

Syllabus for the subject

of

**ENGINEERING DRAWING**

Under

**CRAFT INSTRUCTOR TRAINING SCHEME (CITS)**

(For Engineering Trades under Group IV)

Re-Designed in

- 2014 -

By

**Government of India  
Ministry of Labour & Employment  
Directorate General of Employment & Training**

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## **A. RATIONALE**

Success & Sustainability of any Training System depends upon given other things, availability of good quality instructors. An Instructor should possess, besides trade skills, **“Skills to Transfer Skills”**. To cope up this quality possession of core skills is imperative.

Ability to read Engineering Drawing is essential to perform a job / task of Engineering Trades. It is the skills set which enables comprehending the given job and subsequent planning to complete the task/job. Thus it is regarded as core skills for all Engineering trades.

Similarly, knowledge of basic scientific principles creates the foundation for acquiring hard skills. It is the initial/inherent knowledge set which enables analyzing the given job and subsequent detail planning; Such as selecting proper physical conditions e.g. Temperature for a heat treatment process, Material of cutting tool etc.

Similarly, ability to perform simple calculations also creates the foundation for proper hard skills. It is the inherent knowledge set which enables to analyse the given job - Quantitatively and subsequent detail planning; Such as selecting the physical conditions quantitatively e.g. speed and feed of a cutting operation.

Thus Engineering Drawing, Workshop Calculation & Science are regarded as a core skills set which supplements hard skills in all Engineering Trades.

Recognizing this importance of the core skills, the subjects of Engineering Drawing and Workshop Calculation & Science are made integral part of all Engineering Trades for Craft Instructors Training Scheme (CITS) under NCVT.

## **B. GENERAL INFORMATION**

1. Name of the Course : Craft Instructor Training Scheme
2. Duration of Instructor Training : 1 Year (Two semesters each of six months duration).
3. Subjects covered in the Semesters : Detailed in Section - D
4. Name of the Subject : **ENGINEERING DRAWING**
5. Applicability : For all Engineering Trades of Group IV (Fitter, Turner, Machinist, Machinist (Grinder), Tool & Die Maker, MMTM, Operator Adv. M/c Tool)
6. Examination : AITT to be held at the end of each semester.
7. Space Norms :
  - (a) One Drawing Hall of minimum 60 sq.m. area having Minimum width of 6 m. with minimum Illumination of 9000 lumen will be reqd.
  - (b) CAD Lab. : 50 Sq.m. area having minimum width of 5 m. with Illumination of minimum 12000 lumen will be reqd. (No separate CAD Lab. is required if IT Lab. / Information Centre is available in the Institute)  
**The electrical equipments of Drawing Hall should conform to minimum 3 star Building energy rating as per Bureau of Energy Efficiency (B.E.E.)**
8. Power Norms :
  - (a) 1.3 Kw for Drawing Hall
  - (b) 1.5 Kw for CAD Lab.
9. Unit strength(Batch Size) : 20
10. Entry qualification : NTC / NAC from NCVT in any one of the trades of Gr.-IV **OR** Diploma/Degree in Mechanical/Production Industrial Engineering from AICTE recognized Board / University.
11. Trainers' Qualification : Diploma or Degree in Mechanical / Production / Industrial Engineering from AICTE recognized Board / University with five / two years experience respectively.

**Desirable:** Craft Instructor Certificate in RoD & A course under NCVT.

### 12. Trainer:

- At least one full time instructor is required for two batches.
- For one batch, the instructor may be out sourced/ hired on contract basis.

### **C. GROUPING OF TRADES IN CRAFT INSTRUCTOR TRAINING SCHEME**

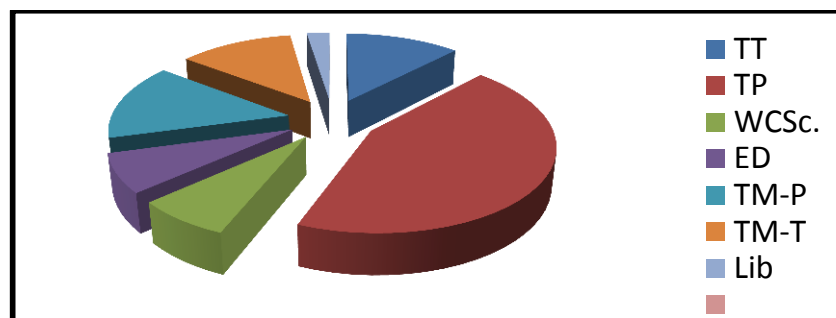
GROUP NO.	TRADE NAME
I	Forger & Heat Treater, Carpenter, Foundry man, Pattern Maker Sheet Metal Worker, ALL WELDER TRADES {Welder, Welder (GMAW &GTAW), Welder (Pipe), Welder (Structural), Welder (Fabrication & Fitting) and Welder (Welding & Inspection)}, Plumber.
II	Mechanic Motor Vehicle, Mech. Ref. & Air Conditioning, Farm Mech. & Mech. Agricultural Machineries
III	Draughtsman (Mechanical), Draughtsman (Civil), Reading of Drawing & Arithmetic (RoD&A), Surveyor , Draughtsman (Architect)
IV	Fitter, Turner, Machinist, Machinist (Grinder), Tool & Die Maker, MMTM, Operator Adv. M/C Tool, Refractory Technician.
V	Electrician, Wireman
VI	Maintenance Mech. (CP), Attendant Operator(CP), Instrument Mechanic(CP), Laboratory Attendant(CP), Instrument Mechanic
VII	Electronics Mechanic, Mechanic Radio TV, IT&ESM, Computer Hardware & Networking Maintenance.

### D. SEMESTER WISE ALLOTMENT OF TIME & MARKS AMONG THE SUBJECTS FOR CITS

	SUBJECTS	Hrs. / Week	% of time allotted	Marks	Sessional	Full Marks	Pass Marks		
							Exam.	Sessional	Total
First semester	Trade Practical – 1	20	50	200	30	<b>230</b>	120	18	<b>138</b>
	Trade Theory - 1	6	15	100	20	<b>120</b>	60	12	72
	Workshop Cal. & Sc.	<b>6</b>	15	50	-	<b>50</b>	30	-	30
	Engineering Drawing	<b>6</b>	15	100	-	<b>100</b>	60	-	60
	Library	<b>2</b>	5	-	-				
	<b>TOTAL for Sem. - I</b>	<b>40</b>		<b>450</b>	<b>50</b>	<b>500</b>	<b>270</b>	<b>30</b>	<b>300</b>
Second semester	Trade Practical – 2	16	40	200	30	<b>230</b>	120	18	<b>138</b>
	Trade Theory - 2	4	10	100	20	<b>120</b>	60	12	72
	Training Methodology - Practical	12	30	200	30	<b>230</b>	120	18	<b>138</b>
	Training Methodology - Theory + IT	8	20	100	20	<b>120</b>	60	12	72
	<b>TOTAL</b>	<b>40</b>		<b>600</b>	<b>100</b>	<b>700</b>	<b>360</b>	<b>60</b>	<b>420</b>
	<b>GRAND TOTAL</b>	<b>80</b>		<b>1050</b>	<b>150</b>	<b>1200</b>	<b>630</b>	<b>90</b>	<b>720</b>

Hourly Distribution

TOTAL: 1200 marks for 2 semesters Pass marks: 720



Subject	Time in %	Marks in %
Trade Practical	45	38
Trade Theory	12.5	20
<b>Total for Trade</b>	<b>57.5</b>	<b>58</b>
Training Methodology (Practical)	15	19
Training Methodology (Theory) + IT	12.5	10
<b>Total for Training Methodology &amp; IT</b>	<b>27.5</b>	<b>29</b>
Engineering Drawing	7.5	12
Workshop Cal. & Sc.	7.5	4
Library	2.5	-

## **E. DETAILS OF ENGINEERING DRAWING SYLLABUS**

### **Under Craft Instructor Training Scheme (CITS)**

#### **Group-IV**

<b>Sl. No.</b>	<b>Topics</b>	<b>Hours</b>	<b>Marks</b>
1.	<b>FREE HAND SKETCH</b> Free hand sketch of commonly used Hand Tools and equipments.	4	5
2.	<b>SCALES</b> Scales – their need and importance – (Theoretical instructions). Drawing of plain and diagonal scales; harder problems	4	5
3.	<b>ENGINEERING CURVES</b> Various types of curves like epicycloids, hypocycloid, Involute, spiral & Archimedes spiral.	4	5
4.	<b>PROJECTIONS</b> Theory of projections (Elaborate theoretical instructions), Reference planes, orthographic projections concept 1st Angle and 3rd Angle, Projections of points, Projections of Lines–determination of true lengths & inclinations. Projections of plane, determination of true shape. Exercises on missing surfaces and views. Orthographic drawing or interpretation of views. Introduction to first angle projections of solids.	14	10
5.	<b>SECTIONS</b> Importance and salient features, Methods of representing sections, conventional sections of various materials, classification of sections, conventional in sectioning. Drawing of full section, half section, partial or broken out sections, offset sections, revolved sections and removed sections. Drawing of different conventions for materials in section, conventional breaks for shafts, pipes, Rectangular, square angle, channel, rolled sections. Exercises on sectional views of different objects.	14	10
6.	<b>ISOMETRIC VIEWS</b> Fundamentals of isometric projections (Theoretical Projections) Isometric views from 2 to 3 given orthographic views. Preparation of simple working drawing of Furniture items like table, stool and any job prepared in the workshop.	22	15

7.	<p><b>FASTENERS</b></p> <p>Sketches of elements of screw threads, Sketches of studs, cap screws machine screws, set screws, Locking devices, bolts, Hexagonal &amp; square nuts &amp; nut bolt &amp; washer assembly. Sketches of plain spring lock, toothed lock, washers, cap nut, check nut, slotted nut, cassette\ nut, sawn nut, wing nut, eye blot, tee bolt &amp; foundation bolt.</p> <p>Sketches of various types of rivet heads (snap–pan–conical–countersunk)</p> <p>Sketches of keys (sunk, flat, saddle, gib head, woodruff)</p> <p>Sketches of hole &amp; shaft Assembly.</p>	14	10
8.	<p><b>GRAPHS &amp; CHARTS</b></p> <p>Types (Bar, Pie, Percentage bar, Logarithmic), Preparation &amp; interpretation of the graphs and charts.</p>	8	5
9.	<p><b>DETAIL DRWAING</b></p> <p>Detail drawing of the following with complete dimensioning, tolerances, material and Surface finish specifications</p> <ol style="list-style-type: none"> <li>1. Universal couplings</li> <li>2. Ball bearing and roller bearing.</li> <li>3. Fast and loose pulley.</li> <li>4. Stepped and V belt pulley.</li> <li>5. Flanged Pipe joints, right angle bend.</li> <li>6. Tool Post of Lathe Machine.</li> <li>7. Tail Stock of Lathe Machine</li> <li>8. Stepped and V belt pulley.</li> <li>9. Flanged Pipe joints, right angle bend.</li> <li>10. Tool Post of Lathe Machine.</li> <li>11. Tail Stock of Lathe Machine</li> </ol> <p>Practice of blue print reading on limit, size, fits, tolerance, machining symbols, and reading out of assembly drawing etc., ISO Standards.</p>	34	25
10.	<p><b>COMPUTER AIDED DESIGN (CAD)</b></p> <p>Making simple drawings using features of CAD and confirming the drafting specifications.</p> <p>Saving and retrieving drawings. Dimensioning. Lettering. Plotted drawing.</p>	14	10
<b>Total Hours &amp; Marks</b>		132	100
<b>Revision &amp; Examination</b>			



## **F. LIST OF TOOLS & EQUIPMENTS**

<b>Sl. No.</b>	<b>NAME OF TOOLS / EQUIPMENTS</b>	<b>QUANTITY</b>
<b><u>Trainees Kit</u></b>		
1.	Drawing Instrument Box with accessories.	20+1 sets
2.	Set square celluloid 45(250x1.5mm)	20+1 sets
3.	Set square celluloid 60(250x1.5mm)	20+1 sets
4.	French-curves(set of 20 celluloid)	20+1 sets
5.	Drawing Board (700 x 500) IS:1444	20+1 sets
6.	Tee-Square (700 mm blade) IS:1360	20+1 sets
7.	Mini Drafter	20+1 sets
<b><u>General Outfit</u></b>		
1.	Computer 3GHz or latest with 1GB Or higher RAM with compatible motherboard DVD combo drive with latest x version, hard disk with 160 GB or above, 19" TFT Monitor, 1 GB AGP card, 10/100 Ethernet card, Internal modem, UPS with 800 VA / Latest Version	11 nos.
2.	Software: MS-Office XP or latest version of operating software Auto-CAD with power pack or latest version.	11 users licensed
3.	Laser Jet printer Latest model – Print, Copy and Scan 1200x1200dpi, 16MB	1 no.
4.	UPS-5 KVA	1 no.
5.	Chest of drawers (8 drawers)	2 nos.
6.	Trainees Locker (8 drawers )	3 nos.
7.	Book Self	2 nos.
8.	Steel tape 2 meters (Pull type)	1 nos.
9.	Drawing table for A1 sheet	20+1 nos.
10.	Stools (Revolving type) Adjustable height	20+1 nos.
11.	T.O's Table 6ftX4ft	1 no.
12.	T.O's Chair Armed chair – Revolving	1 no.
13.	Almirah Steel 6ft. height or higher	2 nos.
14.	Computer table	11 nos.
15.	Computer chairs – Revolving	21 nos.
16.	Table for printers	1 no.
17.	D.L.P Projector 2000 LUMEN OR HIGHER	1 no.
18.	Motorised Screen forv Projector	1 no.
19.	White board 6FT. x 4FT.	1 no.
20.	Fire Fighting Equipments	As required
21.	First Aid Box	1 no.