

CURRICULUM

FOR THE TRADE OF

SURVEYOR

UNDER

APPRENTICESHIP TRAINING SCHEME



सत्यमेव जयते
Government of India

**GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT & ENTREPRENURESHIP
DIRECTORATE GENERAL OF TRAINING**

CONTENTS

Sl. No.	Topics	Page No.
1.	Acknowledgement	03
2.	Background 2.1 Apprenticeship Training under Apprentice Act 1961 2.2 Changes in Industrial Scenario 2.3 Reformation	04 – 05
3.	Rationale	06
4.	Job roles: reference NCO	07
5.	General Information	08
6.	Course structure	09 – 10
7.	Syllabus 7.1 Basic Training 7.1.1 Detail syllabus of Core Skill A. Block-I (Engg. drawing & W/ Cal. & Sc.) B. Block-II (Engg. drawing & W/ Cal. & Sc.) 7.1.2 Detail syllabus of Professional Skill & Professional Knowledge A. Block – I B. Block – II 7.1.3 Employability Skill 7.1.3.1 Syllabus of Employability skill A. Block – I B. Block – II 7.2 Practical Training (On-Job Training) 7.2.1 Broad Skill Component to be covered during on-job training. A. Block – I B. Block – II	11 – 24
8.	Assessment Standard 8.1 Assessment Guideline 8.2 Final assessment-All India trade Test (Summative assessment)	25 – 27
9.	Further Learning Pathways	28
10.	Annexure-I – Tools & Equipment for Basic Training	29 - 32
11.	Annexure-II – Infrastructure for On-Job Training	33
12.	Annexure-III - Guidelines for Instructors & Paper setter	34

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2. Central Staff Training & Research Institute, Kolkata

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2. BACKGROUND

2.1 Apprenticeship Training Scheme under Apprentice Act 1961

The Apprentices Act, 1961 was enacted with the objective of regulating the programme of training of apprentices in the industry by utilizing the facilities available therein for imparting on-the-job training. The Act makes it obligatory for employers in specified industries to engage apprentices in designated trades to impart Apprenticeship Training on the job in industry to school leavers and person having National Trade Certificate (ITI pass-outs) issued by National Council for Vocational Training (NCVT) to develop skilled manpower for the industry. There are four categories of apprentices namely; **trade apprentice, graduate, technician and technician (vocational) apprentices.**

Qualifications and period of apprenticeship training of **trade apprentices** vary from trade to trade. The apprenticeship training for trade apprentices consists of basic training followed by practical training. At the end of the training, the apprentices are required to appear in a trade test conducted by NCVT and those successful in the trade tests are awarded the National Apprenticeship Certificate.

The period of apprenticeship training for graduate (engineers), technician (diploma holders and technician (vocational) apprentices is one year. Certificates are awarded on completion of training by the Department of Education, Ministry of Human Resource Development.

2.2 Changes in Industrial Scenario

Recently we have seen huge changes in the Indian industry. The Indian Industry registered an impressive growth during the last decade and half. The number of industries in India have increased manifold in the last fifteen years especially in services and manufacturing sectors. It has been realized that India would become a prosperous and a modern state by raising skill levels, including by engaging a larger proportion of apprentices, will be critical to success; as will stronger collaboration between industry and the trainees to ensure the supply of skilled workforce and drive development through employment. Various initiatives to build up an adequate infrastructure for rapid industrialization and improve the industrial scenario in India have been taken.

2.3 Reformation

The Apprentices Act, 1961 has been amended and brought into effect from 22nd December, 2014 to make it more responsive to industry and youth. Key amendments are as given below:

- Prescription of number of apprentices to be engaged at establishment level instead of trade-wise.

- Establishment can also engage apprentices in optional trades which are not designated, with the discretion of entry level qualification and syllabus.
- Scope has been extended also to non-engineering occupations.
- Establishments have been permitted to outsource basic training in an institute of their choice.
- The burden of compliance on industry has been reduced significantly.

3. RATIONALE

(Need for Apprenticeship in SURVEYOR trade)

A Unique Training Process

The Apprenticeship system of training is unique in that it is the only formal, structured, and nationally recognized education and training program available that combines the two most common forms of career and occupational learning: classroom instruction with on-the-job training.

Apprentices not only learn occupational skills in the classroom, their learning is expanded to include hands-on, paid, on-the-job training. Students learn and practice all phases of the trade/occupation in real-world applications.

Apprenticeship is a training strategy that, leads to a certificate of completion and nationally recognized skilled worker status. These credentials have explicit meaning, recognition, and respect in the eyes of Central and State Governments and relevant Industries.

The Apprenticeship Programs train men and women to craftsman status. By participating in a program, apprenticeship training shape applicants with character, aptitude, motivation and good personality traits into competent Craftsmen and Craftswomen who have in-demand skill sets, comprehensive knowledge, positive attitudes and superior abilities.

4. JOB ROLES: REFERENCE NCO

Brief description of Job roles:

2148.20 Surveyor, Topographical surveys land to determine out line, contours and relative position of control points (land marks) on tract of land, coast, harbour, etc. for preparing topographical and other maps and records. Establishes control points and pillars to do instrumentation work on ground to prepare maps. Provides identification marks on ground for photographs taken in aerial survey. Fixes position of control points on ground in relation to some permanent position and with reference to celestial bodies using astrolabes (for lat. And long), transit telescopes (for time and longitudes), field magnet instruments (for magnetic forces and elements), theodolites and precise levels, tellurometers (electronic distance measuring instruments) barometers for atmospheric pressure, etc. Adjusts and sets theodolites, compasses, plane tables, levelling and other instruments for surveyor, observes and records measurements and angles from three determined points (triangulation), locations to scale on proper sketch. Corrects margin of error due to worn-out tapes which become incorrect, and readings on instruments which are affected by light, sound, heat, tension, environments and gravitational changes due to varying reserves underneath ground. May be known as Superintendent Surveyor Officer Surveyor or Surveyor according to degree of authority.

3112.30 Plain Tabler; Ground Surveyor prepares topographical and cadastral (ground) maps based on control points fixed by Surveyor, Topographical by plane tabling method (field operations involving use of plane-table, clinometers, magnetic compass, sight rule, etc.). Plots points in drawing conforming to points on ground using plane table and sight rule, in hills and planes with accuracy. Registers colour and light traces in drawings, project maps, flood surveys, cadastral surveys, etc. Visits area to be surveyed and carries out plotting, sketching, contouring, drawing etc. of territory on basis of control data and other relevant available material. Collects, records and interprets air photographs which lack in such details as small bridges, streams, rivulets, tracks or pillars on account of no visibility from photographic distances.

3112.40 Topographical Auxiliary participates in field survey by traversing (computing direct distances) leveling, rectangulation (determining a point from 4 ends) recording angular and liner measurements and comparing readings with 100 ft. and 66 ft. chains, (Gunter chains) theodolites levels, etc. Carries out rectangulation for permanently identifying ground marks. Computes measurements using log tables, traverse tables. Makes astronomical observation such as sun azimuth, arc of heaven to know about magnetic meridian. Determines elevation and slope using leveling instruments such as dumpy level, eye level, tilting level, etc. Uses vernier type theodolites for large-scale drawings. Completes all circuits and applies checks to ensure accuracy. May identify or pick points on aerial photographs. May be known as Traverser or Leveler, Theodolite Surveyor according to degree of responsibility.

Reference NCO: 2004 / 2148.20, 3112.30, 3112.40

5. GENERAL INFORMATION

1. **Name of the Trade** : **SURVEYOR**

2. **N.C.O. Code No.** : **2004 / 2148.20, 3112.30, 3112.40**

3. **Duration of Apprenticeship Training (Basic Training + Practical Training):** 2 years

3.1 **For Fresher's :- Duration of Basic Training: -**

a) Block –I : 3 months

b) Block – II : 3 months

Total duration of Basic Training: 6 months

Duration of Practical Training (On -job Training): -

a) Block–I: 9 months

b) Block–II : 9 months

Total duration of Practical Training: 18 months

3.2 **For ITI Passed :- Duration of Basic Training: - NIL**

Duration of Practical Training (On -job Training): 12 months

4. **Entry Qualification** : Passed 10th Class under 10+2 system

5. **Selection of Apprentices:** The apprentices will be selected as per Apprentices Act amended time to time.

8. **Rebate to ITI Passed out Trainees : One year** for the trade of **SURVEYOR**

Note: Industry may impart training as per above time schedule for different block, however this is not fixed. The industry may adjust the duration of training considering the fact that all the components under the syllabus must be covered. However the flexibility should be given keeping in view that no safety aspects is compromised.

6. COURSE STRUCTURE

Training duration details: -

Time (in months)	1-3	4-12	13-15	16-24
Basic Training	Block– I	-----	Block – II	-----
Practical Training (On - job training)	----	Block – I	-----	Block – II

Components of Training ↓	Duration of Training in Months →																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Basic Training Block - I	█	█	█																					
Practical Training Block - I				█	█	█	█	█	█	█	█													
Basic Training Block - II													█	█	█									
Practical Training Block - II																█	█	█	█	█	█	█	█	█

7. SYLLABUS
7.1 BASIC TRAINING
(BLOCK – I & II)
DURATION: 06 MONTHS

GENERAL INFORMATION

- 1) **Name of the Trade** : **SURVEYOR**
- 2) **Hours of Instruction** : 1000 Hrs. (500 hrs. in each block)
- 3) **Batch size** : 20
- 4) **Power Norms** : 3 KW for Workshop
- 5) **Space Norms** : 64 Sq.m.
- 6) **Examination** : The internal assessment will be held on completion of each Block.
- 7) **Instructor Qualification** :

i) Degree/Diploma in **CIVIL Engg.** from recognized university/Board with one/two year post qualification experience respectively in the relevant field.

OR

ii) NTC/NAC in the trade of **SURVEYOR** with three year post qualification experience in the relevant field.

Preference will be given to a candidate with Craft Instructor Certificate (CIC)

- 8) **Tools, Equipments & Machinery required** : - As per Annexure – I

7.1.1 DETAIL SYLLABUS OF CORE SKILL

A. Block– I Basic Training

Topic No.	b) Workshop Calculation	Duration (in hours)	Workshop Science	Duration (in hours)
1	Fraction:- Fraction, Decimal fraction, L.C.M., H.C.M., Multiplication and division of fraction and decimal, Conversion of fraction to decimal and vice versa.	30	Mass, Weight and Density:- Mss, Unit of mass, Weight, Difference between mass and weight, Density, Unit of density, Specific gravity of metals.	20
2	Square Root:- Square and square root, Method of finding out square roots.		Work, Power and Energy:- Work, units of work, Power, Unit of power, Horse power of engines, Mechanical efficiency, Energy, Use of energy, Potential and Kinetic energy, Example of potential and kinetic energy.	
3	Unit:- System of units-FPS, MKS, CGS, SI unit - Unit of length, mass and time. Conversion of units.		Speed and Velocity:- Rest and motion, Speed, Velocity, Acceleration, Retardation, Equation, of motion, Simple related problems.	
4	Ratio And Proportion:- Simple calculation on related problems			
5	Percentage:- Introduction, Simple calculation, changing percentage to decimal and fraction and vice versa.			

B. Block- II

Basic Training

Topic No.	b) Workshop Science & Calculation	Duration (in hours)	Workshop Science	Duration (in hours)
1	Algebra:- Addition, Subtraction, Multiplication, Division, Algebraic formula, Linear Equations (with two variables)	30	Heat and Temperature:- Definition of heat and temperature and their units, difference between heat and temperature. Scale of temperature, boiling point, melting point, relation between different scale of temperature.	20
2	Mensuration:- Area and perimeter of square, rectangle, parallelogram, triangle, circle, semicircle Volume of solid - cube, cuboid, cylinder, and sphere. Surface area of solid - cube, cuboid, cylinder, and sphere.		Basic Electricity:- Introduction, Use of Electricity, How electricity is produced, Types of currents, AC, DC, their comparison, Voltage, Resistance, their units, Conductor, Insulators, Types of connection - series, parallel, electric power, energy, unit of electrical energy.	
3	Trigonometry:- Trigonometrical ratio, measurement of angles, Height & distance.		Levers and Simple Machines:- Levers and its types, Simple machines, Efforts and load, Mechanical advantage, Velocity ratio, Efficiency of machine, Relationship between efficiency, Velocity ratio and Mechanical advantage.	

7.1.2 DETAIL SYLLABUS OF PROFESSIONAL SKILLS & PROFESSIONAL KNOWLEDGE

A. Block –I Basic Training

Week No.	Professional Skill (275 hrs.)	Professional Knowledge (120 hrs.)
1	familiarization with Institute, importance of trade training, instrument & equipments used, nature of job done by Surveyor. Drawing different types of lines, printing letters & figures. Construction of plane scales.	Importance of safety, general safety, precautions-introduction to trade. Use of different instrument & equipments used by surveyor, their types and uses. Lettering using stencils. Scales-different types.
2	Conventional signs & symbols used in survey (Topography and building drawing). Map reading practice, contour, drainage.	Classification of survey. Accuracy and speed in field & office work. Common terms used and definitions. Conventional signs and symbols.
3-4	Chain survey-practice in unfolding & folding chain, errors & adjustment of chains, alignment, chaining lines, measurement of distances and booking. Practice in chaining, taking offset, uses of optical square and cross staff. Setting out right angles and booking. testing a chain, tape, optical square & cross staff.	Linear measuring instrument, their description & uses. Types of chain. Principles of chain surveying. Instrument used & and their description.
5	Procedure in conducting chain survey. Chain survey of an area plots by triangulation, locating details, booking and plotting.	Field book-types, methods of entry of check lines & its importance. Types of offsets and their limit, procedure in plotting.
6	Taking horizontal measurement on sloping ground, overcoming obstacles, measuring distance between two points invisible from each other. Inking and coloring the plotted map. Surveying of tank, a rout or obstructed field by chain traverse, method of finding height of inaccessible objects.	Care & maintenance of chain & accessories. Types of obstacles in chaining and methods of overcoming them. Errors in chain survey & their remedies, problems in chain survey, degree of accuracy required, procedure of inking & coloring.
7	Showing plot no (dag no.) of cultivation land or houses from the cadastral map.	introduction of C.S. & R.S. cadastral map
8-9	practice in setting up compass & checking its accuracy taking bearings & calculating angles. Determining the bearings of a given line & establishing lines of given bearings, laying out rectilinear & polygonal plots of ground using compass & tape. Conducting closed traverse of built up fields and plotting the same.	Technical terms used in compass survey, difference between angles& bearings, magnetic & true meridians, declination and its variations, local attraction, its detection & elimination. Locating details by bearing, 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.

10	practice in setting up a level & performing temporary adjustment - practice in reading staff, practice of permanent adjustment of Dumpy & Auto level,	Leveling parts, types- Dumpy level & Auto level, types of staff, technical terms used in leveling, permanent adjustment of leveling instruments
11	Practicing simple leveling, differential leveling, reciprocal leveling, fly leveling, longitudinal sectioning, cross sectioning and check leveling. Reduction of levels, Preparation of sections & working profiles. Setting out gradients.	Methods of observation, booking reduction of levels, types of field book, working out problems on reduction, various methods of leveling namely simple leveling, differential leveling, reciprocal leveling, fly leveling, check leveling, longitudinal sectioning, cross sectioning etc. plotting of sections & working profiles, establishment of gradient, effects of earth's curvature & refraction in leveling, common errors & their elimination, degree of accuracy
12-13	Setting up plane table, leveling, centering & orientation. Surveying an area with plane table by radiation & Intersection methods. Traversing with plane table of built up areas, running a& open traverse with plane table & fixing details. Inking, finishing, coloring & tracing of plane table maps. Practice in finding the position of table resection methods.	Plane table survey - merits & demerits, equipments use, methods of plane tabling,. Errors in plane tabling & their elimination - others instruments used in combination with plane table, their construction & uses. Tangent clinometers & telescopic alidade. Survey maps - care & maintenance of plane table accessories, procedure of plane tabling
Internal Assessment 03 days		

B. Block –II

Basic Training

Week No.	Professional Skill (275 hrs.)	Professional Knowledge (120 hrs.)
1	Locating contour lines, direct & indirect methods, interpolation of contours, contour gradient, preparation of sections from contour map - computation of volume by prismatic & trapezoidal formula. Establishment of gradient using Abney level, Ceylon ghat tracer and by using boning rods.	Contouring - Contour interval - section of contour interval - characteristics of contours - uses of contours - contouring by various methods - interpolation of contours by various methods – drawing of contours - computation of volume prismatic formula & trapezoidal formula. Construction & Use of boning rods. Establishment of gradient using Ceylon ghat tracer, Abney level
2	Practice to set up the theodolite & to read the verniers, booking performing of permanent adjustment of theodolite. Measurements of horizontal angles by various method, setting out angles, measurement of vertical angles, deflection angles & prolongation of lines by various methods.	Introduction of Theodolite, types of theodolite, parts of theodolite, terms used in theodolite surveying, temporary adjustment of theodolite, reading of verniers, booking readings, permanent adjustment of theodolite, Measurement of horizontal angles by repetition methods, reiteration methods, setting out angles by repetition methods, measurement of vertical angles, measurement of deflection angles, measurement of bearings, prolongation of lines & locating the intersection point of directions.
3-4	Traversing (closed & open) using theodolite and steel tape, measurement of horizontal angles, bearings of lines- computation of coordinates from the bearing, angle and length. Preparation of Gale's traverse table, plotting of traverse by coordinates, computation of area using coordinates. omitted measurements.	Traversing using theodolite (closed & open), traverse computation, determination of consecutive coordinates, independent coordinates, check of traverse, balancing of traverse closing errors, preparation of Gale's table, computation of area using coordinates, omitted measurement
5	Simple curve, computation of elements of simple curve, set out of simple curves by linear and angular methods.	Curves- purpose- types of curves- simple-compound- reverse- transition-elements of simple curve - computation of simple curve, various method for setting out simple curve.

6	Road project reconnaissance., preliminary and final location survey including preparation of route map, traversing, leveling, preparation of sections, computation of earth work and other materials for laying the road.	Types of surveys for the location of a road, points to be considered during reconnaissance, preliminary and final location survey. Classification of roads and termed used in road engineering. Alignments of roads - relative importance of length of road, height of embankment and depth of cutting-road gradients- foundation, drainage, camber, super elevation, road surfaces such as earth road, water bound macadam and concrete pavements.
7-8	Determination of horizontal and vertical distances by tacheometric method. Enlargement and redacting of plans and proportionate compass.	Introduction of tacheometry- advantages and disadvantages- constants of tacheometer and its determination- various method of tacheometry- determination of horizontal and vertical distances by various methods. Technical terms in connection with simple triangulation-base line measurements & its correction.
9	Setting up of digital theodolite, measurements of horizontal and vertical angles-traversing using digital theodolite.	Modern survey instrument-Digital theodolite, study of parts, adjustments, measurement of angles by various methods, traversing using digital theodolite (closed& open)
10-11	. Temporary adjustment of Total Station. Measurements angles, measurements of coordinates, determination of height, determination of an area, traversing (Closed & open) using total station, determination of the coordinates of the points using GPS.	Familiarization of modern survey equipments, study of the parts of total station-temporary adjustment, measurements of angle and coordinates – setting out of angles and lines. Traverse survey of closed and open field, determination of enclosed areas using total station. introduction to GPS and uses, adjustment , determination of coordinates
12-13	Working with Cad- use of commands such as DRAW MODIFY etc. Adding dimension and text. Development of 2D drawing. Preparation of drawings of simple building.	Introduction to Computer Aided Drafting (CAD)- working with CAD, setting limits, drawing lines, using grid and snap, saving work, drawing simple shapes, exit and quit commands. Editing, adding dimension and text. Editing drawing using various modify commands. Developing simple building with CAD.
Internal Assessment 03 days		

7.1.3 EMPLOYABILITY SKILLS

GENERAL INFORMATION

- 1) **Name of the subject** : **EMPLOYABILITY SKILLS**
- 2) **Applicability** : **ATS- Mandatory for fresher only**
- 3) **Hours of Instruction** : **110 Hrs. (55 hrs. in each block)**
- 4) **Examination** : **The examination will be held at the end of two years Training by NCVT.**
- 5) **Instructor Qualification** :

i) MBA/BBA with two years experience or graduate in sociology/social welfare/Economics with two years experience and trained in Employability skill from DGET Institute.

And

Must have studied in English/Communication Skill and Basic Computer at 12th /diploma level

OR

ii) Existing Social Study Instructor duly trained in Employability Skill from DGET Institute.

7.1.3.1 SYLLABUS OF EMPLOYABILITY SKILLS

A. Block – I Basic Training

Topic No.	Topic	Duration (in hours)
	English Literacy	15
1	Pronunciation : Accentuation (mode of pronunciation) on simple words, Diction (use of word and speech)	
2	Functional Grammar Transformation of sentences, Voice change, Change of tense, Spellings.	
3	Reading Reading and understanding simple sentences about self, work and environment	
4	Writing Construction of simple sentences Writing simple English	
5	Speaking / Spoken English Speaking with preparation on self, on family, on friends/ classmates, on know, picture reading gain confidence through role-playing and discussions on current happening job description, asking about someone's job habitual actions. Cardinal (fundamental) numbers ordinal numbers. Taking messages, passing messages on and filling in message forms Greeting and introductions office hospitality, Resumes or curriculum vita essential parts, letters of application reference to previous communication.	
	I.T. Literacy	15
1	Basics of Computer Introduction, Computer and its applications, Hardware and peripherals, Switching on-Starting and shutting down of computer.	
2	Computer Operating System Basics of Operating System, WINDOWS, The user interface of Windows OS, Create, Copy, Move and delete Files and Folders, Use of External memory like pen drive, CD, DVD etc, Use of Common applications.	
3	Word processing and Worksheet Basic operating of Word Processing, Creating, opening and closing Documents, use of shortcuts, Creating and Editing of Text, Formatting the Text, Insertion & creation of Tables. Printing document. Basics of Excel worksheet, understanding basic commands, creating simple worksheets, understanding sample worksheets, use of simple formulas and functions, Printing of simple excel sheets	
4	Computer Networking and INTERNET Basic of computer Networks (using real life examples), Definitions of Local Area Network (LAN), Wide Area Network (WAN), Internet, Concept of Internet (Network of Networks), Meaning of World Wide Web (WWW), Web Browser, Web Site, Web page and Search Engines. Accessing the Internet using Web Browser, Downloading and Printing Web Pages, Opening an email account and use of email. Social media sites	

	and its implication. Information Security and antivirus tools, Do's and Don'ts in Information Security, Awareness of IT - ACT, types of cyber crimes.	
	Communication Skill	25
1	Introduction to Communication Skills Communication and its importance Principles of Effective communication Types of communication - verbal, non verbal, written, email, talking on phone. Non verbal communication -characteristics, components-Para-language Body - language Barriers to communication and dealing with barriers. Handling nervousness/ discomfort. Case study/Exercise	
2	Listening Skills Listening-hearing and listening, effective listening, barriers to effective listening guidelines for effective listening. Triple- A Listening - Attitude, Attention & Adjustment. Active Listening Skills.	
3	Motivational Training Characteristics Essential to Achieving Success The Power of Positive Attitude Self awareness Importance of Commitment Ethics and Values Ways to Motivate Oneself Personal Goal setting and Employability Planning. Case study/Exercise	
4	Facing Interviews Manners, Etiquettes, Dress code for an interview Do's & Don'ts for an interview	
5	Behavioral Skills Organizational Behavior Problem Solving Confidence Building Attitude Decision making Case study/Exercise	

B. Block– II
Basic Training

Topic No.	Topic	Duration (in hours)
	Entrepreneurship skill	10
1	Concept of Entrepreneurship Entrepreneurship- Entrepreneurship - Enterprises:-Conceptual issue Entrepreneurship vs. Management, Entrepreneurial motivation. Performance & Record, Role & Function of entrepreneurs in relation to the enterprise & relation to the economy, Source of business ideas, Entrepreneurial opportunities, The process of setting up a business.	
2	Project Preparation & Marketing analysis Qualities of a good Entrepreneur, SWOT and Risk Analysis. Concept & application of Product Life Cycle (PLC), Sales & distribution Management. Different Between Small Scale & Large Scale Business, Market Survey, Method of marketing, Publicity and advertisement, Marketing Mix.	
3	Institutions Support Preparation of Project. Role of Various Schemes and Institutes for self-employment i.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for financing/ non financing support agencies to familiarizes with the Policies /Programmes & procedure & the available scheme.	
4	Investment Procurement Project formation, Feasibility, Legal formalities i.e., Shop Act, Estimation & Costing, Investment procedure - Loan procurement - Banking Processes.	
	Productivity	10
1	Productivity Definition, Necessity, Meaning of GDP.	
2	Affecting Factors Skills, Working Aids, Automation, Environment, Motivation How improves or slows down.	
3	Comparison with developed countries Comparative productivity in developed countries (viz. Germany, Japan and Australia) in selected industries e.g. Manufacturing, Steel, Mining, Construction etc. Living standards of those countries, wages.	
4	Personal Finance Management Banking processes, Handling ATM, KYC registration, safe cash handling, Personal risk and Insurance.	
	Occupational Safety, Health & Environment Education	10
1	Safety & Health Introduction to Occupational Safety and Health importance of safety and health at workplace.	

2	Occupational Hazards Basic Hazards, Chemical Hazards, Vibro-acoustic Hazards, Mechanical Hazards, Electrical Hazards, Thermal Hazards. Occupational health, Occupational hygienic, Occupational Diseases/ Disorders & its prevention.	
3	Accident & safety Basic principles for protective equipment. Accident Prevention techniques - control of accidents and safety measures.	
4	First Aid Care of injured & Sick at the workplaces, First-Aid & Transportation of sick person	
5	Basic Provisions Idea of basic provision legislation of India. of safety, health, welfare under legislation of India.	
6	Ecosystem Introduction to Environment. Relationship between Society and Environment, Ecosystem and Factors causing imbalance.	
7	Pollution Pollution and pollutants including liquid, gaseous, solid and hazardous waste.	
8	Energy Conservation Conservation of Energy, re-use and recycle.	
9	Global warming Global warming, climate change and Ozone layer depletion.	
10	Ground Water Hydrological cycle, ground and surface water, Conservation and Harvesting of water	
11	Environment Right attitude towards environment, Maintenance of in -house environment	
	Labour Welfare Legislation	5
1	Welfare Acts Benefits guaranteed under various acts- Factories Act, Apprenticeship Act, Employees State Insurance Act (ESI), Payment Wages Act, Employees Provident Fund Act, The Workmen's compensation Act.	
	Quality Tools	5
1	Quality Consciousness : Meaning of quality, Quality Characteristic	
2	Quality Circles : Definition, Advantage of small group activity, objectives of quality Circle, Roles and function of Quality Circles in Organization, Operation of Quality circle. Approaches to starting Quality Circles, Steps for continuation Quality Circles.	
3	Quality Management System : Idea of ISO 9000 and BIS systems and its importance in maintaining qualities.	
4	House Keeping : Purpose of Housekeeping, Practice of good Housekeeping.	
5	Quality Tools Basic quality tools with a few examples	

7.2 PRACTICAL TRAINING (ON-JOB TRAINING)
(BLOCK – I & II)
DURATION: 18 MONTHS (9 months in each block)

GENERAL INFORMATION

1) **Name of the Trade** : **SURVEYOR**

2) **Duration of On-Job Training** : a) Block–I: 9 months

b) Block–II : 9 months

Total duration of Practical Training: 18 months

3) **Batch size** : a) Selection of Apprentices as per apprenticeship guidelines.

b) Max. 20 trainees per group

2) **Examination** : i) The internal assessment will be held on completion of each block

ii) NCVT exam will be conducted at the end of 2nd year.

3) **Instructor Qualification** :

i) Degree/Diploma in **CIVIL Engg.** from recognized university/Board
With one/two year post qualification experience in the relevant field.

OR

ii) NTC/NAC in the trade of **SURVEYOR** with three year post qualification experience in the relevant field.

Preference will be given to a candidate with Craft Instructor Certificate (CIC)

4) **Tools, Equipments & Machinery required** : - As per Annexure – II

7.2.1 BROAD SKILL COMPONENT TO BE COVERED DURING ON-JOB TRAINING

A. BLOCK – I

1. Chain Survey
2. Compass Survey
3. Leveling
4. Plane Table Survey

B. BLOCK – II

1. Contouring
2. Surveying with Theodolite
3. Traversing using Theodolite.
4. Road Survey
5. Determination of distances by Tachometric method
6. Determination of angles – traversing using digital Theodolite
7. Survey with Total Station
8. Preparation of plan drawing with CAD

8. ASSESSMENT STANDARD

8.1 Assessment Guideline:

Appropriate arrangements should be made to ensure that there will be no artificial barriers to assessment. The nature of special needs should be taken into account while undertaking assessment. Due consideration to be given while assessing for team work, avoidance/reduction of scrape/wastage and disposal of scarp/wastage as per procedure, behavioral attitude and regularity in training.

The following marking pattern to be adopted while assessing:

a) Weightage in the range of 60-75% to be allotted during assessment under following performance level:

For this grade, the candidate with occasional guidance and showing due regard for safety procedures and practices, has produced work which demonstrates attainment of an acceptable standard of craftsmanship.

In this work there is evidence of:

- good skill levels in the use of hand tools, machine tools and workshop equipment
- many tolerances while undertaking different work are in line with those demanded by the component/job.
- a fairly good level of neatness and consistency in the finish
- occasional support in completing the project/job.

b) Weightage in the range of above 75%- 90% to be allotted during assessment under following performance level:

For this grade, the candidate, with little guidance and showing due regard for safety procedures and practices, has produced work which demonstrates attainment of a reasonable standard of craftsmanship.

In this work there is evidence of:

- good skill levels in the use of hand tools, machine tools and workshop equipment
- the majority of tolerances while undertaking different work are in line with those demanded by the component/job.
- a good level of neatness and consistency in the finish
- little support in completing the project/job

c) Weightage in the range of above 90% to be allotted during assessment under following performance level:

For performance in this grade, the candidate, with minimal or no support in organization and execution and with due regard for safety procedures and practices, has produced work which demonstrates attainment of a high standard of craftsmanship.

In this work there is evidence of:

- high skill levels in the use of hand tools, machine tools and workshop equipment
- tolerances while undertaking different work being substantially in line with those demanded by the component/job.
- a high level of neatness and consistency in the finish.
- minimal or no support in completing the project

8.2 FINAL ASSESSMENT- ALL INDIA TRADE TEST (SUMMATIVE ASSESSMENT)

SUBJECTS	Marks	Sessional Marks	Full Marks	Pass Marks	Duration of Exam.
Practical	300	100	400	240	08 hrs.
Trade Theory	100	20	120	48	3 hrs.
Workshop Cal. & Sc.	50	10	60	24	3 hrs.
Engineering Drawing	50	20	70	28	4 hrs.
Employability Skill	50		50	17	2 hrs.
Grand Total	550	150	700	-	

Note: - The candidate pass in each subject conducted under all India trade test.

9. FURTHER LEARNING PATHWAYS

- On successful completion of the course trainees can opt for Diploma course (Lateral entry). [Applicable for candidates only who undergone ATS after CTS]
- On successful completion of the course trainees can opt for CITS course.

Employment opportunities:

On successful completion of this course, the candidates shall be gainfully employed in the following industries:

1. Land and Land Reforms organisations.
2. Building & Construction Industries
3. In public sector (Central and State) and private industries of related field in India & abroad.
4. Self employment

10. TOOLS & EQUIPMENT FOR BASIC TRAINING

**INFRASTRUCTURE FOR PROFESSIONAL SKILL & PROFESSIONAL
KNOWLEDGE**

TRADE: SURVEYOR

LIST OF TOOLS & EQUIPMENTS FOR 20 APPRENTICES

A : TRAINEES TOOL KIT:-

Sl. No.	Name of the items	Quantity (indicative)
1.	Protractor 15 cm full circular	21
2.	Card board/ plastic metric scale set- A to H	21
3.	Diagonal scale, electroplated	10
4.	Erasing shield small size	21
5.	Architect's & builder's template	10
6.	Chisel- steel 80 mm blade	10
7.	French curve- set of 12	10

B : TOOLS INSTRUMENTS AND GENERAL SHOP OUTFITS

Sl. No.	Name & Description of Machines	Quantity (indicative)
1.	Abney level	1
2.	Box sextant	2
3.	Boning rod	1 set
4.	Binocular	4
5.	Chalk board/White board	1
6.	Cupboard (Big)	4
7.	Ceylon ghat tracer with stand & target	2
8.	Scientific calculator	21
9.	Computing scales two hectares	4
10.	Computing scales five hectares	4
11.	Wooden cross staff- box type	2

12	Wooden cross staff- open type	2
13	Engineer's chain	2
14	Engineer's level	6
15	Dumpy level	6
16	Auto level	5
17	Tilting level	1
18	Fire extinguisher	1
19	Gunter's chain	2
20	Hand press for numbering & lettering	2
21	Canvas bag	8
22	Height indicators	8
23	Hold all canvas for instruments	8
24	Hones in case	1
25	Tracing board with lamp	2
26	Leveling staff - telescopic type	10
27	Metric chain- 30 m & 20 m	5 each
28	Magnifying glass	2
29	Magnet bar (for magnetizing through compass needles)	2
30	Plastic tubes for keeping drawings	21
31	Pen knife	5
32	Pentagraph	2
33	Prismatic compass	5
34	Planimeter (digital)	2
35	Proportionate compass	21
36	Plane table with stand , accessories & water proofing cover	8
37	Telescopic alidade	8
38	Indian pattern clinometers	8
39	Ranging rod 4 m	40
40	Offset rod	5
41	Optical square	5
42	Railway curves-Set of 50 in a box	4
43	Steel almirah (Big)	4
44	Survey plotting scale-8 scales with offset scale in box	21 sets
45	Stencil set	5
46	Substance bar	2
47	Metallic tape 30 m	10

48	Metallic tape 20 m	10
49	Steel tape 30 m	10
50	Steel band 30 m & 20 m	2 each
51	Surveyor's umbrella	6
52	Theodolite transit	5
53	Digital Theodolite	2
54	Rules ebonite plain for drawing lines	21
55	Wooden set square, T square & Compass in a box (for chalk board)	1
56	Total station -Leica	2
57	Hand GPS-latest version	2
58	Computer table	5
59	Computer chair	5
60	Printer table	1
61	UPS-5KVA	1

C: GENERAL MACHINERY INSTALLATIONS:-

Sl. No.	Name of the items	Quantity (indicative)
1	Ammonia printing machine with box	1
2	Computer & software	5 sets
3	A3 size Printer-colour	1

Note: In case of basic training setup by the industry the tools, equipment and machinery available in the industry may also be used for imparting basic training.

**INFRASTRUCTURE FOR WORKSHOP CALCULATION & SCIENCE AND
ENGINEERING DRAWING**

TRADE: SURVEYOR

LIST OF TOOLS& EQUIPMENTS FOR 20 APPRENTICES

1) **Space Norms** : 45 Sq. m.(For Engineering Drawing)

2) **Infrastructure:**

A : TRAINEES TOOL KIT:-

Sl. No.	Name of the items	Quantity (indicative)
1.	Draughtsman drawing instrument box	20+1 set
2.	Set square celluloid 45 ⁰ (250 X 1.5 mm)	20+1 set
3.	Set square celluloid 30 ⁰ -60 ⁰ (250 X 1.5 mm)	20+1 set
4.	Mini drafter	20+1 set
5.	Drawing board (700mm x500 mm) IS: 1444	20+1 set

B : FURNITURE REQUIRED

Sl. No.	Name of the items	Quantity (indicative)
1	Models : Solid & cut section	as required
2	Drawing Table for trainees	as required
3	Stool for trainees	as required
4	Cupboard (big)	01
5	White Board (size: 8ft. x 4ft.)	01
6	Trainer's Table	01
7	Trainer's Chair	01

11. INFRASTRUCTURE FOR ON-JOB TRAINING

TRADE: SURVEYOR

For Batch of 20 APPRENTICES

Actual training will depend on the existing facilities available in the establishment.

However, the industry should ensure that the broad skills defined against On-Job–

Training part (i.e. 9 months + 9 months) are imparted. In case of any short fall the

concerned industry may impart the training in cluster mode / in any other industry / at

ITI.

12. GUIDELINES FOR INSTRUCTORS AND PAPER SETTERS

1. Due care to be taken for proper & inclusive delivery among the batch. Some of the following method of delivery may be adopted:

- A) LECTURE
- B) LESSON
- C) DEMONSTRATION
- D) PRACTICE
- E) GROUP DISCUSSION
- F) DISCUSSION WITH PEER GROUP
- G) PROJECT WORK
- H) INDUSTRIAL VISIT

2. Maximum utilization of latest form of training viz., audio visual aids, integration of IT, etc. may be adopted.

3. The total hours to be devoted against each topic may be decided with due diligence to safety & with prioritizing transfer of required skills.