

Syllabus for the subject

of

TRADE THEORY-I

AND

TRADE PRACTICAL-I

Under

CRAFT INSTRUCTOR TRAINING SCHEME

READING OF DRAWING AND ARITHMETIC

Redesigned in

2014

By

Government of India

Ministry of Labour & Employment (DGE&T)

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 good trade skills to impart skill training. To cope up this quality possession of trade skills is imperative.

Ability to understand and interpret the course content is essential to perform a job / task of Engineering Trades. It is the skills, Knowledge and Attitude which enables comprehending the given job and subsequent planning to complete the task/job. Thus it is imperative for any trade to instructor to have skill so that same can be transferred.

For an instructor it is essential to have in depth knowledge set which enables analyzing the given job and subsequent detail planning. To transfer skill the practical know how is most important criteria as in ITI system skill is the ultimate requirement. To perform a task/job both theoretical and practical knowledge are very much needed. Thus Trade Technology is regarded as basic/hard skills which are base of all skill based training.

Recognizing this importance maximum weight age has been given to the Trade Technology in all Engineering Trades in Craft Instructors Training Scheme (CITS) under NCVT.

B. GENERAL INFORMATION

1. Name of the Course : **Craft Instructor Training**
2. Duration of Instructor Training : 1 Year (Two semesters each of six months duration).
3. Subjects covered in the Semesters : Detailed in Section - C
4. Name of the Subject : **TRADE THEORY –I & TRADE PRACTICAL-I**
5. Applicability : **READING OF DRAWING AND ARITHMETIC**
6. Examination : AITT to be held at the end of each semester.
7. Space Norms : (a) One class room of minimum 30 sq.m. area having Minimum width of 5 m.and with 6000 lumen
(b) Drawing Hall : 100 sq. meter having minimum width of 8 m. and with 20000 lumen
The electrical equipments of Class room should conform to minimum 3 star Building energy rating as per Bureau of Energy Efficiency (B.E.E.)
8. Power Norms : (a) 1 KW for Class room
(b) 3 KW for Drawing Hall.
9. Unit strength(Batch Size) : 20 Trainee
10. Entry qualification : Diploma/Degree in Mechanical/Production / Industrial Engineering from AICTE recognized Board / University. OR
National Trade / Apprenticeship Certificate in the relevant trade
11. Trainers' Qualification : Diploma or Degree in Mechanical / Production / Industrial Engineering from AICTE recognized Board / University with five / two years experience respectively.
12. Desirable: Passed National Craft Instructor Training course in same or relevant trade.

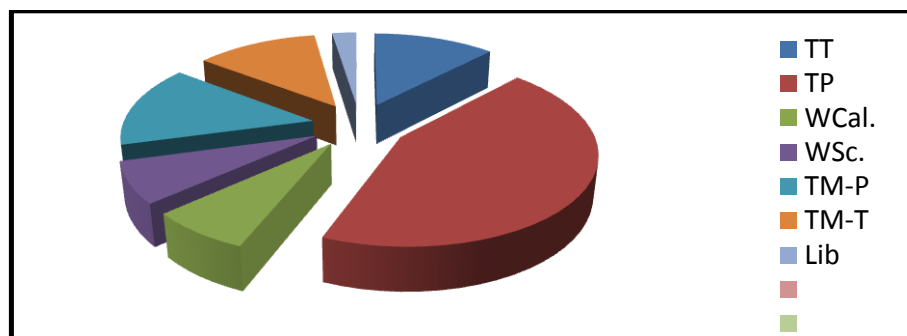
In case of two units, one trainer must be Degree in Engineering.

C. 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	230	120	18	138
	Trade Theory - 1	6	15	100	20	120	60	12	72
	Workshop Cal.	6	15	75	-	75	45	-	45
	Workshop Sc.	6	15	75	-	75	45	-	45
	Library	2	5	-	-				
	TOTAL for Sem. - I	40		450	50	500	270	30	300
Second semester	Trade Practical – 2	16	40	200	30	230	120	18	138
	Trade Theory - 2	4	10	100	20	120	60	12	72
	Training Methodology - Practical	12	30	200	30	230	120	18	138
	Training Methodology - Theory + IT	6+2	20	100	20	120	60	12	72
	TOTAL	40		600	100	700	360	60	420
	GRAND TOTAL	80		1050	150	1200	630	90	720

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
Total for Trade	57.5	58
Training Methodology (Practical)	15	19
Training Methodology (Theory) + IT	12.5	10
Total for Training Methodology & IT	27.5	29
Workshop Cal.	7.5	6.25
Workshop Sc.	7.5	6.25
Library	2.5	-

D. SYLLABUS FOR THE TRADE: READING OF DRAWING AND ARITHMETIC

CRAFT INSTRUCTOR TRAINING SCHEME

SEMESTAR -I

WEEK NO.	TRADE THEORY	Hours	Marks	PRATICAL	Hours	Marks
1.	Importance of trade, Environmental, occupation & safety hazards specific to the trade like electrical, computer & related shop floor hazards. Introduction to BIS & ISO & their function.	6	30	Conventional Representation signs and symbols of machine parts, practising free hand sketches on hand tools, simple machine parts & equipments.	20	80
2.	Scales: Principles, types, and applications. Dimensioning: - Introduction, Importance, system of dimensioning Conversion.	6		Construction of scales. Types of lines, Dimensioning practice on technical drawing.	20	
3.	Pictorial views: types, methods of representation & function.	6		Geometrical drawing & Practice on 1 st angle projection method.	20	
4.	Orthographic projection: General principles of projection.	6		Practice on 3 rd angle projection method.	20	
5.	Sectioning: basic concept , types, importance	6		Exercises on sectional views on the given models /actual objects. Exercise s on true shapes of different sectional views.	20	
6.	Development of surfaces: principles, types, importance and application.	6		Exercises on development of surface of simple objects like cube, cone, pyramid, cylinder, prism etc.	20	
7.	Fasteners & fastening: Nut & Bolt, Keys, Cotter – types, uses, symbols & applications	6	20	Drawing on fasteners-screw threads, nuts & bolts, studs and other locking devices.	20	20
8.	. Rivet – its types and different types of rivet joints & symbols.	6		Drawing of butt joint and lap joint, single plate, & double plate rivet joints maintaining relation between plate thickness, rivet diameter and pitch etc.	20	

9& 10	Symbols of Electrical, Electronics, and their basic application on circuits.	12	15	Drawing of symbols for electrical, electronics, and basic electrical, electronic circuits.	40	10
11.	Hydraulics & pneumatics components and their basic application on circuits.	6		Hydraulics & pneumatics components. and Drawing of basic hydraulics & pneumatics circuits used in machine tools.	20	
12,13 &14	Introduction to gear – its tooth profile. Types of gears and their uses. Calculation of gear data for spur, helical, worm & worm wheel, rack & pinion	18	5	Drawing of Gears: spur, bevel, helical, worm & worm wheel. , rack & pinion.	60	20
15.	Introduction to Welding. Principle of common welding process and its defects. Types of welded joints. Types of electrodes and wires used in weld joints. Edge preparation and its use.	6		Drawing of weld joints, their symbols, representation of welding symbols used on drawing.	20	
16 &17	Limits, fits, tolerance	12	10	Practice on dimensioning & tolerance,	40	20
18.	surface finish: Introduction, representation, importance, symbols & applications on drawing.	6		indication of surface finish symbols used as per IS on working drawing.	20	
19 &20	Concepts of 2D Drafting using CAD (specially AUTO-CAD)software.	12	10	Practice & Exercises on 2D Drafting using CAD(specially AUTO-CAD) software. Preparation of assy. drawing.	40	20
21	Introduction to vernier calipers, micrometer, bevel protector, sine bar, dial test indicator, slip gauge, rollers - its calculation of least count and measurement procedures . Their principles, reading and precautions.	6	5	Practice with precision measuring / gauging instruments on real object and comparison with working drawing. Measurement practice for taper angle using sine bar, slip gauge, dial test indicator, and roller.	20	10
22	Allied Trades: - Overview Fitter, Turner, Electrician, welding ,foundry Hand on practice related to trade work and preparation of drawings from real objects and circuits	6	5	Allied Trades: - Overview Fitter, Turner, Electrician, welding ,foundry Hand on practice related to trade work and preparation of drawings from real objects and circuits	20	20
23	Project Work(Work in a team)/ Industrial Visit (Optional)					
24, 25 & 26	Revision Final Test					

E. LIST OF TOOLS & EQUIPMENT FOR A BATCH OF 20 TRAINEES

Trade: Reading of Drawing & Arithmetic

SEMESTAR-I

SL.NO.	DESCRIPTION	QUANTITY
<u>Trainees Kit</u>		
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
<u>General Outfit</u>		
1A)	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.
B)	Software: MS-Office XP or latest version of operating software Auto-CAD with power pack or latest version.	11 users licenced
C)	Laser Jet printer Latest model – Print, Copy and Scan 1200x1200dpi, 16MB	1 no.
D)	UPS-10KVA	1 no.
2	Chest of drawers (8 drawers)	2 nos.
3	Trainees Locker (8 drawers)	3 nos.
4	Book Self	2 nos.
5	Steel tape 2 meters (Pull type)	1 nos.
6	Drawing table for A1 sheet	20+1 nos.
7	Stools (Revolving type) Adjustable height	20+1 nos.
8	T.O's Table 6ftX4ft	1 no.
9	T.O's Chair Armed chair – Revolving	1 no.
10	Almirah Steel 6ft. height or higher	2 nos.
11	Computer table	11 nos.
12	Computer chairs – Revolving	21 nos.
13	Table for printers	1 no.
14	D.L.P Projector 2000 LUMEN OR HIGHER	1 no.
15	Motorised Screen forv Projector	1 no.
16	White board 6FT. x 4FT.	1 no.
17	Fire Fighting Equipments	As required
18	First Aid Box	1 no.

**F. FURNITURE, ACCESSORIES AND AUDIO VISUAL AIDS FOR
THE SEMESTAR-I AND SEMESTAR-II (COMMON FOR ALL ENGG. TRADES)**

Sl. No.	Description	Quantity
01	Class Room Chairs (armless) / Dual desk may also be allowed	20 /10
02	Class Room Tables (3ft X 2ft) / Dual desk may also be allowed	20 /10
03	Chair for Trainer (armed) movable	01
04	Table for Trainer (4 ½ ft X 2 ½ ft) with Drawer and cupboard	01
05	LCD / LED Projector	01
06	Multimedia Computer System with all accessories with UPS (.5 KVA)	01 set
07	Computer Table	01
08	White Board (6ft X 4 ft.)	01 no.
09	LCD Projector Screen	
10	Air Conditioner 1.5Ton (OPTIONAL)	02
11	Wall Clock	01 no.
12	Wall charts, Transparencies and DVDs related to the trade	As required
13	Laser Printer with scanner	01
14	Steel Cupboard with 8 pigeon lockers	3
15	Work bench for fitters with two vices of 100mm	2
16	Steel cupboard 180x90x45cm	2
17	Steel cupboard 120x60x45cm	2
18	Multi drawer tool rack trolley with minimum 4 drawers and 20 tool capacity	04
19	First aid box.	1

G. LIST OF TRADE COMMITTEE MEMBERS

Sl. No.	Name & Designation Sh./Mr./Ms.	Organization	Mentor Council Designation
1.	Prof. Nirjhar Dhang. (H.O.D)	Dept. of Civil Engg. IIT Kharagpur	Chairman
2.	Col. N. B. Saxena.	Construction Skill Development Council of India (CSDCI)	Member
3.	Satish Gottipati. (M. D.)	Preca Solutions (E)	Member
4.	Meena Raghunathan. (Director, Community Science.)	GMRU Foundation, Hyderabad.	Member
5.	D. K. Chattopadhyay. (Training Officer.)	ATI, Kolkata. Dasnagar, Howrah.	Member
6.	S. R. Vhatkar. (Training Officer.)	ATI, Kolkata. Dasnagar, Howrah.	Member
7.	A. K. Naskar. (Training Officer.)	ATI, Kolkata. Dasnagar, Howrah.	Member
8.	S. Chockalingam. (Training Officer.)	CTI, Chennai,	Member
9.	Tapan Kr. Halder. (Training Officer.)	RDAT, Kanpur.	Member
10.	Arpana Singh. (T.O.)	N.V.T.I (W) Noida.	Member
11.	P. Karithashankar. (T. O.)	N.V.T.I (W) Noida.	Member
12.	Simni. (T. O.)	N.V.T.I (W) Noida.	Member
13.	Suman Kumari. (T. O.)	N.V.T.I (W) Noida.	Member

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having Minimum width of 5 m.and with 6000 lumen
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University.
OR
Completed Semester – I of READING OF DRAWING AND
ARITHMETIC trade under CITS
23. Trainers' Qualification : Diploma or Degree in Mechanical / Production /
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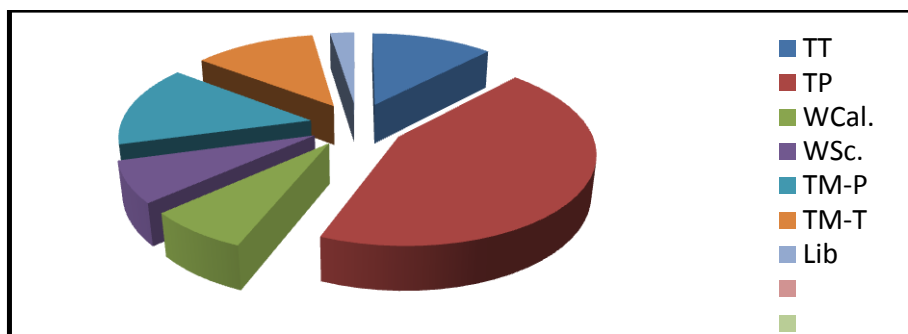
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**SYLLABUS FOR THE TRADE: READING OF DRAWING AND ARITHMETIC
CRAFT INSTRUCTOR TRAINING SCHEME**

SEMESTAR-II

WEEK NO.	TRADE THEORY	Hours	Marks	PRATICAL	Hours	Marks
1	Bearing: Different Types& symbols	4	50	Drawing of bearings application – bush bearing, , foot step bearing, ball, roller, Tapper roller and needle bearing use on assembly. Drawing of carpentry joints: angle, framing, broadening and lengthening joints and their different types. Isometric view of pipe joints & drawing of flanged, socket and spigot joint etc. Drawing on various types of shaft couplings, flanged, cone, universal and muff. Practice on detailed drawing of simple machine components. Practice on Assembly & detailed drawing of simple machine components. Different Machine Vice, Head stock, tailstock ,milling arbour.	32	100
2	Applications of bearing	4				
3	Carpentry: joints, symbols	4			16	
4	Applications of joints	4			16	
5	Pipe & Pipe joints – types, symbols &	4			16	
6	Applications of pipe joints	4			16	
7	Concept of assembly & detailed drawing; relation, importance & application.	4			16	
8& 9	Mechanical properties of metal, Properties of steel by adding alloying element like cobalt, vanadium, magnesium, tungsten etc.	8			32	
10 & 11	Calculation and definition of Ratio, Proportion, Percentage, work, power, energy, its application in work-shop.	8	5	32	10	
12 & 13	Jigs & Fixtures:- Introduction, types, use and advantages.	8	20	32	40	

14 15&16	Calculation related to cutting speed, feed, r.p.m. depth of cut, machining time for drilling, turning, shaping, milling etc.	12		Drawing of ellipse, parabola, hyperbola, cycloid, epicycloids and hypocycloid Helix and Involutés etc.	48	
17 &18	Allied Trades: - Overview Fitter, Turner, Electrician, carpenter, machinist Hand on practice related to trade work and preparation of drawings from real objects and circuits.	8	10	Allied Trades: - Overview Fitter, Turner, Electrician, carpenter, machinist Hand on practice related to trade work and preparation of drawings from real objects and circuits.	32	20
19&20 21	Practices latest version of CAD (specially AUTO-CAD) software & use of different menus and different tool bars. Drawing of Isometric and 3 Dimensions objects using CAD (specially AUTO-CAD) software.	12	15	Practices latest version of CAD (specially AUTO-CAD) software & use of different menus and different tool bars. Drawing of Isometric and 3 Dimensions objects using CAD (specially AUTO-CAD) software.	48	30
22	Use of Internet in accessing and sending drawing.	4		Use of Internet in accessing and sending drawing. Project work and Industrial-cum-study tour.	16	
23	Project work /Industrial visit					
24, 25 & 26	Revision Final Test.					

LIST OF TOOLS & EQUIPMENT FOR A BATCH OF 20 TRAINEES

Trade: Reading of Drawing & Arithmetic SEMESTAR-II

SL.NO.	DESCRIPTION	QUANTITY
<u>Trainees Kit</u>		
1	Drawing Instrument Box with accessories.	20+1 sets
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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
<u>General Outfit</u>		
1A)	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 or Latest version	11 nos.
B)	Software: MS-Office XP or latest version of operating system Auto-CAD with power pack or latest version.	11 users licenced
C)	Laser Jet printer Latest model Print, Copy and Scan 1200x1200dpi, 16MB – A3 size	1 no.
D)	UPS-10KVA	1 no.
2	Chest of drawers (8 drawers)	2 nos.
3	Trainees Locker (8 drawers)	3 nos.
4	Book Self	2 nos.
5	Steel tape 2 meters (Pull type)	1 nos.
6	Drawing table (A1 sheet)	20+1 nos.
7	Stools(Revolving and adjustable type)	20+1 nos.
8	T.O's Table 6ft. X 4ft.	1 no.
9	T.O's Chair – revolving type with Arm	1 no.
10	Almirah Steel 6 ft.	2 nos.
11	Computer table	11 nos.
12	Computer chairs (Revolving type)	21 nos.
13	Master cam software latest version	10 user license
14	Table for printers	1 no.
15	D.L.P Projector – 2000 LUMEN OR HIGHER	1 no.
16	Motorised screen for projector	1 no.
17	White board 6ft. X 4ft.	1 no.
18	Fire Fighting Equipments	As required
19	First Aid Box	1 no.

**D. FURNITURE, ACCESSORIES AND AUDIO VISUAL AIDS FOR
THE SEMESTAR-I AND SEMESTAR-II (COMMON FOR ALL ENGG. TRADES)**

01	Class Room Chairs (armless) / Dual desk may also be allowed	20 /10
02	Class Room Tables (3ft X 2ft) / Dual desk may also be allowed	20 /10
03	Chair for Trainer (armed) movable	01
04	Table for Trainer (4 ½ ft X 2 ½ ft) with Drawer and cupboard	01
05	LCD / LED Projector	01
06	Multimedia Computer System with all accessories with UPS (.5 KVA)	01 set
07	Computer Table	01
08	White Board (6ft X 4 ft.)	01 no.
09	LCD Projector Screen	
10	Air Conditioner 1.5Ton (OPTIONAL)	02
11	Wall Clock	01 no.
12	Wall charts, Transparencies and DVDs related to the trade	As required
13	Laser Printer with scanner	01
14	Steel Cupboard with 8 pigeon lockers	3
15	Work bench for fitters with two vices of 100mm	2
16	Steel cupboard 180x90x45cm	2
17	Steel cupboard 120x60x45cm	2
18	Multi drawer tool rack trolley with minimum 4 drawers and 20 tool capacity	04
19	First aid box.	1

G. LIST OF TRADE COMMITTEE MEMBERS

Sl. No.	Name & Designation Sh./Mr./Ms.	Organization	Mentor Council Designation
1.	Prof. Nirjhar Dhang. (H.O.D)	Dept. of Civil Engg. IIT Kharagpur	Chairman
2.	Col. N. B. Saxena.	Construction Skill Development Council of India (CSDCI)	Member
3.	Satish Gottipati. (M. D.)	Preca Solutions (E)	Member
4.	Meena Raghunathan. (Director, Community Science.)	GMRU Foundation, Hyderabad.	Member
5.	D. K. Chattopadhyay. (Training Officer.)	ATI, Kolkata. Dasnagar, Howrah.	Member
6.	S. R. Vhatkar. (Training Officer.)	ATI, Kolkata. Dasnagar, Howrah.	Member
7.	A. K. Naskar. (Training Officer.)	ATI, Kolkata. Dasnagar, Howrah.	Member
8.	S. Chockalingam. (Training Officer.)	CTI, Chennai,	Member
9.	Tapan Kr. Halder. (Training Officer.)	RDAT, Kanpur.	Member
10.	Arpana Singh. (T.O.)	N.V.T.I (W) Noida.	Member
11.	P. Karithashankar. (T. O.)	N.V.T.I (W) Noida.	Member
12.	Simni. (T. O.)	N.V.T.I (W) Noida.	Member
13.	Suman Kumari. (T. O.)	N.V.T.I (W) Noida.	Member
14.	M.C Sharma	DGE&T (HQ)	Mentor