determination of the meridian and Azimuth.	Load, elongation, stress and strain, hook's law.
82.	Cadastral survey: Testing plotting of (1: 4000) village map and location errors in measurements.	Procedure in typing field numbers, printing names and inter-setting topographical details in maps.	Modulus of elasticity elastic limit and yield point.
83.	Typing field numbers, printing names and inserting topographical detail in maps-comparison of field and village boundaries and side measurements.	Comparison of field and village boundaries and side measurements procedures to prepare of transfer paper and transfer drawings-lithography-incography - Vandyke process.	Ultimate stress and breaking stress. Problems on the above.
84.	Tracing and inking taluka. District and state maps-tracing of maps-observation of substance bar and its calculation,	Convergences of meridian-substance bar and its use.	Bending moment, shear force their definitions and calculations thereof.

85. to 86	Azimuth observation and computation- computation of latitudes and azimuths, solutions of spherical triangles.	Computation of latitudes and azimuth, solution of spherical triangles-computation of spherical triangles, values of village trijunctions, maps projection methods of reducing values of points from one origin to other.	Bending moment, shear force their definitions and calculations thereof.
87 to 90.	(1) elementary DOS (disc operating system) (2) Knowledge of editor. (3) How to install Auto-CAD. (4) How to load Auto-CAD. (5) Elementary command of Auto-CAD. (6) Knowledge of window software. (7) Free hand working practice on Auto- CAD.	(1) What is Computer? General terms used in computer. (2) Elementary DOS commands. (3) Word processor Commands and their uses. (4) Window command and their uses. (5) Auto-CAD Commands and use of different menus of Auto- CAD.	-----do-----
91.	Types of bonds plan Section and elevation of 115 mm and 340 mm thick wall detailed drawing of parts of a building such a brick arch stone masonry. Drawing of King and Queen posts, trusses, simple doors and simple RCC structural parts.	Types of bonds, English bond, Flemish bonds, Tee joints, wall junctions, stone masonry, random rubble coarsed and Ashlars stone masonry. Type of Arch, King post and Queen post, doors and RCC simple beams and lintels.	-----do-----

92 to 93	Drawing plan elevation and section of simple building simple building by measurements, plan section and elevation.	Glossary terms of building construction and building materials.	Estimation of simple buildings.
94-95	Setting out a simple building and simple culvert on the ground from given drawing.	Glossary terms of roads irrigation.	-----do-----
96-98.	The trainees should visit some project with their trainer together the correct ideas about survey project and its importance in the society. The trainee should also evaluate the approximate cost for a project work.		
99-100	Estimating and costing for a simple building in details and specification for different works.		
101.	Tracing, inking and printing.		
102-103.	Revision	Revision	Revision
104.	Final trade test.		

Sr. No.	Name of the tools & equipment as per the syllabus	No. of required for Instructor & Trainees for one Unit as per DGET Norms.
	TRAINEE TOOL KIT	
7	BOX DRAWING INSTRUMENTS	17
9	CALCULATORS SCIENTIFIC	17
13	SCALE SET CARD BOARD IN CASE (MATRIC) A TO H.	16
16	DRAWING BOARD (SIZE 1000X700 MM) I.S.I. -B.I.	16
18	DRAWING TABLE.	16
23	ERASING SHIELD SMALL SIZE	16
44	KNIFE (PEN KNIFE) DOUBLE BLADED ELECTRICIAN	16
45	PROTECTOR, FULL CIRCLE (PLASTIC 150MM DIA)	16
46	PROPORTIONATE COMPASS	16
61	SURVEY PLOTTING SCALES WITH OFFSET BITS (8 IN ONE SET)	16
64	SET SQUARE (60)	17
68	SQUARE T 1250 MM.	17
73	RULES EBONITE PLAIN FOR DRAWING LINE	16
	GENERAL SHOP OUTFIT	
1	ABENYLEVEL (225 -MM, READING VERTICAL ANGLE) WITH SLOW MOTION N SCREW (ABENY LEVEL)	1
2	AMMONIA BOX 120CM*35*35CMS.	1
3	BOX SECTION	2
4	BONING ROD	1
5	BINOCULAR	3

6	BLACK BOARD WITH EASEL	1
8	ALMIRH STEEL	8
10	CHISEL STEEL 80MM.BLADE	4
11	COMPUTING SCALES TWO HECTRES	4
12	COMPUTING SCALES FIVE HECTRES	4
14	CELONGHAT TRACER	2
15A	CROSS STAFF (WOODEN BOX TYPE)	2
17	UNIVERSAL DRAFTING M/C. 1500/1000MM COMPLETE WITH ACCESSORIES	4
19B	DUMPY LEVEL (SIZE 300MM,INTERNAL FOCUSSING MADE OF GUNING DRUM, READING 1:5000	2
20A	ENGINEERS LEVEL NG DRUM, READING 1:5000	5
21C	COOKE'S REVERSIBLE LEVEL SIZE 325MM,INTERNAL FOCUSSING DRUM, READING 1:5000	1
22D	TILTING LEVEL, SIZE 225MM,INTERNAL FOCUSSING WITH TITLING DRUM, READING 1: 5000	1
24	FRENCH CURVE SET OF 12(CELLULOID)	4
25	PRINT. FRAME 45CM.*60CM.	1
26	PRINT. FRAME 80CM.*60CM.	1
27	FIRE EXTINGUISHER (FOR 4UNITS)	2
28	GUNTERS CHAIN	5
29	GROPHO'S PEN (B) FOR PRINTING	2
30	GRAPHO'S PEN (A) FOR LINING	2
31	HAND PRESS FOR NUMBERING & LETTERING	1
32	HAVERSACKS	8
33	HEIGHT INDICATORS (SURVEY OF INDIA PATTERN)	8
34	CANVAS FOR INSTRUMENTS (S.O.I)	8

35	HONESINCASE	1
36	STEEL CHAIR FOR INSTRUCTOR	1
37	STEEL TABLE FOR INSTRUCTOR	1
38	TRACING TABLE WITH PLATE GLA. 1250*900CMS	4
39	LEVELING STAFF 4 MTR READING TO 5MM, TELESCOPIC TYPE	10
40	TAPER GUAGE M.T.NO.1, 2,3,4&5 METRIC CHAIN	5
41	MAGNIFYING GLASS (5CM DIA)	2
42	BAR MAGNET	1
43	METAL TUBE FOR KEEPING DRAWING DIA 100MM & 1MTR. LONG	8
47	PLANIMETER (SIZE 710 MM)	2
48	STOOL FOR DRAWING TABLES	16
49	PENTAGRAPH BRASS COMPL. WITH ACCESS.60CM.	2
50	PRISMATIC COMPASS (SIZE 150MM DIA)	5
51	PLANE TABLE WITH STAND AND WATER PROOF COVER (76X60 CM)	4
52	ALIDADE	4
53	TROUGH COMPASS (WOODEN BEAM)	8
54	RANGING RODS 4 M, 25MM. CONDUITE PIPE	32
55	OFFSET ROD 3M.	4
56	OPTICAL SQUARE (TO BE PROCURED ACCORDING TO AVAILABILITY)	4
57	RAILWAY CURVES	1
60	SCALE DIAGONAL, ELECTROPLATED 1 M LENGTH	1
62	STENCIL SET COMPLETE BOX	2
63	SUBSTANCE BAR	2

65	METALIC TAPE30 MTR.	10
66	METALIC TAPE 20 MTR.	10
67	STEEL TAPES 30 MTR.	2
69	SURVEYOR'S UMBRELLA	8
70	THEODOLITE, TRANSIT (SIZE 175 MM READING 500MM)	4
71	MICROMETER THEODOLITE, TRANSIT	1
72	TRAVERSE STAFF (SURVEY OF INDIA)	1
74	ZINC TRAY (FOR WASHING PRINT)	1
75	WOODEN GEOMETRY BOX FOR BLACKBOARD WORK	1