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GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP
DIRECTORATE GENERAL OF TRAINING

COMPETENCY BASED CURRICULUM

DRAUGHTSMAN CIVIL

(Duration: Two Years)
Revised in July 2022

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL- 4

SECTOR – CONSTRUCTION

Directorate General of Training

DRAUGHTSMAN CIVIL

(Engineering Trade)

(Revised in July 2022)

Version: 2.0

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL- 4

Developed By

Ministry of Skill Development and Entrepreneurship

Directorate General of Training

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1. COURSE INFORMATION

During the two-year duration, a candidate is trained on subjects viz. Professional Skill, Professional Knowledge and Employability Skillrelated to job role. In addition to this a candidate is entrusted to make/do project work and Extra Curricular Activities to build up confidence. The practical skills are imparted in simple to complex manner & simultaneously theory subject is taught in the same fashion to apply cognitive knowledge while executing task. The practical part starts with simple geometrical drawing and finally ends with preparing sanction plan of Residential/ Public building, drawing of roads, bridges, railway tracks, dams and Estimation and costing of civil works at the end of the course.

The broad components covered under Professional Skill subject are as below:

FIRST YEAR:- The practical part starts with basic drawing (consisting geometrical figure, symbols & representations). Later the drawing skills imparted are drawing of different scales, projections, drawing of shoring, scaffolding, stone and brick masonry, foundation, damp proofing, arches / lintel etc. and observation of all safety aspects is mandatory. The safety aspects covers components like OSH&E, PPE, Fire extinguisher, First Aid and in addition 5S being taught. Different site survey (using Chain & tape, Prismatic compass, Plane table, Levelling instrument, Theodolite), field book entry, plotting, mapping, calculation of area, Drawing of carpentry joints and Electrical wiring, drawing of floors, slabs, vertical movements (viz.stair, lift well, ramp and escalator), drawing of different types of roof truss are being taught in the practical.

SECOND YEAR:- Single storied building plan in traditional drawing.Knowledge and application of Computer Aided Drafting.Workspace creating drawing using toolbars, commands, and menus.Plotting drawing from CAD. 2D drafting of Doors, Windows, hand railing, wash basin, and plumbing joints. Preparing library folders by creating blocks of regularly used items. Preparation of a sanction plan of double storied RCC flat roof residential building using CAD. Preparation of a drawing of public building by framed structure using CAD. Preparation of Bar bending schedule. Drawing of different steel structure joints using CAD. Detail drawing of sanitary fittings and sewerage arrangements using CAD. Detail and sectional drawing of Roads, Bridges, culverts, railway tracks and embankment, Dams, Barrages, Weir and cross drainage works using CAD, schematic diagram of hydro electric project using CAD, Estimating and Cost analysis of different types of buildings and structures, preparation of map using Total Station and location of station point using GPS are being performed as part of practical training.

2. TRAINING SYSTEM

2.1 GENERAL

The Directorate General of Training (DGT) under Ministry of Skill Development & Entrepreneurship offers a range of vocational training courses catering to the need of different sectors of economy/ Labour market. The vocational training programmes are delivered under the aegis of Directorate General of Training (DGT). Craftsman Training Scheme (CTS) with variantsand Apprenticeship Training Scheme (ATS) are two pioneer schemes of DGT for strengthening vocational training.

Draughtsman Civil trade under CTS is one of the most popular courses delivered nationwide through network of ITIs. The course is of two-years duration. It mainly consists of Domain area and Core area. In the Domain area (Trade Theory & Practical) imparts professional skills and knowledge, while Core area(Employability Skills) imparts requisite core skill, knowledge and life skills.After passing out the training program, the trainee is awarded National Trade Certificate (NTC) by DGT which is recognizedworldwide.

Candidates broadly need to demonstrate that they are able to:

- Read & interpret technical parameters/documentation, plan and organize work processes, identify necessary materials and tools;
- Perform work with due consideration to safety rules, Govt. Bye laws and environmental protection stipulations;
- Apply professional knowledge, core skills & employability skills while performing the work
- Check the work as per sketches and rectify errors.
- Document the technical parameters related to the work undertaken.

2.2 PROGRESSION PATHWAYS:

- Can join industry as Draughtsman Civil and will progress further as Senior Draughtsman, Supervisor and can rise up to the level of Manager.
- Can become Entrepreneur in the related field.
- Can take admission in diploma course in notified branches of Engineering by lateral entry.
- Can join Apprenticeship programme in different types of industries leading to National Apprenticeship certificate (NAC).

- Can join Crafts Instructor Training Scheme (CITS) in the trade for becoming an instructor in ITIs.
- Can join Advanced Diploma (Vocational) courses under DGT as applicable.

2.3 COURSE STRUCTURE:

Table below depicts the distribution of training hours across various course elements during a period of two-years: -

S No.	Course Element	Notional Training Hours	
		1st Year	2nd Year
1	Professional Skill (Trade Practical)	840	840
2	Professional Knowledge (Trade Theory)	240	300
3	Employability Skills	120	60
	Total	**1200**	**1200**

Every year 150 hours of mandatory OJT (On the Job Training) at industry, wherever not available then group project is mandatory.

4	On the Job Training (OJT)/ Group Project	150	150

Trainees of one-year or two-year trade can also opt for optional courses of up to 240 hours in each year for 10th/ 12th class certificate along with ITI certification, or, add on short term courses

2.4 ASSESSMENT & CERTIFICATION

The trainee will be tested for his skill, knowledge and attitude during the period of course through formative assessment and at the end of the training programme through summative assessment as notified by the DGT from time to time.

a) The **Continuous Assessment** (Internal) during the period of training will be done by **Formative Assessment Method** by testing for assessment criteria listed against learning outcomes.The training institute has to maintain an individual trainee portfolio as detailed in assessment guideline. The marks of internal assessment will be as per the formative assessment template provided on www.bharatskills.gov.in.

b) The final assessment will be in the form of summative assessment. The All India Trade Test for awarding NTCwill be conducted by **Controller of examinations, DGT**as per the guidelines. The pattern and marking structure is being notified by DGT from time to time. **The learning outcome and assessment criteria will be the basis for setting question papers for final assessment. The examiner during final examination will also check** the individual trainee's profile as detailed in assessment guideline before giving marks for practical examination.

2.4.1 PASS REGULATION

For the purposes of determining the overall result, weightage of 100% is applied for six months and one year duration courses and 50% weightage is applied to each examination for two years courses. The minimum pass percent for Trade Practical and Formative assessment is 60% & for all other subjects is 33%.

2.4.2 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 the assessment. Due consideration should be given while assessing for teamwork, avoidance/reductionofscrap/wastage and disposal of scrap/waste as per procedure, behavioral attitude, sensitivity to the environment and regularity in training. The sensitivity towards OSHE and self-learning attitude are to be considered while assessing competency.

Assessment will be evidence based comprising some of the following:

- Job carried out in labs/workshop
- Record book/ daily diary
- Answer sheet of assessment
- Viva-voce
- Progress chart
- Attendance and punctuality
- Assignment
- Project work
- Computer based multiple choice question examination
- Practical Examination

Evidences and records of internal (Formative) assessments are to be preserved until forthcoming examination for audit and verification by examining body. The following marking pattern to be adopted for formative assessment:

Performance Level	Evidence
(a) Marks in the range of 60%-75% to be allotted during assessment	
For performance in this grade, the candidate should produce work which demonstrates attainment of an acceptable standard of craftsmanship with occasional guidance, and due regard for safety procedures and practices	• Demonstration of good skill in the use of hand tools, machine tools and workshop equipment. • 60-70% accuracyachieved while undertaking different work 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) Marks in the range of 75%-90% to be allotted during assessment	
For this grade, a candidate should produce work which demonstrates attainment of a reasonable standard of craftsmanship, with little guidance, and regard for safety procedures and practices	• Good skill levels in the use of hand tools, machine tools and workshop equipment. • 70-80% accuracyachieved while undertaking different work 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) Marks in the range of more than 90% to be allotted during assessment	
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.	• High skill levels in the use of hand tools, machine tools and workshop equipment. • Above 80% accuracyachieved while undertaking different work 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.

3. JOB ROLE

Draughtsperson, Civil; prepares drawings of buildings, stores, high ways, dams, culverts, etc. from sketches, notes or data for purposes of construction or alternations. Takes instructions form Civil Engineer studies sketches and calculates dimensions from notes or data. Draws to given scale different elevations, plan, sectional views etc. of desired construction using drawing instruments. Draws detailed drawings of specific portions as required. Indicates types of materials to be used, artistic and structural features, etc. in drawing as necessary.May do tracing and blue printing. May reduce or enlarge drawings. May prepare or check estimate schedules for cost of materials and labour. May prepare tender schedules and draft agreements. May work as Draughtsman Architectural.

Draught person, Structural; prepares drawings of bridges, steel structures, roof tresses etc. From sketches, designs or data for purposes of construction, alteration or repairs. Studies sketches, data, notes etc. and receives instructions from Structural or Mechanical Engineers regarding details and types of drawings to be made. Calculates dimensions as necessary from available notes, data etc. and by application of standard formulae. Draws to scale detail, assembly and arrangement drawings showing sectional plan and other views as directed and prints (writes) necessary instructions regarding materials to be used, limits, assembly etc. to clearly indicate all aspects of structure to be manufactured. May prepare estimate and operation schedules for labour and material costs. May prepare tender schedule and draft agreements. May prepare tables showing requirements of bars, their numbers, sizes and shapes. May trace and make blue prints.

Draughtsperson, Topographical; Sketches topographical drawings to scale in different colours using blue print prepared from field plane tables.Carries out independently projection of small scale map to predetermined size, incorporating features covered in survey, producing total geographical effect by hill shading, giving contours, profile, cross sections, authorised symbols, etc.Uses grid tables, projection table compasses, pantograph, planimeter, etc.

Reference NCO-2015:

a) 3118.0200 – Draughtsperson, Civil
b) 3118.0500 – Draught person, Structural
c) 3118.0600 – Draughtsperson, Topographical

Reference NOS: - IES/N9401, IES/N9402, IES/N9403, IES/N9404, IES/N9405, IES/N9406, IES/N9407, IES/N9408, IES/N9409, IES/N9410, IES/N9411**,** IES/N9412, IES/N9413, IES/N9414, IES/N9415**,** IES/N9416, IES/N9417, IES/N9418, IES/N9419, IES/N9420, IES/N9421, IES/N9422, IES/N9423, CON/N1302, IES/N9424, IES/N9425, IES/N9426, IES/N9427, IES/N9428, IES/N9429, IES/N9430, IES/N9431, IES/N9432, IES/N9433, IES/N9434, IES/N9435, IES/N9436, IES/N9437, IES/N9438, IES/N9439, IES/N9440

4. GENERAL INFORMATION

Name of the Trade	**DRAUGHTSMAN CIVIL**
Trade Code	DGT/1007
NCO - 2015	3118.0200, 3118.0500, 3118.0600
NOS Covered	IES/N9401, IES/N9402, IES/N9403, IES/N9404, IES/N9405, IES/N9406, IES/N9407, IES/N9408, IES/N9409, IES/N9410, IES/N9411, IES/N9412, IES/N9413, IES/N9414, IES/N9415, IES/N9416, IES/N9417, IES/N9418, IES/N9419, IES/N9420, IES/N9421, IES/N9422, IES/N9423, CON/N1302, IES/N9424, IES/N9425, IES/N9426, IES/N9427, IES/N9428, IES/N9429, IES/N9430, IES/N9431, IES/N9432, IES/N9433, IES/N9434, IES/N9435, IES/N9436, IES/N9437, IES/N9438, IES/N9439, IES/N9440
NSQF Level	Level - 4
Duration of Craftsmen Training	Two Years (2400 hours + 300 hours OJT/Group Project)
Entry Qualification	Passed 10th Class examination
Minimum Age	14 years as on first day of academic session.
Eligibility for PwD	LD, CP, LC, DW, AA, LV, DEAF, AUTISM, MD
Unit Strength (No. of Student)	24 (There is no separate provision of supernumerary seats)
Space Norms	90 Sq. m
Power Norms	3 KW
Instructors Qualification for:	
1. Draughtsman Civil Trade	B.Voc./Degree in Civil Engineering from AICTE/UGC recognized Engineering College/ university with one-year experience in the relevant field. **OR** 03 years Diploma in Civil Engineering from AICTE / recognized board of technical education or relevant Advanced Diploma (Vocational) from DGT with two years' experience in the relevant field. **OR** NTC/NAC passed in the Trade of "Draughtsman Civil" With 3 years post qualification experience in the relevant field.

	<u>Essential Qualification</u>: Relevant Regular / RPL variants of National Craft Instructor Certificate (NCIC) under DGT. ***NOTE: Out of two Instructors required for the unit of 2(1+1), one must have Degree/Diploma and other must have NTC/NAC qualifications.However both of them must possess NCIC in any of its variants.***
2. Workshop Calculation & Science	B.Voc/Degree in Engineering from AICTE/UGC recognized Engineering College/ university with one-year experience in the relevant field. **OR** 03 years Diploma in Engineering from AICTE / recognized board of technical education or relevant Advanced Diploma (Vocational) from DGT with two years' experience in the relevant field. **OR** NTC/ NAC in any one of the engineering trades with three years' experience. **<u>Essential Qualification:</u>** Regular / RPL variants of National Craft Instructor Certificate (NCIC) in relevant trade **OR** Regular / RPL variants NCIC in RoDA or any of its variants under DGT
3. Employability Skill	MBA/ BBA / Any Graduate/ Diploma in any discipline with Two years' experience with short term ToT Course in Employability Skills. (Must have studied English/ Communication Skills and Basic Computer at 12th / Diploma level and above) **OR** Existing Social Studies Instructors in ITIs with short term ToT Course in Employability Skills.
4. Minimum age for Instructor	21 years
List of Tools and Equipment	As per Annexure – I

5. LEARNING OUTCOME

Learning outcomes are a reflection of total competencies of a trainee and assessment will be carried out as per the assessment criteria.

5.1 LEARNING OUTCOMES (TRADE SPECIFIC)

FIRST YEAR

1. Draw free hand sketches of hand tools used in civil work following safety precautions. (NOS: IES IES/N9401)
2. Draw plane figures applying drawing instruments with proper layout and the method of folding drawing sheets. (NOS: IES/N9402)
3. Construct plain scale, comparative scale, diagonal scale and vernier scale. (NOS: IES/N9403)
4. Draw orthographic projections of different objects with proper lines, lettering and dimensioning. (NOS: IES/N9404)
5. Draw Isometric / Oblique / Perspective views of different solid / hollow / cut sections with proper lines, lettering and dimensioning. (NOS: IES/N9405)
6. Draw component parts of a single storied residential building with suitable symbols and scales. (NOS: IES/N9406)
7. Draw different types of stone and brick masonry. (NOS: IES/N9407)
8. Draw different types of shallow and deep foundation. (NOS: IES/N9408)
9. Draw different types of shoring, scaffolding, underpinning, framework and timbering. (NOS: IES/N9409)
10. Draw different types of Damp proofing in different position. (NOS: IES/N9410)
11. Drawing of different types of arches and lintels with chajja. (NOS: IES/N9411)
12. Perform site survey with plane table and prepare a map. (NOS: IES/N9412)
13. Make topography map bycontourswith leveling instrument. (NOS: IES/N9413)
14. Perform site survey with Theodolite and prepare site plan. (NOS: IES/N9414)
15. Drawing of different types of carpentry joints. (NOS: IES/N9415)
16. Draw different types of doors and windows according to manner of construction, Arrangement of component, and working operation. (NOS: IES/N9416)
17. Perform site survey with chain / tape and prepare site plan. (NOS: IES/N9417)
18. Perfom site survey with prismatic compass and prepare site plan. (NOS: IES/N9418)
19. Prepare the detailed drawing of electrical wiring system. (NOS: IES/N9419)
20. Draw types of ground and upper floors. (NOS: IES/N9420)
21. Draw different types of vertical movement according to shape, location, materials in stair, lift, ramp and escalator. (NOS: IES/N9421)

22. Draw different types of roofs, truss according to shape, construction, purpose and span. (NOS: IES/N9422)
23. Demonstrate basic mathematical concept and principles to perform practical operations. Understand and explain basic science in the field of study. (NOS: IES/N9423)

SECOND YEAR

24. Draw single storied building site plan layout. (NOS: CON/N1302)
25. Create objects on CAD workspace using Toolbars, Commands, Menus, formatting layer and style. (NOS: CON/N1302)
26. Draw a sanction plan of double storied flat roof residential building by using CAD. (NOS: CON/N1302)
27. Create objects on 3D modeling concept in CAD. (NOS: IES/N9424)
28. Prepare a drawing of public building detailing with roof and coloumns by frame structures using CAD. (NOS: CON/N1302)
29. Prepare detailed drawing of RCC structures using CAD and prepare bar bending schedule. (NOS: IES/N9425)
30. Draw the details of a framed structure and portal frame of a residential building using CAD. (NOS: IES/N9426)
31. Draw the different types of steel sections, rivets and bolts using CAD. (NOS: CON/N1302)
32. Draw the details of girders, roof trusses and steel stanchions using CAD. (NOS: CON/N1302)
33. Prepare the detailed drawing showing the different types of sanitary fittings, arrangements of manholes, details of septic tank using CAD. (NOS: IES/N9427)
34. Draw the details flow diagram of water treatment plant (WTP) and Swerage Treatment plant (STP). (NOS: IES/N9428)
35. Draw the cross sectional view of different types of roads showing component parts using CAD. (NOS: IES/N9429)
36. Draw the details of different types of culverts using CAD. (NOS: IES/N9430)
37. Prepare detailed drawing a bridge using CAD. (NOS: IES/N9431)
38. Draw the typical cross section of rail sections, railway tracks in cutting and embankment usingCAD. (NOS: IES/N9432)
39. Prepare detailed drawing of typical cross sections of Dam, barrages, weir and Cross drainageworks using CAD. (NOS: IES/N9433)
40. Draw the schematic diagram of different structures of Hydro electric project using CAD. (NOS: IES/N9434)

41. Prepare detailed estimate and cost analysis of different types of building and other structures using application software. (NOS: IES/N9435)
42. Prepare rate analysis of different items of work. (NOS: IES/N9436)
43. Problems on preparing preliminary/Approximate estimates for building project. (NOS: IES/N9437)
44. Prepare a map using Total station. (NOS: IES/N9438)
45. Locate the station point using GPS and obtain a set of co-ordinates. (NOS: IES/N9439)
46. Demonstrate basic mathematical concept and principles to perform practical operations. Understand and explain basic science in the field of study (NOS: IES/N9440)

6. ASSESSMENT CRITERIA

ASSESSABLE OUTCOMES	ASSESSMENT CRITERIA
FIRST YEAR	
1. Draw in Freehand Sketching of hand tools used in civil workfollowing safety precautions. (NOS: IES /N9401)	Ensure data and informationreceived are sufficient forpreparationof drawing.
	(a) sketch horizontal lines from left to right, vertical lines downward, inclined lines in different angles by freehand, (b) draw freehand sketches of tools (viz. hoe, head pan, trowel,wooden float, plumb bob, sand screener)
	Check the drawings to confirm their compliance with the supplied design / object.
2. Draw Plain figures applying drawing instruments with proper layout and the method of folding drawing sheets. (NOS: IES/N9402)	(a) prepare Layout of drawing sheet, (b) prepare a Title block, (c) set and fix drawing paper on the drawing board, (d) mark and fold on the designated drawing Sheet.
	(a) draw parallel lines using T-square and set-square (b) draw angles of 15° increments by combination of set-squares and check by protractor.
	(a) construct different types of geometrical figures from given data. (b) construct ellipse with the given conditions.and parabolic curves using the various conditions given.
	Add specifications as per the drawing requirements providedand use relevant and appropriate symbols as per drawingrequirement to provide details in the drawings
	Check the drawings to confirm their correctness.
3. Construct plain scale, comparative scale, diagonal scale and vernier scale. (NOS: IES/N9403)	Read and interpret the drawing requirements. Ensure dataand information received are sufficient for preparation ofdrawing.
	Draw different types of scales.
	Find out R.F of the scale, calculate the length of scale on drawing.
	Construction of plain scales, comparative scales, diagonal scales andvernier scales, mark the distance on the scale.
	Check the drawings to confirm their correctness.
4. Draw Orthographic projection of different objects with proper lines,	Read and interpret the drawing requirements. Ensure dataandinformation received are sufficient for preparation ofdrawing.

lettering and dimensioning. (NOS: IES/N9404)	Carry out necessary calculations to compute dimensions ofVarious components/ parts of drawings.
	(a) develop view in orthographic projection by placing object between horizontal and vertical plane of axes, (b) generate side view of blocks in different inclination on VP and HP by auxiliary vertical plane.
	(a) write name of the drawing on heading at centre alignment, (b) write individual title for every projection drawing, (c) construct drawing views, construction lines and dimensionlines as per standard.
	Check the drawings to confirm their compliance with thesupplied design / object.
5. Draw Isometric / Oblique / Perspective views of different solid / hollow / cut sections with proper lines, lettering and dimensioning. (NOS: IES/N9405)	Read and interpret the drawing requirements. Ensure dataand information received are sufficient for preparation ofdrawing.
	Carry out necessary calculations to compute dimensions ofVarious components/ parts of drawings.
	Construct an Isometric scale to a given length. draw the isometric projection of regular solids.
	Draw the isometric views for the given solids with hollow and cut sections.
	Draw the given objects/component in perspective view by Vanishing point method (i) Single point perspective (ii)Two point perspective/Angular perspective Visual ray method/multi-view method
	Check the drawings to confirm their compliance with the supplied design / object.
6. Draw component parts of a single storied residential building with suitable symbols and scales. (NOS: IES/N9406)	Read and interpret the drawing requirements such as roughsketches, specifications, drawing brief, RFD etc. ensure dataand information received are sufficient for preparation ofdrawing.
	Construct parts of a building and list the sequence of construction.
	Draw and indicate the levels of different parts of building.
	Draw dressing and varieties of finishes, artificial stones, natural bed of stone.
	Draw RCC used in different component parts of a building.
	Draw timber joints used in doors, windows and arches.
	Draw steel framing for pre-cast concrete,
	Use codes and other references that follow the required conventions.
	(a) draw the appropriate signs and symbols for showing different types of openings used in drawing. (b) draw the signs and symbols of various types of doorswindows

	and ventilators.
	Check the drawings to confirm their compliance with the supplied design / object.
7. Draw different types of stone and brick masonry. (NOS: IES/N9407)	Read and interpret the drawing requirements such as rougsketches, specifications, drawing brief, RFD etc. ensure dataand information received are sufficient for preparation ofdrawing.
	Sketch thedifferent types of stone masonry and bonding.
	Draw and mention the types of bonds used in brick masonry.
	Draw different types of special bricks.
	Add specifications and use codes and other references as perthe drawing requirements.
	Check drawings to confirm their compliance with the supplied design.
8. Draw different types of shallow and deep foundation. (NOS: IES/N9408)	Read and interpret the drawing requirements such as roughsketches, specifications, drawing brief, RFD etc. ensure dataand information received are sufficient for preparation of drawing.
	Carry out necessary calculations to compute dimensions of Various components/ parts of drawings.
	Draw different types of shallow and deep foundation.
	(a) draw footing for column, (b) draw footings for wall, (c) draw stepped foundation and inverted arch foundation,
	(a) draw grillage foundation (b) draw raft foundation
	(a) draw various types of pile foundation, (c) draw pier foundation (d) draw well foundation (caisson),
	Add specifications and use codes and other references as perthedrawing requirements.
	Check drawings to confirm their compliance with the supplied design.
9. Draw different types of shoring, scaffolding, underpinning, framework and timbering. (NOS: IES/N9409)	Read and interpret the drawing requirements such as roughsketches, specifications, drawing brief, RFD etc. ensure dataand information received are sufficient for preparation ofdrawing.
	carry out necessary calculations to compute dimensions of Various components/ parts of drawings.
	Draw different types of shoring.

	Draw different types of scaffolding.
	Draw different types of underpinning.
	(a)draw the elevation of formwork for beams and slabs., (b) draw the details of form work for square or rectangularcolumn, (c) draw the details of form work for circular column,
	Draw the detail of form work for R.C.C wall.
	Draw isometric view of different types of arch.
	Draw isometric view of timbering for trenches in different types of ground.
	Add specifications and use codes and other references as perthe drawing requirements.
	Check drawings to confirm their compliance with the required design.
10. Draw different types of Damp proofing in different position. (NOS: IES/N9410)	Read and interpret the drawing requirements such as roughsketches, specifications, drawing brief, RFD etc. ensure dataand information received are sufficient for preparation ofdrawing.
	Carry out necessary calculations to compute dimensions of Various components/ parts of drawings.
	(a) draw details of damp proofing in basement., (b) draw details of damp proofing in external wall, (c) draw details of damp proofing in internal walls
	(a) draw details of damp proofing by cavity wall. (b) draw details of damp proofing in flat roof and parapet wall.
	(a) draw details of damp proofing of flat roof by tar felting, (b) draw details of damp proofing by mud phuska terracing with tile, (c) draw details of damp proofing in pitched roof.
	draw sectional view of thermal insulation used in coldstorage floor, walls and roof.
	add specifications and use codes and other references as perthe drawing requirements
	Check drawings to confirm their compliance with the required design.
11. Drawing of different types of arches and lintels with chajja. (NOS: IES/N9411)	Read and interpret the drawing requirements such as roughsketches, specifications, drawing brief, RFD etc. ensure dataand information received are sufficient for preparation ofdrawing.
	Carry out necessary calculations to compute dimensions of Various components/ parts of drawings.
	sketch the various arches with number of centers.
	Draw the elevation of flat arch, semi circular arch, segmental arch, elliptical arch, three centered elliptical arch, five centered, two

	centered arch.
	Draw the elevation and section of wooden lintel, stone lintel,brick lintel, RCC lintel, steel lintel, reinforced brick lintel.
	add specifications and use codes and other references as perthe drawing requirements.
	Check drawings to confirm their compliance with the required design.
12. Perform site survey with plane table and prepare a map. (NOS: IES/N9412)	Interpret the drawing requirements.
	Perform plane table survey by the following methods: Radiation Intersection Traversing Resection (Orientation)
	Prepare the traverse by any type of method,
	Calculate area.
	prepare the site map.
	add specifications and use codes and other references as per the drawing requirements
	Check drawings to confirm their compliance with the required design.
13. Make topography map bycontourswith leveling instrument. (NOS: IES/N9413)	Interpret the drawing requirements.
	Set leveling instrument and adjust the horizontal control.
	Fix vertical control of points by leveling and booking readings in level book.
	Determine reduced levels and check.
	prepare a road project for a limited distance.
	Prepare a plot by contours, fix contour interval, interpolate contour points and draw contour lines.
	Furnish all the details and complete the drawing.
	Check drawings to confirm their compliance with the required design and take out the print.
14. Perform site survey with Theodolite and prepare site plan. (NOS: IES/N9414)	Interpret the drawing requirements.
	Conduct reconnaissance survey, prepare key plan.
	Mark station points.
	Prepare reference sketches.
	Measure lengths and bearing.
	Measure angles, repetition.
	Compute co-ordinates, check angles, calculate bearings, find consecutive co-ordinates, find independent co-ordinates.
	Prepare the traverse.
	Calculate area.
	Add specifications and use codes and other references as per the drawing requirements.
	Check drawings to confirm their compliance with the

	required design.
15. Drawing of different types of carpentry joints. (NOS: IES/N9415)	Read and interpret the drawing requirements such as rough sketches, specifications, drawing brief, RFD etc. ensure dataand information received are sufficient for preparation of drawing.
	Carry out necessary calculations to compute dimensions of Various components/ parts of drawings
	Draw different types of carpentry joints: (a)draw the views of lengthening joints (b) draw the views of widening joints
	(a) draw the views of bearing joints (b) angled or corner joints (c) oblique shouldered joints
	Add specifications and use codes and other references as per the drawing requirements.
	Check drawings to confirm their compliance with the required design.
16. Draw different types of doors and windows according to manner of construction, Arrangement of component, and working operation. (NOS: IES/N9416)	Read and interpret the drawing requirements such as rough sketches, specifications, drawing brief, RFD etc. ensure data and information received are sufficient for preparation of drawing.
	Carry out necessary calculations to compute dimensions of Various components/ parts of drawings.
	Draw ledged and battened door, ledged, battened and braced door And ledged, battened, broced and framed door.
	Draw panelled door and panelled and glazed door.
	(a) draw flush doors, (b) draw collapsible door, (c) draw Sliding door
	Draw different types of fixtures and fastenings.
	Draw the different types of windows: panelled windows metal windows corner window gable window ventilators, etc.
	Add specifications and use codes and other references as per the drawing requirements.
	Check drawings to confirm their compliance with the required design.
17. Perfom site survey with chain / tape and prepare	Interpret the drawing requirements
	perform surveying measuring distance by chain, tape and

the site plan. (NOS: IES/N9417)	other accessories.
	enter Field book and ploting
	Conduct the chain surveying and prepare the site map.
	Calculate the area of the plot.
	add specifications and use codes and other references as per the drawing requirements
	Check drawings to confirm their compliance with the required design.
18. Perfom site survey with prismatic compass and prepare site plan. (NOS: IES/N9418)	Interpret the drawing requirements
	Observe the bearings of lines and conduct the traverse survey using compass and other accessories.
	enter Field book and ploting
	Calculate area and check the traverse.
	prepare the site map.
	add specifications and use codes and other references as per the drawing requirements
	Check drawings to confirm their compliance with the required design.
19. Prepare the detailed drawing of electrical wiring system. (NOS: IES/N9419)	Read and interpret the drawing requirements such as rough sketches, specifications, drawing brief, RFD etc. ensure data and information received are sufficient for preparation of drawing.
	Carry out necessary calculations to compute dimensions of Various components/ parts of drawings
	Draw the signs and symbols used in wiring plan.
	Furnish all the details and complete the drawing
	Add specifications and use codes and other references as per the drawing requirements
	Check drawings to confirm their compliance with the required design.
20. Draw types of ground and upper floors. (NOS: IES/N9420)	Read and interpret the drawing requirements such as rough sketches, specifications, drawing brief, RFD etc. ensure data and information received are sufficient for preparation of drawing.
	Carry out necessary calculations to compute dimensions of Various components/ parts of drawings
	Draw section of a timber ground floor, brick floor, flag stone, concrete floor, terrazzo floor and mosaic floor. (e) draw the section of concrete jack arch floor.
	(a) draw plan and section of single joist timber floor.

	(b) draw plan and section of double joist timber floor. (c) draw plan and section of triple of framed timber floor. (d)draw the section of brick jack arch floor.
	Add specifications and use codes and other references as per the drawing requirements
	Check drawings to confirm their compliance with the required design.
21. Draw different types of vertical movement according to shape, location, materials in stair, lift, ramp and escalator. (NOS: IES/N9421)	Read and interpret the drawing requirements such as rough sketches, specifications, drawing brief, RFD etc. ensure data and information received are sufficient for preparation of drawing.
	Carry out necessary calculations to compute dimensions of Various components/ parts of drawings
	draw ramp
	draw straight stair
	draw quarter turn newel stair
	(a) draw bifurcated stair (b) draw quarterturn and geometrical stair (c) draw halfturn and R.C.C dog legged stair (d) draw the R.C.C open well stair (e)draw three quater turn stairs (f)draw spiral stairs
	(a) prepare the data table of the different loading capacity of a lift. (b) draw the schematic diagram of lift well and other mountings for a load of 10 persons. (c) draw the typical arrangements of a lift.
	Draw moving stairs (escalators)
	Add Symbols and specifications and use codes and other references as per the drawing requirements
	Check drawings to confirm their compliance with the required design.
22. Draw different types of roofs, truss according to shape, construction, purpose and span. (NOS: IES/N9422)	Read and interpret the drawing requirements such as rough sketches, specifications, drawing brief, RFD etc. ensure data and information received are sufficient for preparation of drawing.
	Carry out necessary calculations to compute dimensions of Various components/ parts of drawings
	(a)draw lean-to-roof (b) draw the sectional elevation of couple roof (c)draw the sectional elevation of couple close roof
	(a) draw the sectional elevation of single collar roof (b)draw the sectional elevation of collar and scissors roof

	(c)draw the section of double or purlin roof
	(a)draw the elevation of king post truss (b) draw details of each joint of king post truss
	(a)draw the elevation of queen post truss (b) draw details of each joint of queen post truss
	(a)draw the elevation of steel truss (b) draw details of joint of steel (c)draw the elevation of tubler steel truss (d) draw details of tubler steel truss
	Add Symbols and specifications and use codes and other references as per the drawing requirements
	Check drawings to confirm their compliance with the required design.
23. Demonstrate basic mathematical concept and principles to perform practical operations. Understand and explain basic science in the field of study. (NOS: IES/N9423)	Read & interpret the information on drawings and apply in executing practical work.
	Read &analyze the specification to ascertain the material requirement, tools and assembly/maintenance parameters.
	Encounter drawings with missing/unspecified key information and make own calculations to fill in missing dimension/parameters to carry out the work.
SECOND YEAR	
24. Draw single storied building site plan layout. (NOS: CON/N1302)	Read and interpret the drawing requirements such as rough sketches, specifications, drawing brief, RFD etc. ensure data and information received are sufficient for preparation of drawing.
	Carry out necessary calculations to compute dimensions of Various components/ parts of drawings.
	(a) draw the line diagram of the residential building. (b) draw size and position of rooms, wall thickness and number of openings.
	(a) develop the sectional plan of building (b) prepre sectional elevation as per the section plan. (c) draw the elevation of building. (d) prepare working drawing of the building.
	Draw various interior and exterior furnishings details of a residence.
	Create a site plan showing details.
	Prepare a key / location plan.
	Prepare area statement.
	Add Symbols and specifications and use codes and othe references as per the drawing requirements.
	Check drawings to confirm their compliance with the required design.

25. Create objects on CAD workspace using tool bars, commands, menus and formatining layers and styles. (NOS: IES CON/N1302)	Ensure that computer system is correctly operating. Check that all required peripheral devices are connected and correctly operating.
	Start up the software and adjust the page size, measurement unit, scale and plot area before staring the work
	Set drawing parameters like, colour, layer, line type, line weight, text font etc. prepare title block for the drawing covering specification required.
	Draw 2D drafting by using CAD toolbars and from set of tool icons in ribbon.
	Draw drawing using sortcut keyboard command. Layers.
	Creating templates, inserting drawings, Layers, Modify
	Customize Dimension and Text styles.
	Provide title and dimension on object drawing.
	Add Symbols and specifications and use codes and other references as per the drawing requirements
	Check drawings to confirm their compliance with the required design.
	Create layout space and viewports,
	Plot the drawing with required scale.
26. Draw a sanction plan of double storied flat roof residential building by using CAD. (NOS: CON/N1302)	Read and interpret the drawing requirements such as rough sketches, specifications, drawing brief, RFD etc. ensure dataand information received are sufficient for preparation ofdrawing.
	Carry out necessary calculations to compute dimensions ofVarious components/ parts of drawings.
	Use appropriate commands in the software to draw therequired drawings as per standard practices. Use keyboard commands and pull down menus available in common cad systems to prepare the drawings.
	Prepare drawing of plan, elevation, section, site plan location plan and area statement of double storied flat roof residential building with suitable symbols and scales according to local bye laws.
	Prepare structural arrangement of the above plan.
	Draw the plan sectional elevation and front elevation two storied residential building showing partly tiled and partly RCC flat roof.
	Prepare the working drawing of the building.
	Add Symbols and specifications and use codes and other references as per the drawing requirements.
	Check drawings to confirm their compliance with the required design.
27. Create objects on 3D modeling concept in CAD.	start up the software and adjust the page size, measurementunit, scale and plot area before staring the work.

(NOS: IES/N9424)	Define 3D modeling concept in CAD.
	Demonstrate 3D coordinate systems to aid in the construction of 3D objects.
	Create and use model space viewports.
	Create a standard engineering layout.
	Create and edit wireframe model.
	Create and edit solid mesh and surface modeling.
	Create and edit simple 2D regions and 3D solid models.
	Generate 3D text and dimensions using a variety of 3D display techniques.
	Render a 3D model with a variety of lights and materials.
	plot the drawing with required scale.
	Check drawings to confirm their compliance with the requireddesign.
28. Prepare a drawing of public building detailing with roof and coloumns by frame structures using CAD. (NOS: CON/N1302)	Read and interpret the drawing requirements such as rough sketches, specifications, drawing brief, RFD etc. ensure data and information received are sufficient for preparation of drawing.
	Carry out necessary calculations to compute dimensions of Various components/ parts of drawings
	Prepare a Public Building drawing indicating all related data and service plan: (a) Village library – in RCC flat roof. (b) Workshop building – in pitch roof (c) Primary Health Centre – in RCC flat roof. (d) Restaurant Building – in RCC flat roof.
	School building – in RCC flat roof.
	Bank Building – in RCC flat roof.
	Add Symbols and specifications and use codes and other references as per the drawing requirements
	Check drawings to confirm their compliance with the required design.
29. Prepare detailed drawing of RCC structures using CAD and prepare bar bending schedule. (NOS: IES/N9425)	Read and interpret the drawing requirements such as rough sketches, specifications, drawing brief, RFD etc. ensure data and information received are sufficient for preparation of drawing.
	Carry out necessary calculations to compute dimensions of Various components/ parts of drawings
	Draw different types of structural arrangements of RCC members and bar bending schedule: (a) Foundations (b) Rectangular beam (c) Column (c) Floor slab / roof slab

	(d) Lintel with chajja (e) stair (f) underground and overhead reservoir (g) Lift pit (h) septic tank (i) retaining wall
	complete the drawing by furnishing the details, such as dimensioning and notes related to reinforcement
	prepare a table containng weight of different bars.
	prepare the bar bending schedule of the above structure.
	add Symbols and specifications and use codes and other references as per the drawing requirements
	Check drawings to confirm their compliance with the required design.
30. Draw the details of a framed structure and portal frame of a residential building using CAD. (NOS: IES/N9426)	Read and interpret the drawing requirements such as roughsketches, specifications, drawing brief, RFD etc. ensure dataand information received are sufficient for preparation ofdrawing.
	Carry out necessary calculations to compute dimensions of Various components/ parts of drawings
	Prepare the features of framed structure, portal frame and its reinforcement details.
	Add Symbols and specifications and use codes and other eferences as per the drawing requirements
	Check drawings to confirm their compliance with therequired design.
31. Draw the different types of steel sections, rivets and bolts using CAD. (NOS: CON/N1302)	Read and interpret the drawing requirements such as rough sketches, specifications, drawing brief, RFD etc. ensure dataand information received are sufficient for preparation ofdrawing.
	Carry out necessary calculations to compute dimensions of Various components/ parts of drawings.
	Draw the different views of steel section, rivets and bolts.
	Prepare drawing of bolted and riveted joints in steel structures.
	Add Symbols and specifications and use codes and other references as per the drawing requirements
	Check drawings to confirm their compliance with the required design.
32. Draw the details of girders, roof trusses and steel stanchions using CAD. (NOS: CON/N1302)	Read and interpret the drawing requirements such as rough sketches, specifications, drawing brief, RFD etc. ensure dataand information received are sufficient for preparation ofdrawing.
	Carry out necessary calculations to compute dimensions of Various

	components/parts of drawings.
	Draw the elevation and section of girders, roof trusses and steel stanchions.
	add Symbols and specifications and use codes and other eferences as per the drawing requirements
	Check drawings to confirm their compliance with the required design.
33. Prepare the detailed drawing showing the different types of sanitary fittings, arrangements of manholes, details of septic tank using CAD. (NOS: IES/N9427)	Read and interpret the drawing requirements such as rough sketches, specifications, drawing brief, RFD etc. ensure dataand information received are sufficient for preparation of drawing.
	Carry out necessary calculations to compute dimensions of Various components/ parts of drawings
	Draw plumbing and sanitary appliances and sanitary fittings,
	Draw system of plumbing.
	design the septic tank according to the users.
	draw the plan, and sectional elevation of man hole and septic tank.
	draw the features of drainage system and sewer system.
	draw the service plan.
	add Symbols and specifications and use codes and other references as per the drawing requirements
	Check drawings to confirm their compliance with the required design.
34. Draw the details flow diagram of water treatment plant (WTP) and Swerage Treatment plant (STP). (NOS: IES/N9428)	Read and interpret the drawing requirements such as rough sketches, specifications, drawing brief, RFD etc. ensure dataand information received are sufficient for preparation of drawing.
	Carry out necessary calculations to compute dimensions of Various components/ parts of drawings
	draw the features and functions of water treatment plant (WTP)
	draw the plan, longitudinal and cross sectional elevation of water treatment plant (WTP).
	draw the features and functions of Swerage Treatment plant (STP).
	draw the plan, longitudinal and cross sectional elevation of Swerage Treatment plant (STP).
	add Symbols and specifications and use codes and other references as per the drawing requirements
	Check drawings to confirm their compliance with the required design.
35. Draw the cross sectional view of different types of roads showing component parts using CAD. (NOS:	Read and interpret the drawing requirements such as roughsketches, specifications, drawing brief, RFD etc. ensure dataand information received are sufficient for preparation ofdrawing.
	Carry out necessary calculations to compute dimensions of Various

IES/N9429)	components/ parts of drawings
	draw and indicate the structural parts of different of roads forembankment and cutting as per IRC (a) camber (b) super-elevation (c) gradient (d) curves (e) side drain, etc.
	add Symbols and specifications and use codes and other references as per the drawing requirements.
	Check drawings to confirm their compliance with the required design.
36. Draw the details of different types of culverts using CAD. (NOS: IES/N9430)	Read and interpret the drawing requirements such as rough sketches, specifications, drawing brief, RFD etc. ensure data and information received are sufficient for preparation ofdrawing.
	Carry out necessary calculations to compute dimensions ofcomponents/ parts of drawings
	draw the half sectional Plan, longitudinal and cross sectional elevation of different culvert.
	add Symbols and specifications and use codes and other references as per the drawing requirements
	Check drawings to confirm their compliance with the required design.
37. Prepare detailed drawing a bridge using CAD. (NOS: IES/N9431)	Read and interpret the drawing requirements such as rough, specifications, drawing brief, RFD etc. ensure dataand information received are sufficient for preparation ofdrawing.
	Carry out necessary calculations to compute dimensions of Various components/ parts of drawings
	Draw the features and parts of bridge, caisson, coffer dam and classification of bridges.
	Draw the half sectional - Plan, longitudinal and cross sectional elevation of bridge.
	add Symbols and specifications and use codes and other references as per the drawing requirements
	Check drawings to confirm their compliance with the required design.
38. Draw the typical cross section of rail sections, railway tracks in cutting and embankment using CAD. (NOS: IES/N9432)	Read and interpret the drawing requirements such as rough sketches, specifications, drawing brief, RFD etc. ensure dataand information received are sufficient for preparation ofdrawing.
	Carry out necessary calculations to compute dimensions of Various components/ parts of drawings.

	draw coning of wheels, hogged rail, bending of rail, creep of rail and fixtures and fastenings.
	draw and indicate the structural parts of typical permanent way in cutting and embankment.
	Add Symbols and specifications and use codes and otherreferences as per the drawing requirements.
	Check drawings to confirm their compliance with the required design.
39. Prepare detailed drawing of typical cross sections of Dam, barrages, weir and Cross drainage works using CAD. (NOS: IES/N9433)	Read and interpret the drawing requirements such as rough sketches, specifications, drawing brief, RFD etc. ensure dataand information received are sufficient for preparation ofdrawing.
	Carry out necessary calculations to compute dimensions ofVarious components/ parts of drawings.
	draw detail drawing of Dams, barrages and weirs, cross drainageworks and head regulators in irrigation structure.
	add Symbols and specifications and use codes and otherreferences as per the drawing requirements.
	Check drawings to confirm their compliance with the required design.
40. Draw the schematic diagram of different structures of Hydro electric project using CAD. (NOS: IES/N9434)	Read and interpret the drawing requirements such as rough sketches, specifications, drawing brief, RFD etc. ensure dataand information received are sufficient for preparation ofdrawing.
	Carry out necessary calculations to compute dimensions of Various components/ parts of drawings.
	draw the features of different structures of hydro electricproject.
	prepare the schematic diagram.
	add Symbols and specifications and use codes and other references as per the drawing requirements.
	Check drawings to confirm their compliance with the required design.
41. Prepare detailed estimate and cost analysis of different types of building and other structures using application software. (NOS: IES/N9435)	Read and interpret the drawing requirements, specifications,etc. ensure data and information received are sufficient for preparation of estimation.
	Carry out necessary calculations to compute estimation and cost analysis.
	Prepare detailed estimate of a building.
	Prepare a detailed estimate for – boundary wall, septic tank, underground and overhead reservoir.
	Calculate the quantities in the standard format.
	Prepare abstract of estimate.
	Check estimation and cost analysis to confirm theircompliance with

	the design.
42. Prepare rate analysis of different items of work. (NOS: IES/N9436)	Read and interpret the drawing requirements, specifications,etc. ensure data and information received are sufficient for preparation of rate analysis.
	Carry out necessary calculations to compute estimation and cost analysis.
	preapare rate analysis and identify the units of measurement.
	calculation techniques of quantities of materials or by standard data.
	calculate quantities of labour required for different item of work from standard data.
	calculate the rate per unit of works of different items including labour charges from schedule of rate.
	Check rate analysis to confirm their compliance with the design.
43. Problems on preparing preliminary/Approximate estimates for building project. (NOS: IES/N9437)	Read and interpret the drawing requirements, specifications,etc.ensure data and information received are sufficient for preparation of estimation.
	Carry out necessary calculations to compute estimation and cost analysis.
	Prepare the contents of a building project.
	Calculatethe difference to be occur in structural detailing and various finishing.
	Calculate the plinth area and cubical content rates.
	Prepare and Check estimation and cost analysis to confirm their compliance with the design.
44. Prepare a map using Total station. (NOS: IES/N9438)	Interpret the drawing requirements.
	adjust and fix the Total Station in an station point.
	conduct reconnaissance survey-prepare key plan.
	prepare reference sketches.
	conduct traverse survey-set up the instrument over the first station-set job-set station-orient-collect data-take foresight to next station-shift instrument to next station-set up-back orientation-collect data-repeat same procedure at each stations.
	download and process the data, prepare plan/map.
	measureremote distance and elevation.
	calculate 2D / 3D area on field/site.
	calculates surface volume of field/site.
	add specifications and use codes and other references as per the drawing requirements.
	Check drawings to confirm their compliance with the required one.
45. Locate the station point	Interpret the drawing requirements.

using GPS and obtain a set of co-ordinates. (NOS: IES/N9439)	Set up and use GPS equipment.
	Practical application of GPS and Components of GPS dataprocessing.
	Determine the position of points.
	Record and process the results, TOA,TOT,TOF, set the co ordinates.
	Open CAD and set up the basic requirement for drafting. comparison of GPS with GIS,CAD
	Export the details from GPS system
	Operate co- ordinate and time system, satellite and conversional geodetic system. and GPS. Signal, code, andbiases.
	Apply Remote sensing and Photogrammetry.
	Perform tracking devises& system, time measurement andGPS timing.
	Create arialphotography, satellite images use pattern recognition and digital signal.
	Add specifications and use codes and other references as perthe drawing requirements
	Check drawings to confirm their compliance with therequired one.
46. Demonstrate basic mathematical concept and principles to perform practical operations. Understand and explain basic science in the field of study. (NOS: IES/N9440)	Read & interpret the information on drawings and apply in executing practical work.
	Read &analyze the specification to ascertain the material requirement, tools and assembly/maintenance parameters.
	Encounter drawings with missing/unspecified key information and make own calculations to fill in missing dimension/parameters to carry out the work.

7. TRADE SYLLABUS

SYLLABUS FOR DRAUGHTSMAN CIVIL TRADE			
FIRST YEAR			
Duration	**Reference Learning Outcome**	**Professional Skills (Trade Practical) With Indicative Hours**	**Professional Knowledge (Trade Theory)**
Professional Skill 56Hrs; Professional Knowledge 14Hrs	Draw free hand sketches of hand tools used in civil work following safety precautions. (Mapped NOS: IES/N9401)	1. Importance of trade training, demonstrate tools &equipments used in the trade.(02 hrs) 2. Importance of housekeeping & good shop floor practices. (02 hrs) Occupational Safety & Health : 3. Introduction to safetyequipmentsand their uses. Introduction of first aid. Health, Safety andEnvironment guidelines, legislations & regulations as applicable.(04 hrs) 4. Disposal procedure of wastematerials of the trade. (03hrs) 5. Personal protective Equipments (PPE):-Basic injuryprevention, Basic first aid. (04hrs) 6. Hazard identification and avoidance, safety signs for Danger, Warning, caution & personal safety message. (03hrs) 7. Preventive measures forelectrical accidents & steps tobe taken insuchaccidents. (02 hrs) 8. Use of Fire extinguishers.(08hrs)	Importance of safety and general precautions observed in the in the industry/shop floor. All necessary guidance to be provided to the new comers to become familiar with the working of Industrial Training Institute system including stores procedures. Soft Skills: its importance and Job area after completion of training. Introduction of First aid. Introduction of PPEs. Introduction to 5S concept& its application. Response to emergencies e.g.; power failure, fire alarm, etc. (07 hrs.)
		9. Awareness about the job-	• Familiarisation& information

		sheets made by the ex. Trainees. (02hrs) 10. Use of drawing instruments and equipment with care. (03hrs) 11. Method of fixing of drawing sheet on the drawing board. (03hrs) 12. Layout of different size ofDrawing sheets and foldingof sheets. (06hrs) 13. Draw free hand sketch of hand tools used in civil work.(14hrs)	about rules and regulations of the Institute and Trade. • Overview of the subjects to be taught for each year. • List of the Instruments, equipments and materials to be used during training. (07 hrs.)
Professional Skill 56Hrs; Professional Knowledge 12Hrs	Draw plane figures applying drawing instruments with proper layout and folding of drawing sheets. (Mapped NOS:IES/N9402)	14. Symbols & conventional representation for materials in sections as per IS 962-1989, SP-46:2003 for buildingdrawings. (15hrs) 15. Lines, lettering andDimensioning. (24hrs) 16. Construction of plaingeometrical figures. (17hrs)	• Importance of B.I.S. • Introduction of Code for practice of Architectural and • Building Drawings (IS: 962-1989, SP-46:2003). • Layout of drawing. Lines, Lettering, Dimensioning. (12 hrs.)
Professional Skill 28Hrs; Professional Knowledge 06Hrs	Construct plain scale, comparative scale, diagonal scale and vernier scale. (Mapped NOS: IES /N9403)	17. Drawing of:-Construction of scales – Plain, comparative, diagonal, vernier& scale of cords. (28hrs)	• Knowledge of different types of scale. Principle of R.F. Materials:- • Stones :–characteristics, types & uses. • Bricks –. Manufacturing, characteristics of good bricks, types,uses and hollow bricks. • Lime– characteristics, types, manufacturing &its uses. • Pozzolanic :- characteristics, types & uses. • Cement :– Manufacturing, characteristics, types, uses and test of good cement. (06 hrs.)
Professional Skill 56Hrs; Professional	Draw orthographic projections of different objects with proper lines, lettering	Drawing of :- 18. Three views in OrthographicProjection of Line, plane, Solid objects&	• Different types of projection views: Orthographic, Isometric, Oblique and Perspective.

Knowledge 12Hrs	and dimensioning. (Mapped NOS: IES /N9404) Draw Isometric / Oblique / Perspective views of different solid / hollow / cut sections with proper lines, lettering and dimensioning. (Mapped NOS: IES /N9405)	section of solids. (18hrs) 19. Isometric Projection of geometrical solids. (10hrs) 20. Construction of solid geometrical figures. (10hrs) 21. Oblique and Perspective views of step block. (18hrs)	Building materials:- • *Sand:*- characteristics,types&uses. • Clay Products :– types, earthenware, stoneware, porcelain, terracotta, glazing. • Mortar&Concrete:– Types,uses, preparation, proportion, admixtures and applications. (12 hrs.)
Professional Skill 28Hrs; Professional Knowledge 06Hrs	Draw component parts of a single storied residential building with suitable symbols and scales. (Mapped NOS: IES /N9406)	Drawing of :- 22. Component parts of a single storied residential building. (in sectional details)Showing Foundation, Plinth, Doors, Windows, Brick work, Roof, Lintel and Chajjah, etc. (28hrs)	Building materials:- • Timber:- Types, Structure, disease & defects, characterstic, seasoning, preservation and uitility. • Alternaative material to Timber • Plywood, Block board, Particle board, Fireproof reinforced plastic(FRP), Medium density fireboard (MDF) etc. • Tar, bitumen, asphalt:- • Properties, application and uses. (06 hrs.)
Professional Skill 56Hrs; Professional Knowledge 12Hrs	Draw different types of stone and brick masonry. (Mapped NOS: IES /N9407)	23. Draw Details of stone masonryincluding stone joints. (26hrs) 24. Drawing of :-Different types of brick bondingShowing arrangement of bricks in different layers as per thickness of wall, pillars, copying, etc. (30hrs).	Protective materials:- • *Paints*:- characteristic, types, uses. • Varnishes :– characteristics and uses. • Metal:– characteristic, types, uses. • Plastics :– characteristic, types, uses. Building Construction:- • Sequence of construction of a building. • Name of different parts of building. • Stone masonry:-

			• Terms, use and classification. • Principle of construction, composite masonry. • Strength of walls. • Strength of masonry. • Brick masonry – principles of construction of bonds. Tools and equipments used. (12 hrs.)
Professional Skill 56Hrs; Professional Knowledge 18Hrs	Draw different types of shallow and deep foundation. (Mapped NOS: IES /N9408)	Drawing of Foundation:- Drawing of different types of foundation – Shallow :- 25. Spread Footing. (06hrs) 26. Grillage foundation. (06hrs) Deep - 27. Pile foundation. (12hrs) 28. Raft foundation. (12hrs) 29. Well foundation. (12hrs) 30. Special foundation. (8hrs)	Building Construction:- Foundation:- • Purpose of foundation • Causes of failure of foundation • Bearing capacity of soils • Dead and live loads • Examination of ground • Types of foundation • Drawing of footing foundation setting out of building on ground excavation Simple machine foundation (18 hrs.)
Professional Skill 28Hrs; Professional Knowledge 06Hrs	Draw different types of shoring, scaffolding, underpinning, form work and timbering. (Mapped NOS: IES /N9409)	Drawing of :- 31. Shoring.(7hrs) 32. Scaffolding.(7hrs) 33. Underpinning. (7hrs) 34. Timbering. (7hrs)	Building Construction:- • Types of shoring and scaffolding in details. • Types of Underpinning and Timbering in detail (06 hrs.)
Professional Skill 28Hrs; Professional Knowledge 06Hrs	Draw different types of Damp proofing in different position. (Mapped NOS: IES /N9410)	Drawing details of treatments in building:- 35. Damp proofing. (06hrs) 36. Anti-termites. (06hrs) 37. Fire proofing. (16hrs)	Treatments of building structures:- • DPC Sources and effects of dampness • Method of prevention of dampness in building • Damp proofing materials – properties, function and types. • Anti-termite treatment – objectives, uses and applications.
Professional	Drawing of different	Draw different forms of :-	• Arches: - Technical terms-.

Skill 56Hrs; Professional Knowledge 12Hrs	types of arches and lintels with chajja. (Mapped NOS: IES /N9411)	38. Arches. (22hrs) 39. Lintels. (12hrs) 40. Lintels with Chajjahs. (22 hrs)	types ,centring • *Lintel :*-types,wooden, brick, stone, steel & RCC. • Chajjahs – characteristics, Centring& Shuttering (12 hrs.)
Professional Skill 28Hrs; Professional Knowledge 12Hrs	Drawing of different types of carpentry joints. (Mapped NOS: IES /N9415) Draw different types of doors and windows according to Manner of construction, Arrangement of component, and working operation.b (Mapped NOS:/N9416)	**Making detailed drawing of :-** 41. Carpentry joints:- lengthening, bearing, housing, framing, panelling&moulding. (11hrs) 42. Different Types doors including panelled, glazed and flush door. (11hrs) 43. Different types windows and ventilators. (06hrs)	• Carpentry joints :- terms,classification of joints, Uses, types of fixtures , fastenings. • Doors –Parts, Location, standard sizes, types. • *Windows*-types. • *Ventilators*-purpose-types. (12 hrs.)
Professional Skill 28Hrs; Professional Knowledge 06Hrs	Prepare the detailed drawing of electrical wiring system. (Mapped NOS: IES /N9419)	Electrical Wiring:- Prepare drawing of 44. Wiring in different system.(08hrs) 45. Electrical wiring plan with all fittings showing in drawing.(20 hrs)	Electrical Wiring:- • Safety precaution and elementary first aid. • Artificial respiration and treatment of electrical shock • Elementary electricity. • General ideas of supply system. • Wireman's tools kit. Wiring materials. Electrical fittings. • System of wirings. Wiring installation for domestic lightings. (06 hrs.)
Professional Skill 28Hrs; Professional Knowledge 06Hrs	Draw types of ground and upper floors. (Mapped NOS:/N9420)	Drawing details of:- 46. Types of ground & upper floors. (14hrs) 47. Various floor finishing, sequence of construction. (14hrs)	• Floors – Ground floor & upper floor-Types. • Flooring- materials used types. (06 hrs.)
Professional Skill 56Hrs;	Draw different types of vertical movement according to shape,	Drawing different forms of vertical movements:- 48. As per shape - Drawing of	• Stairs:- Terms. Requirements,Planning and designing of stair and details

Professional Knowledge 12Hrs	location, materials by using stair, lift, ramp and escalator. (Mapped NOS:/N9421)	straight, open newel, dog-legged, geometrical and bifurcated stairs & spiral stairs. (18hrs) 49. As per material - brick, stone, wooden, steel & RCC stairs. (20 hrs) 50. Drawing of Lift and Escalator. (18hrs)	of construction. • Basic concept of lift and Escalator (12 hrs.)
Professional Skill56Hrs; Professional Knowledge 18Hrs	Draw different types of roofs, truss according to shape, construction, purpose and span(Mapped NOS: IES /N9422)	Drawing details of:- 51. Slopped/Pitched Roof Truss - King Post and Queen Postroof trusses showing detailed connections. (23hrs) 52. Steel roof trusses showing detailed connections. (21hrs) 53. Wooden roof truss, showing detailed connections. (12hrs)	Roofs & Roof coverings: – • purposes,Elements, Types, Fla, pitched. • *Truss*-king post, queen post, mansard, bel-fast, steel, composite. • *Roof & coverings* – objectives, types & uses. (18 hrs.)
Professional Skill 84Hrs; Professional Knowledge 18Hrs	Perform site survey with chain / tape and prepare site plan. (Mapped NOS: IES /N9417) Perfom site survey with prismatic compass and prepare site plan. (Mapped NOS:/N9418) Perform site survey with plane table and prepare a map. (Mapped NOS: IES /N9412)	Surveying:- **Chain Survey :- (35 hrs.)** 54. Equipment and instrument used to perform surveying.(06hrs) 55. Distance measuring with chainand tape. (08hrs 56. Entering Field book and plotting. (05hrs) 57. Calculating the area of site. (07hrs 58. Prepare site planwith the helpof Mouza map. (09hrs **Compass survey:- (42hrs)** 59. Field work of prismatic compass survey. (07hrs) 60. Plotting of prismatic compasssurvey. (05hrs) 61. Testing and adjusting thecompass. (08hrs) 62. Observation of bearings. (08hrs) 63. Bearing a line. (05hrs) 64. F.B.,B.B., R.B.,W.C.B. of	*Surveying:-* • Introduction, History and principles of chain survey. • Instrument employed. • Use, care, maintenance and common terms. • Classification, accuracy, types. • Main divisions (plane & geodetic). • Chaining. • Speed in field and office work. • Knowledge of Mouza Map. Compass survey:- • Instrument and its setting up • Bearing and each included angle of close traverse. • Local attraction. • Magnetic declination and its true bearing. • Precaution in using prismatic compass.

		aLine,Traverse and also checkthe close traversing. (09hrs) **Plane Table Survey :- (07hrs)** 65. Surveying of a Building sitewith Plane Table. (07hrs)	Plane table survey:- • Instrument used in plane table survey • Care and maintenance of plane table (18 hrs.)
Professional Skill 56Hrs; Professional Knowledge 12Hrs	Make tropography map by contours with leveling instruments. (Mapped NOS: IES /N9413)	***Levelling*:-** (03 hrs.) 66. Handling of levellinginstruments& their settings(04 hrs.) 67. Temporary adjustment of alevel. (03 hrs.) 68. Simple levelling. 69. Differential levelling (Fly levelling). (03 hrs.) 70. Carry out Levelling field book. (03 hrs.) 71. Equate Reduction of levels – Height of collimation and Riseand Fall method – Comparisonof methods. (04 hrs.) 72. Solve problems on reduction of levels. (03 hrs.) 73. Calculate Missing data and how to fill it up–calculations &Arithmaticalcheckin various problems and its solution. (04 hrs.) 74. Practice leveling with different instruments. (04 hrs.) 75. Check levelling. (04 hrs.) 76. Profile levelling or Longitudinal, plotting the profile. (03 hrs.) 77. Surveying of a building site with chain and Levelling Instrument with a view to computing earth work. (04 hrs.) 78. Contour - Direct and Indirect methods. (03 hrs.) 79. Make Topography map, contours map. (04 hrs.)	*Levelling:-* • Auto level , dumpy Level, Tilting Level - introduction, definition • Principle of levelling. • Levelling staffs, its graduation & types. • Minimum equipment required • Types,component / part and function. • Temporary and permanent adjust ment, procedure in setting up. • Level& horizontal surface. Datum Benchmark, Focussing& parallax • Deduction of levels / Reduced Level. • Types of leveling, Application to chain and Levelling Instrument to Building construction. • Contouring ;-Definition, Characteristics, Methods. • Direct and Indirect methods • Interpolation of Contour, Contour gradient , Uses of Contour plan and Map. • Knowledge on road project. (12 hrs.)

		80. Solve trigonometric problems. (03 hrs.) 81. Prepare a road project in a certain alignment. (04 hrs.)	
Professional Skill 56 Hrs; Professional Knowledge 12 Hrs	Perform a site survey with Theodolite and prepare site plan. (Mapped NOS: IES /N9414)	Theodolite survey:- 82. Field work of theodolite. (05 hrs.) 83. Horizontal angle. (05 hrs.) 84. Vertical angle. (05 hrs.) 85. Magnetic bearing of a line. (05 hrs.) 86. Levelling with a theodolite. (05 hrs.) 87. Calculation of area from traverse. (04 hrs.) 88. Determination of Heights. (06 hrs.) 89. Calculation of departure, latitude, northing and easting- (5hrs) 90. Setting out work- Building,culvert, centre line of Dams,Bridges and Slope of Earth work, etc. (16hrs)	Theodolite survey:- • Introduction. • Types of theodolite. • Uses, Methods of Plotting. • Transit vernier theodolite. • Terms of transit theodolite. • Fundamental line of theodolite. • Adjustment of theodolite. • Checks, Adjustment of errors. • Open and closed traverse and their application to Engineering Problems. • Vernier scale- types. • Measurement of horizontal angle. • Measurement of vertical angle. • Adjustment of a close traverse. • Problems in transit theodolite-departure, latitude, northing and easting. (12 hrs.)
WORKSHOP CALCULATION & SCIENCE: 40 Hrs			
Professional Knowledge WCS- 40 Hrs.	Demonstrate basic mathematical concept and principles to perform practical operations. Understand and explain basic science in the field of study. (Mapped NOS: IES /N9423)	**WORKSHOP CALCULATION & SCIENCE:** **Unit, Fractions** Classification of unit system Fundamental and Derived units F.P.S, C.G.S, M.K.S and SI units Measurement units and conversion Factors, HCF, LCM and problems Fractions - Addition, substraction, multiplication & division Decimal fractions - Addition, subtraction, multilipication & division Solving problems by using calculator **Square root, Ratio and Proportions, Percentage** Square and suare root Simple problems using calculator Applications of pythagoras theorem and related problems Ratio and proportion	

		Ratio and proportion - Direct and indirect proportions Percentage Precentage - Changing percentage to decimal and fraction **Material Science** Types metals, types of ferrous and non ferrous metals Physical and mechanical properties of metals Introduction of iron and cast iron Difference between iron & steel, alloy steel and carbon steel Properties of timber **Mass, Weight, Volume and Density** Mass, volume, density, weight and specific gravity **Heat & Temperature and Pressure** Concept of heat and temperature, effects of heat, difference between heat and temperature, boiling point & melting point of different metals and non-metals Scales of temperature, celsius, fahrenheit, kelvin and conversion between scales oftemperature Heat &Temperature - Temperature measuring instruments, types of thermometer, pyrometer and transmission of heat - Conduction, convection and radiation Co-efficient of linear expansion and related problems with assignments **Mensuration** Area and perimeter of square, rectangle and parallelogram Area and perimeter of Triangles Area and perimeter of circle, semi-circle, circular ring, sector of circle, hexagon and ellipse Surface area and volume of solids - cube, cuboid, cylinder, sphere and hollow cylinder Finding the lateral surface area, total surface area and capacity in litres of hexagonal, conical and cylindrical shaped vessels **Trigonometry** Measurement of angles Trigonometrical ratios Trigonometrical tables Application in calculating height and distance (Simple applications)
Project work / on the job training **Broad area :-** (a) Prepare site map using chain/prismatic compass/plane table / leveling instrument/ theodolite. (b) Prepare innovative drawing/model of doors/ windows. (c) Prepare innovative drawing/model of vertical movement/roofs.		

SYLLABUS FOR DRAUGHTSMAN CIVIL TRADE			
SECOND YEAR			
Duration	**Reference Learning Outcome**	**Professional Skills (Trade Practical) With Indicative Hours**	**Professional Knowledge (Trade Theory)**
Professional Skill 28Hrs; Professional Knowledge 08Hrs	Draw single storied Building site plan layout. (Mapped NOS: CON/N1302)	Drawing details of:- 91. Single storied residential house with attached bath of both pitched and flat roof. (09hrs) 92. Making plan, elevation, and section with aid of line diagrams of the building. (10hrs) 93. Layout and detailing of residential building. (03hrs) 94. Create a drawing of building showing set backs. (03hrs) 95. Showing layout plan and key plan. (03hrs)	Building:- • Principle of planning • Objectives & importance. • Function& responsibility. • Orientation. • Local building Bye-Laws as per ISI code. • Lay out plan & key plan. • Submitted in composition of drawing. • Provisions for safety. • Requirement of green belt and land. (08 hrs.)
Professional Skill 28Hrs; Professional Knowledge 10 Hrs	Create objects on CAD workspace using Toolbars, Commands, Menus, formatting layer and style. (Mapped NOS: CON/N1302)	Computer practice:- 96. Function of keys and practice of basic commands. (03hrs) 97. Use of elementary commands by CAD toolbar. (03hrs) 98. Creation of objects in different layers on CAD workspace. (5 hrs) 99. Plotting of drawing from CAD. (01hr) 100. 2D drafting of flash door, panel door, window, hand railing, wash basin, sewerage pipe joints, etc. (10hrs) 101. Preparing Library folder by creating blocks of the above items. (6hrs)	Computer aided drafting:- • Operating system ,Hardware& software. • Introduction of CAD. • Its Graphical User Interface. • Method of Installation. • Basic commands of CAD. • Knowledge of Tool icons and set of Toolbars. • Knowledge of shortcut keyboard commands. (10hrs.)

Professional Skill 112 Hrs; Professional Knowledge 32 Hrs	Draw a sanction plan of double storied flat roof residential building by using CAD. (Mapped NOS: CON/N1302)	Building Drawing (Residential) Prepare:- 102. Plan, section and elevation of buildings with specifications for the given line drawing to suitable Scale. (32hrs) 103. A House single storeyed residential building with single bed room and attached bathroom with R.C.C. flat roof slab. (18hrs)	Building Planning:- • Economy & orientation. • Provision for lighting and ventilation. • Provision for drainage and sanitation. • Types of building. • Planning & designing of residential , public and commercial building. (16 hrs.)
		104. A residential building with double beded rooms with R.C.C. flat roof slab. (18 hrs.) 105. Two roomed house with RCC slope roof with gable ends. (12 hrs.) 106. A House with fully tiled roof with hips and valleys. (10 hrs.) 107. Design and create a double storied residential building (3BHK) with Positioning layout of Furniture, Electrical appliances and plumbing / sanitary fittings. (22 hrs.)	Prefabricated Structure:- • Preparation. • Method of construction, assembling. • Advantages & disadvantages. (16 hrs.)
Professional Skill 28Hrs; Professional Knowledge 08Hrs	Create objects on 3D modeling concept in CAD. (Mapped NOS: IES /N9424)	3D modeling in CAD :- (28hrs) 108. Create and use model space viewports. (04hrs) 109. Create a standard engineering layout. (04hrs) 110. Create and edit wireframe model. (04hrs) 111. Create and edit solid mesh and surface modeling. (04hrs) 112. Create and edit simple 2D regions and 3D solid	3D modeling concept in CAD • 3D coordinate systems to aid in the construction of 3D objects • Knowledge of shortcut keyboard commands. (08 hrs.)

		models. (04hrs) 113. Generate 3D text and dimensions using a variety of 3D display techniques. (04hrs) 114. Render a 3D model with a variety of lights and materials. (04hrs)	
Professional Skill 56Hrs; Professional Knowledge 16Hrs	Prepare a drawing of public building detailing with roof and coloumns by frame structures using CAD. (Mapped NOS: CON/N1302)	Building Drawing (Public) Prepare:- 115. A Primary health center for rural area with R.C.C roof. (10 hrs.) 116. A Village Library building with R.C.C flat roof. (12 hrs.) 117. A small Restaurant building with R.C.C flat roof. (06 hrs.) 118. A Single storeyed School building with R.C.C flat roof. (10 hrs.) 119. A Small workshop with north light steel roof truss (6 to 10m Span) over R.C.C. Columns. (12 hrs.) 120. Service plans. (06hrs)	• *Parks* &play ground-Types of recreation, landscaping. etc • Concepts of design of earthquake resisting buildings- requirements resistance , safety, flexible building elements, special requirements, base isolation techniques. (16 hrs.)
Professional Skill 28Hrs; Professional Knowledge 08Hrs	Prepare detailed drawing of RCC structures using CAD and prepare bar bending schedule. (Mapped NOS: IES /N9425)	Drawing details of RCC members with reinforcement:- 121. Rectangular beams(Single reinforced &Double reinforced). (10hrs) 122. Lintel, chajjas&slabs.(10hrs) 123. Stair - details of step. (08hrs)	Reinforced cement concrete structure:- • Introduction to RCC uses. • Materials – proportions • Form work • Bar bending details as per IS Code. • Reinforced brick work. (8 hrs.)
Professional Skill 56Hrs; Professional Knowledge 18Hrs	Prepare detailed drawing of RCC structures using CAD and prepare bar bending schedule. (Mapped NOS: IES /N9425)	Draw Reinforced details of RCC members:- 124. Preparing bar-bending schedule. (08hrs) 125. Details of one-way slab & two-way slab. (18 hrs)	Materials used for RCC:- • Construction. • Selection of materials – coarse aggregate, fine aggregate, cement water and reinforcement.

	Draw the details of a framed structure and portal frame of a residential building using CAD. (Mapped NOS: IES /N9426)	126. T-beam, Inverted beam, cantilever, retaining wall, Lift well. (08 hrs) 127. Column with footing. (07hrs) 128. Continuous columns showing disposition of reinforcement. (08hrs) 129. RCC framed structure, portal frame, B.I.S. Code 456-2000, SP - 34 and its application. (07hrs)	• Characteristics. • Method of mixing concrete – machine mixing and hand mixing. • Slump test. • Structure – columns, beams, slabs - one-way slab & two-way slab. • Innovative construction. • Safety against earthquake. • Grade of cement, steel-behaviour and test. • Bar-bending schedule. • Retaining wall. • R.C.C. Framed structure. (18 hrs.)
Professional Skill 56Hrs; Professional Knowledge 16Hrs	Draw the different types of steel sections, rivets and bolts using CAD. (Mapped NOS: CON/N1302) Draw the details of girders, roof trusses and steel stanchions using CAD. (Mapped NOS: CON/N1302)	Drawing of different types of:- 130. Steel sections, rivet,bolts,etc. (16 hrs) 131. Section and elevation of girders. (12hrs) 132. Structural Joints. (12hrs) 133. Plate girders roof trusses, stanchion etc. (16hrs)	Steel structures:- • Conmen forms of steel sections. • Structural fasteners , Joints. • Tension & compression member. • Classification, fabrication. • Construction details. (16 hrs.)
Professional Skill 56Hrs; Professional Knowledge 24Hrs	Prepare the detailed drawing showing the different types of sanitary fittings, arrangements of manholes, details of septic tank using CAD. (Mapped NOS: IES /N9427) Draw the details flow diagram of water treatment plant (WTP) and Swerage Treatment plant (STP). (Mapped NOS: IES /N9428)	Public Health & Sanitation. 134. Drawings of showing various pipe joints for underground drainage. (9hrs) 135. Types of sanitary fittings in multi-storeyed building. (9hrs) 136. Manholes and septic tank. (9hrs) 137. Water supply system. (6hrs) 138. R.C.C square overhead tank supported by four columns. (9hrs) 139. Preparation of service plan(drainage plan)for	House drainage of building:- • Introduction. • Terms used in PHE. • Systems of sanitation. • System of house drainage. • plumbing, sanitary fittings, etc. • Types of sewer appurtenance. • Systems of plumbing. • Manholes & Septic tank. • Water treatment plant • Swerage treatment plant (24 hrs.)

		isolated building & in sewer system. (6 hrs) 140. Drawings of toilet fixtures. (04hrs) 141. Flow diagram of water treatment plant (WTP) and Swerage Treatment plant (STP). (04hrs)	
Professional Skill 56Hrs; Professional Knowledge 16Hrs	Draw the cross sectional view of different types of roads showing component parts using CAD. (Mapped NOS: IES /N9429)	**Roads:-** 142. Draw showing road structure and component parts. (18hrs) 143. Prepare a drawing of Cross-sections showing the different types of roads-accordingto location & materials. (20hrs) 144. Prepare a drawing of road curves & gradient. (18hrs)	**Roads:-** • Introduction. • History of highway development. • General principles of alignment. • Classification and construction of different types of roads, • Component parts. • Road curves, gradient. • Curves-types, designation of curves. • Setting out simple curve by successive bisection from long chords. • simple curve by offsets from long chords. • Road drainage system. (16 hrs.)
Professional Skill 56Hrs; Professional Knowledge 16Hrs	Draw the details of different types of culverts using CAD. (Mapped NOS: IES /N9430) Prepare detailed drawing a bridge using CAD. (Mapped NOS: IES /N9431)	**Bridge &Culvert :-** Prepare drawing of - 145. Different types of culvert. (10hrs) 146. Preparing drawing of an arched bridge. (10 hrs) Draw plan and sectional views of the following:- 147. R.C.C Slab Culvert with splayed wing walls. (12hrs) 148. Steel Foot over bridge across a highway. (12hrs) 149. Two span Tee Beam Bridge with square returns. (12hrs)	**Bridges &Culvert**:- • Introduction to bridges. • Component parts of bridge. • Classification of culverts. • IRC loading. • Selection of type and location. • Factors governing the ideal site. • Alignment of bridge. • Foundation -selection-caisson. • Coffer dam- types. • Types of super structure. • Substructure-piers,

			abutments, wing walls. • Classification of bridge. • Tunnels- rules used for the sizes of different members. (16 hrs.)
Professional Skill 56Hrs; Professional Knowledge 16Hrs	Draw the typical cross section of rail sections, railway tracks in cutting and embankment using CAD. (Mapped NOS: IES /N9432)	**Railway:-** 150. Draw typical cross section of rail track. (06hrs) 151. Draw Railway tracks – embankment layout plans of railway platform. (22 hrs) 152. Draw typical cross-section of railway tracks cutting & embankment (single lane & double lane). (22hrs) 153. Draw layout of signalling points & crossing. (06 hrs)	**Railways :-** • Permanent way • Rail gauges, Functions, Requirements, Types, Sections, Length of rail. • Welding of rail, wear of rail. • Coning of wheels, hogged rail, bending of rail, creep of rail. • Causes and prevention of creep. • Sleeper and ballast-function, types, requirement, materials, rail. • Fixtures, Fastenings and plate laying in rail. • Joints-types, fish plate, fish bolt-spikes, chairs and keys-bearing plate, block elastic, base plate. • Anchors and anti-creepers. • Construction of permanent ways. • Railway station and yard. (16 hrs.)
Professional Skill 56Hrs; Professional Knowledge 16Hrs	Prepare detailed drawing of typical cross sections of Dam, barrages, weir and Cross drainage works using CAD. (Mapped NOS: IES /N9433) Draw the schematic diagram of different	**Drawing of different types of irrigation structures: –** 154. Dams, barrages, weir etc. (9hrs) 155. Longitudinal section of distributaries with the help of given sketch & data. (9hrs) 156. Head regulators. (8hrs) 157. Types of cross drainage	**Irrigation Engineering:-** • Terms used in irrigation. • Hydrology like duty, delta, base period, intensity of irrigation. • Hydrograph, peak flow, run off, catchment area, CCA, corps like, rabi, kharifetc. • Storage, diversion head

	structures of Hydro electric project using CAD. (Mapped NOS: IES /N9434)	work. (9 hrs.) 158. Hydro electric project. (9hrs) **Drawing of canal** 159. Alignment including longitudinal and cross sections of canals with the given data. (12 hrs)	work -characteristics and types. • Reservoir –types of reservoirs, i.e., single purpose and multi-purpose, area, capacity and curves of reservoir. • Dams, weir & barrages-types purposes. • Hydro electric project like Forebay, Penstock, Turbines, Power house, etc. • **Canals**- classification and distribution system, canal structures. • Types of cross drainage works like Aquaduct, Super passage, Syphon, Level crossing, inlet and outlet, etc. (16 hrs.)
Professional Skill 84Hrs; Professional Knowledge 32Hrs	Prepare detailed estimate and cost analysis of different types of building and other structures using application software. (Mapped NOS: IES /N9435) Prepare rate analysis of different items of work. (Mapped NOS: IES /N9436) Problems on preparing preliminary/Approximate estimates for building project. (Mapped NOS: IES /N9437)	**Estimating and Costing:- (visualizing the plotted drawing)** 160. Prepare detailed Estimate :-Calculate quantities of items of single storied and double storied building. (12 hrs.) 161. Prepare abstract of estimate by prevailing rates. (10 hrs.) 162. Prepare rate analysis of major items - RCC, PCC, Wood works, Stone & Brick masonry & Plastering. (16hrs) 163. Solve problems on preparation ofpreliminary / approximate estimates for building projects by Excel worksheet as per Govt. schedule. (16hrs)	**Estimating and Costing** :- • Introduction. • Purpose and common techniques. • Drawing of construction. • Measurement techniques. • Estimate-necessity, importance, types-approximate and detailed estimate-main and sub estimates, revised, supplementary, maintenance / repair estimate-taking off quantities- method • Rate analysis of typical items and their specifications. • Labour and materials. • Govt. Schedule of rate. • Estimating of irregular boundaries by trapezoidal

		164. Familiarisationwith and making estimation with software. (18 hrs) 165. Estimate earthwork of irregular boundaries. (12 hrs)	and Simpsons formula. (32 hrs.)
Professional Skill 56Hrs; Professional Knowledge 16Hrs	Prepare a map using Total station. (Mapped NOS: IES /N9438)	**Total Station:-** 166. Application of survey using TS. (06hrs) 167. Field procedure for co-ordinate measurement. (06hrs) 168. field procedure to run open traverse and closed traverse. (04hrs) 169. Transfer or establish Bench Mark. (03hrs) 170. Perform stakeout / demarcation of building layout /plot layout/ roads/ alignment. (08 hrs.) 171. Measure remote distance and elevation. (10 hrs) 172. Calculate surface area on field/site. (03hrs) 173. Calculate volume of field/site. (03hrs) 174. Procedure for down load and up load data. (06 hrs) 175. Simple survey map using Auto CAD. (07hrs)	**Total Station:-** – • Introduction. • Components parts, accessories used. • characteristics, features. • advantages and disadvantages. • principle of EMD. • Working and need. • Setting and measurement. • Electronic, display & Data reading. • Rectangular and polar co-ordinate system. • Terminology of open and closed traverse. (16 hrs.)
Professional Skill 28Hrs; Professional Knowledge 08Hrs	Locate the station point using GPS and obtain a set of co-ordinates. (Mapped NOS: IES /N9439)	**GPS Awareness:-** 176. Practical application of GPSComponents of GPS data processing.GPS signal. 9hrs 177. Code and biasesTechniques of GPS observing. 4hrs 178. Set up and use GPS equipment. – (9 hrs) 179. Compare with GPS, GIS,GNSS& CAD. (06hrs)	**GPS (Global Positioning System):-** • Introduction of GPS system. • Co- ordinate and time system. • Satellite and conversional geodetic system. • GPS. Signal, code, and biases • Role of TRANSIT in GPS development.

			• GPS segment organisation. • GPS survey methods. Basic geodetic co-ordinate. • Ground support equipment, signals. • Tracking devises& system. • Time measurement and GPS timing. 8hrs
WORKSHOP CALCULATION & SCIENCE: 40 Hrs			
Professional Knowledge WCS- 40 Hrs.	Demonstrate basic mathematical concept and principles to perform practical operations. Understand and explain basic science in the field of study. (Mapped NOS: IES /N9440)	**WORKSHOP CALCULATION & SCIENCE:** **Centre of Gravity** Centre of gravity - Centre of gravity and its practical application **Area of cut out regular surfaces and area of irregular surfaces** Area of cut out regular surfaces - circle, segment and sector of circle Related problems of area of cut out regular surfaces - circle, segment and sector of circle Area of irregular surfaces and application related to shop problems **Algebra** Algebra - Addition , subtraction, multiplication & division Algebra - Theory of indices, algebraic formula, related problems **Elasticity** Elasticity - Elastic, plastic materials, stress, strain and their units and young's modulus Elasticity - Ultimate stress and working stress **Profit and Loss** Profit and loss - Simple problems on profit & loss Profit and loss - Simple and compound interest **Estimation and Costing** Estimation and costing - Simple estimation of the requirement of material etc., as applicable to the trade Estimation and costing - Problems on estimation and costing	
Project work / on the job training Auto CAD 3D modelling with rendering (material, light, shadow, etc.) **Broad Area :-** (a) Prepare project drawing of Roads with cross sectional views showing different components using CAD. (b) Prepare detail project drawing of Culvert/ bridge using Auto Cad 3D modeling with rendering. (c) Prepare project drawing of Dam/ barrage/Weir with cross sectional views using Auto CAD 3D modeling with rendering.			

SYLLABUS FOR CORE SKILLS
1. Employability Skills (Common for all CTS trades) (120 Hrs. + 60 Hrs.)

Learning outcomes, assessment criteria, syllabus and Tool List of Core Skills subjects which is common for a group of trades, provided separately in www.bharatskills.gov.in/ dgt.gov.in

ANNEXURE-I

List of Tools & Equipment			
DRAUGHTSMAN CIVIL (for Batch of 24 Candidates)			
S No.	**Name of the Tools and Equipment**	**Specification**	**Quantity**
A. TRAINEES TOOL KIT			
1.	Box drawing instrument	containing one 15 cm compass with pin point, pin point & lengthening bar, one pair spring bows, rotating compass with interchangeable ink and pencil points, drawing pens with plain point & cross point, screw driver and box of leads.(0.2,0.3,0.4 mm).	24+1 Nos.
2.	Protractor celluloid	15 cm semi- circular.	24+1 Nos.
3.	Scale card board-	metric set of eight A to H in a box 1: 1,1:2, 1:2:5, 1: 5, 1:10, 1:20, 1:50, 1:100,1:200, 1:500, 1:1000,1:2000,1:1250, 1:6000, 1:38 1/3, 1:66 2/3	24+1 Nos.
4.	Scales plotting box wood 6 metric scales	30 cms long withoffset scales.	24+1 Nos.
5.	Set square transparent	20 cm, 2 mm thick with bevelled edges 45 degree .	24+1 Nos.
6.	Set square celluloid	25 cm,2mm thick with bevelled edges60 degrees.	24+1 Nos.
7.	T-Square	750mm/Mini drafter/ Parallel Bar	24+1 Nos.
8.	Template –Architects and builders		24+1 Nos.
B. GENERAL MACHINERY SHOP OUTFIT			
9.	Geometrical models (wooden/plastic)	i) Cube 08 cm sides. ii) Rectangular parallel piped 8cm x 15cm iii) Sphere 8cm dia. iv) Right circular cone 8 cm dia base and 15 cm vertical height v) Square pyramid 8cm side base and 15 cm vertical height vi) Cylinder 8 cm dia. 15 cm height. vii) Prisms triangular 8 cm sides	04 each

		triangle and 15 cm length. viii) Prism hexagonal 8 cm side's hexagon and 15 lengths	
10.	Templates – Circle, Ellipse, furniture, etc.		04 Nos.
11.	French curves	transparent plastic set of 12	04 Nos.
12.	Flexible curves	80 cm long	04 Nos.
13.	Radius curve metric	3 mm to 15 mm	04 Nos.
14.	Brass parallel rulers in a case		04 Nos.
15.	Calculator Scientific (Non-programmable)		04 Nos.
16.	Proportional dividers	15 cm	04 Nos.
C. LIST OF SURVEYING INSTRUMENTS			
17.	Land measuring chain	30 metres with two handles	04 Nos.
18.	Steel tape	30 meters long in a leather case	04 Nos.
19.	Ranging rod wooden fitted iron shoe	2 mt. long	24 Nos.
20.	Steel arrow, wooden peg, wooden mallet, hammer		As required
21.	Prismatic compass with stand	110 mm dia.	01 set
22.	Plane table	with stand with accessories – alidade, trough compass, spirit level (6"), U – fork, plumb bob, etc	2 sets
23.	Telescopic Alidade		01 set
24.	Dumpy Level with all accessories		01 set
25.	Auto level With all accessories		02 Nos.
26.	Levelling staff	4 mt. leading to 5 mt. telescopic type	01 telescopic and 02 straight pieces
27.	Transit Theodolite with stand with all accessories		02 sets
28.	Digital Theodolite	latest model With all accessories (Features:-Based on laser technology, Two large LCD panel with easy to read ,Automatically compensates tilt in two direction and compensates vertical angles. High integrated electronic board and IC elements)	02 Nos.
29.	Instrument for Total Station with latest model, With all	Graphic LCD display on both side.Multy function key board on	02 Nos.

	accessories	both side. Able to interchange data between GPS and Total station without any data conversion. Minimum 8 hours rechargeable li-ion battery .Poles and Prism 2Nos each	
30.	Hand held GPS	(latest model) with standard specification	02 Nos.
D. COMPUTER LAB			
31.	Personal computer	CPU: 32/64 Bit i3/i5/i7 or latest processor, Speed: 3 GHz or Higher. RAM:-4 GB DDR-III or Higher, Wi-Fi Enabled. Network Card: Integrated Gigabit Ethernet, with USB Mouse, USB Keyboard and Monitor (Min. 17 Inch. Licensed Operating System and Antivirus compatible with trade related software.	24 Nos.
32.	Laptop with latest configuration		02 Nos.
33.	CAD software		24user
34.	Plotter	A1 size	01 No.
35.	Printer	(A3 Laser jet) with scanner (multipurpose)	01 No.
36.	Server work station with latest configuration		01 No.
37.	Broad Band connection		01 No.
38.	UPS		As required
39.	Computer Table		24 Nos.
40.	Computer Chair.		24 Nos.
41.	Furniture for server, printer, plotter		01each
42.	White Board	6’ x 4’	02 Nos.
43.	DLP Projector	2000 lumens or higher	02 Nos.
44.	First Aid Box		01 No.
45.	Screen for Projector	motorized	02 Nos.
46.	Fire Extinguisher		01 No.
47.	Air Conditioner		As required
48.	Wall Clock		01 No.
49.	Document Camera / Visualiser		02 Nos.
50.	Smart Board / Inter Active Board		02 Nos.
51.	Steel Cupboard	180 x 90 x 45 cm	02 Nos.
52.	Steel Cupboard	120 x 60 x 45 cm	02 Nos.

53.	Book Shelf		02 Nos.
E. LIST OF FURNITURE			
54.	Trainer's / Instructor's table (big size full secretariat)	6 feet x 4 feet	01 No.
55.	Trainer's / Instructor's table		01 No.
56.	Chair for Trainer / Instructor		02 Nos.
57.	Class room chairs (armless)		24 Nos.
58.	Class room table single / Dual desk		24 /12 Nos.
59.	Almirah steel (major)	6" / higher	02 Nos.
60.	Drawing table with Board	750mm X 550mm	24 Nos.

Note: -

1. *Internet facility is desired to be provided in the class room.*

ABBREVIATIONS

CTS	Craftsmen Training Scheme
ATS	Apprenticeship Training Scheme
CITS	Craft Instructor Training Scheme
DGT	Directorate General of Training
MSDE	Ministry of Skill Development and Entrepreneurship
NTC	National Trade Certificate
NAC	National Apprentiship Certificate
NCIC	National Craft Instructor Certificate
LD	Locomotor Disability
CP	Cerebral Palsy
MD	Multiple Disabilities
LV	Low Vision
HH	Hard of Hearing
ID	Intellectual Disabilities
LC	Leprosy Cured
SLD	Specific Learning Disabilities
DW	Dwarfism
MI	Mental Illness
AA	Acid Attack
PwD	Person with disabilities


कौशलं बलम्