Syllabus for the subject

of

ENGINEERING DRAWING

Under

CRAFT INSTRUCTOR TRAINING SCHEME (CITS)

(For Engineering Trades under Group V)

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 analyze the given job - Quantitatively and subsequent detail planning. Such as selecting the physical conditions quantitatively e.g. speed, feed of a cutting operation.

Thus Engineering Drawing, Workshop Calculation & Science are regarded as a core skills set for acquiring 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
2. Duration of Instructor Training	:	1 Year (Two semesters each of six months duration).
3. Subjects covered in the Semester	:	Detailed in Section - D
4. Name of the Subject	:	**ENGINEERING DRAWING**
5. Applicability	:	For all Engineering Trades of Group V (Electrician, Wireman)
6. Examination	:	To be held at the end of each semester.
7. Space Norms	:	(a) Drawing Hall of minimum 60 sq. m. area having Minimum width of 5 m. with Illumination of 9000 lumen (minimum). (b) CAD Lab. : 50 Sq. m. area having minimum width of 5 m. with Illumination of 12000 lumen (minimum) (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 the trades of Gr.– V **OR** Diploma / Degree in Mechanical/Electrical Engineering from AICTE recognized Board / University.
11. Trainers' Qualification	:	Diploma or Degree in Diploma / Degree in Electrical/Mechanical Engineering from AICTE recognized Board / University. with five/two year experience in the relevant field. **Desirable:** Craft Instructor Certificate in RoD & A course under NCVT.
12. Trainer	:	One full time instructor is required for two batches. For one batch, the instructor may be out sourced/ hired on contract basis

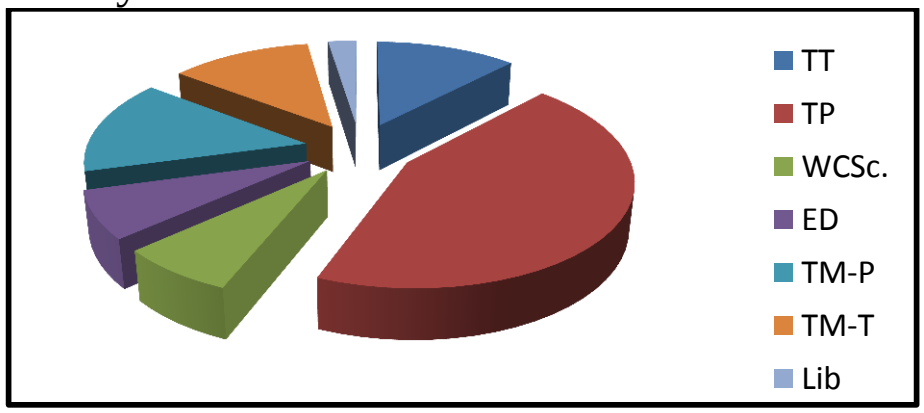
C. GROUPING OF TRADES IN CRAFT INSTRUCTOR TRAINING SCHEME

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	**230**	120	18	**138**
	Trade Theory - 1	6	15	100	20	**120**	60	12	72
	Workshop Cal. & Sc.	**6**	15	50	-	**50**	30	-	30
	Engineering Drawing	**6**	15	100	-	**100**	60	-	60
	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**
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-V

Unit no.	Topics	Hours	Marks
1	Line practice – Straight line and inclined line. Types of lines and their uses. Conventional symbol of materials. Free hand sketching of common hand tools. Free hand sketching of common electrical tools.	10	8
2	Dimensioning techniques. Use of reduced & enlarged scales. Different symbols used in electrical installations and circuit elements as per IS:732. Symbols for motor-starter. Symbols for transfer & rotating machine.	10	10
3	Practice on electrical symbols &…. system as per IS:732. Drawing of D-type cartridge fuse, H.R.C. fuse. Drawing diagram of plug & socket outlets.	10	8
4	Simple Orthographic projection-difference between 1st angle and 3rd angle projections. Orthographic views of simple blocks in 3rd angle method. Blue print reading of connection to motors through ammeter, voltmeter & energy meter. **UNIT TEST - II**	10	8
5	Simple Orthographic views of different blocks in 3rd angle projection. Battery charging circuits. Wiring diagram of an alternator (Control Panel).	10	8
6	Practice on simple orthographic views – 3rd angle projections. Wiring diagram of squirrel cage induction motor with ICTP and starter (DOL). Control panel diagram of motor – generator set. D.C. 3-point starter and 4-point starter.	10	8
7	Practice on simple orthographic views-3rd angle	10	8

	projections. Internal diagram of different types of single phase A.C. motor. Connection diagram of starter with protective devices for slip-ring induction motors.		
8	Practice on simple orthographic views of different objects in 3rd angle projection method. Winding diagram of 3 phase induction motor. Ex -1 3ϕ, 4 pole, 24 slots, single layer winding. Ex -2 3ϕ, 4 pole, 24 slots, double layer lap winding with full pitch coils. **UNIT TEST - II**	10	8
9	Simple orthographic views of different simple blocks in 3rd angle method. D.C. simplex lap & wave winding for known pole pitch, coil pitch, back -& front pitch progressive winding. A.C. 3 phase forward reverse magnetic starter.	10	8
10	Simple orthographic views of different objects in 1st angle projection. Pipe earthing as per B.I.S. Circuit diagram of speed control of shunt & compound motor by armature & field control methods. Sectional view of 500 KVA power transformer with all protective devices.	10	8
11	Orthographic views of different objects in 1st angle projection. Line diagram of a power station. Circuit diagram of star-delta starter (manual, semi-automatic & automatic) connected with 3ϕ squirrel cage induction motor.	10	8
12	Half wave, full wave & bridge circuits. Battery charging circuit (const. current & const. voltage method) Introduction on Auto-cad.	12	10
13	Review on the courses & question papers. **REVISION & FINAL EXAMINATION**	10	
Total Hours & Marks		132	100
Revision & Examination			

F. LIST OF TOOLS & EQUIPMENTS

Sl. No.	NAME OF TOOLS / EQUIPMENTS	QUANTITY
	Trainees Kit	
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
	General Outfit	
1.	Computer 3GHz or latest with 1GB 0r 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.