

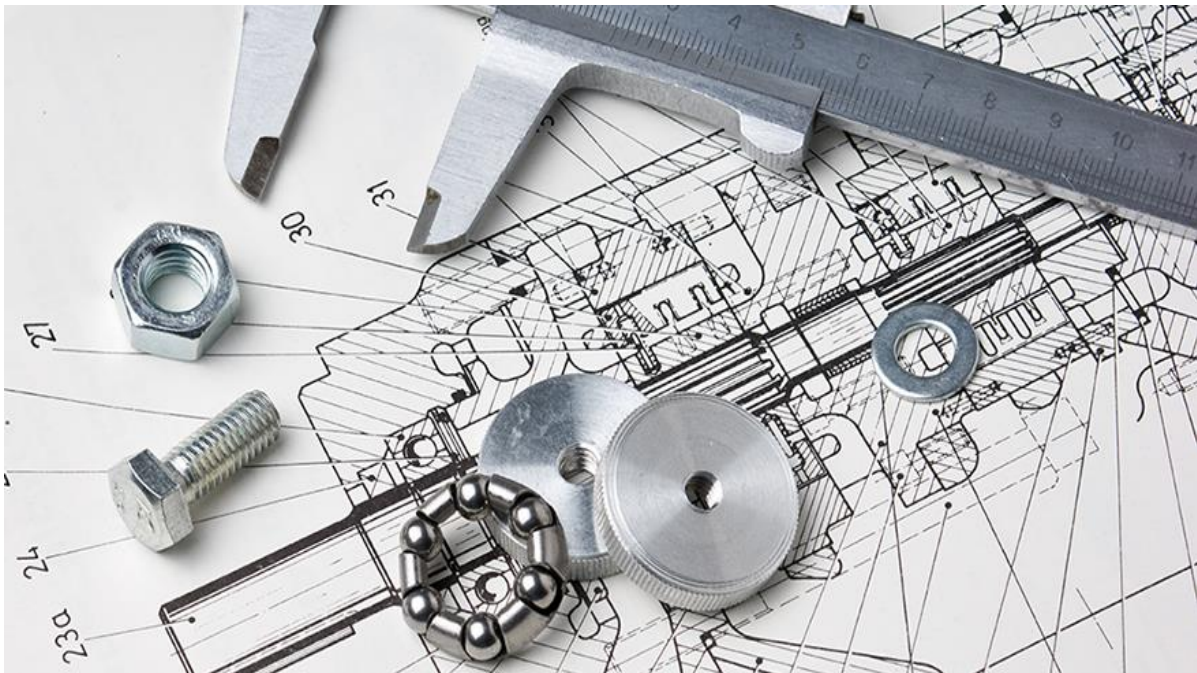


GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP
DIRECTORATE GENERAL OF TRAINING

COMPETENCY BASED CURRICULUM

ENGINEERING DRAWING

FOR CRAFTSMEN TRAINING SCHEME (CTS)



Designed in 2019

Developed By

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RATIONALE

Core skills enhance knowledge, analytical ability, problem solving ability, understanding or comprehending scientific principles and drawings & designs also. At the same time it creates the base for achieving Hard skills. To carry out any skill related task knowledge about basic Engineering Drawing is essential as drawing is the language of engineers.

Knowledge of Engineering Drawing complements the skills of an Artisan / Trade person. More importantly, ability to read drawing increases the productivity of a person besides enhancing confidence to perform task competently.

Recognizing this importance, the core skills (Engineering Drawing) made an integral part of all Engineering Trades under DGT. The syllabus of Engineering Drawing is common for first year for all Engineering Trades. The syllabus of 2nd year are made trade group specific.

GENERAL INFORMATION

1. Name of the Subject	ENGINEERING DRAWING
2. Applicability	CTS - For all engineering trades
3. Hours of Instruction	80 Hrs for 1 st Year & 80 Hrs for 2 nd Year
4. Examination	The examination for the subject will be held at the end of each year
5. Marks Distribution	Full marks – 50 Pass Marks - 17
6. Instructor Qualification	<p>B.Voc/Degree in Engineering from AICTE/ UGC recognized Engineering College/ University with one year Experience in the relevant field.</p> <p style="text-align: center;">OR</p> <p>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.</p> <p style="text-align: center;">OR</p> <p>NTC/ NAC in any one of the relevant engineering group of trades categorized under Engineering Drawing / D'man (Mech. / Civil) with three years' experience.</p> <p><u>Essential Qualification:</u> National Craft Instructor Certificate (NCIC) in relevant trade</p> <p style="text-align: center;">OR</p> <p>NCIC in RoDA / D'man (Mech. / Civil) or any of its variants under DGT.</p>

LEARNING OUTCOMES AND ASSESSMENT CRITERIA

ENGINEERING DRAWING	
LEARNING OUTCOME	ASSESSMENT CRITERIA
1. Read and apply engineering drawing for different application in the field of work.	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.

ENGINEERING DRAWING - I

(Common for CTS Engineering trades during 1st year)

(Not applicable for Draughtsman trade Group)

Sl. No.	Topic	Time in hrs.
1.	Engineering Drawing – Introduction Introduction to Engineering Drawing and Drawing Instruments – <ul style="list-style-type: none"> • Conventions • Viewing of engineering drawing sheets. • Method of Folding of printed Drawing sheet as per BIS SP: 46-2003 	1
2.	Drawing Instrument <ul style="list-style-type: none"> • Drawing board, T-square, Drafter (Drafting M/c), Set squares, Protector, Drawing Instrument Box (Compass, Dividers, Scale, Diagonal Scales etc.), pencils of different grades, Drawing pins/ Clips. 	1
3.	Free hand drawing of – <ul style="list-style-type: none"> • Lines, polygons, ellipse etc. • Geometrical figures and blocks with dimension • Transferring measurement from the given object to the free hand sketches. • Solid objects – Cube, Cuboids, Cone, Prism, Pyramid, Frustum of Cone with dimensions. • Free hand drawing of hand tools and measuring tools, simple fasteners (nuts, bolts, rivets etc.) trade related sketches 	10
4.	Lines <ul style="list-style-type: none"> • Definition, types and applications in drawing as per BIS: 46-2003 • Classification of lines (Hidden, centre, construction, extension, Dimension, Section) • Drawing lines of given length (Straight, curved) • Drawing of parallel lines, perpendicular line • Methods of Division of line segment 	2
5.	Drawing of Geometrical figures: Definition, nomenclature and practice of – <ul style="list-style-type: none"> • Angle: Measurement and its types, method of bisecting. • Triangle: different types • Rectangle, Square, Rhombus, Parallelogram. • Circle and its elements • Different polygon and their values of included angles. Inscribed and circumscribed polygons 	8
6.	Lettering & Numbering – <ul style="list-style-type: none"> • Single Stroke, Double Stroke, Inclined. 	6
7.	Dimensioning and its Practice <ul style="list-style-type: none"> • Definition, types and methods of dimensioning (functional, non-functional and auxiliary) • Position of dimensioning (Unidirectional, Aligned) 	4

	<ul style="list-style-type: none"> • Types of arrowhead • Leader line with text • Symbols preceding the value of dimension and dimensional tolerance. 	
8.	<p>Sizes and layout of drawing sheets</p> <ul style="list-style-type: none"> • Selection of sizes • Title Block, its position and content • Item Reference on Drawing Sheet (Item list) 	2
9.	<p>Method of presentation of Engg. Drawing</p> <ul style="list-style-type: none"> • Pictorial View • Orthographic View • Isometric View 	2
10.	<p>Symbolic representation – different symbols used in the trades</p> <ul style="list-style-type: none"> • Fastener (Rivets, Bolts and Nuts) • Bars and profile sections • Weld, Brazed and soldered joints • Electrical and electronics element • Piping joints and fitting 	6
11.	<p>Projections</p> <ul style="list-style-type: none"> • Concept of axes plane and quadrant • Orthographic projections • Method of first angle and third angle projections (definition and difference) • Symbol of 1st angle and 3rd angle projection in 3rd angle. 	15
12.	Orthographic projection from isometric projection	15
13.	Reading of fabrication drawing	8
Total		80

ENGINEERING DRAWING - II

(03 groups of CTS Engineering trades during 2nd year)
(Not applicable for Draughtsman trade Group)

2nd Year – (Group - I)- Mechanical trade group – Fitter, Turner, Machinist, Machinist Grinder, Mechanic Machine Tool Maintenance, Operator Advance Machine Tool, Mechanic Motor Vehicle, Mechanic Agriculture Machinery, Ref. & A/C Mechanic, Central Air Conditioning Plant, Mechanic Mining Machinery, TDM (D&M), TDM (J&F), Marine Fitter, Aeronautical Structure, Spinning Technician, Textile Wet Processing Technician, Weaving Technician, Textile Mechatronics, Painter General, Mechanic Maint. (Chemical Plant), Refractory Technician, - **22 trades.**

Sl. No.	Topic	Time in hrs.
1.	Construction of scales and diagonal scales	4
2.	Conic sections (Ellipse and Parabola)	3
3.	Sketches of nuts, bolt, screw thread, different types of locking devices e.g. Double nut, Castle nut, Pin, etc.	6
4.	Sketches of foundation	08
5.	Rivets and rivetted joints, welded joints	10
6.	Sketches of pipes and pipe joints	10
7.	Assembly view of Vee blocks, Bush & Bearing, Different types of Coupling viz., Muff coupling, Half Lap Coupling, Flange coupling, etc. Simple work holding device e.g. vice Drawing details of two mating blocks and assembled view	25
8.	Sketch of shaft and pulley, belt, gear, gear drives	14
Total		80

2nd Year – (Group - II)- Electrical, Electronics & IT trade Group – (Electroplater, Lift & Escalator Mechanic, Electrician, Tech. Medical Electronics, Technician Mechatronics, Wireman, Electrician Power Distribution, Instrument Mechanic, Technician Power Electronics System, Electronics Mechanic, Mechanic Consumer Electronics Appliances, Instrument Mechanic (Chemical Plant), Attendant Operator (Chemical Plant), Laboratory Attendant (Chemical Plant), Information & Communication Technology System Maintenance, Information Technology, Tech. Electronic System Design & Repair) – 17 trades.

Sl. No.	Topic	Time in hrs.
1.	Sign and Symbols of Electrical, Electronics and related trades	4
2.	Sketch of Electrical and Electronics/ trade related components	6
3.	Electrical and Electronics wiring diagram/ trade related Layout diagram	14
4.	Electrical earthing diagram - Drawing the schematic diagram of plate and pipe earthing.	8
5.	Electrical, Electronics/ trade related circuit diagram	30
6.	Block diagram of Instruments/ equipment of related trades	18
Total		80

2nd Year – (Group - III) – Vessel Navigator - 01 Trade

Sl. No.	Topic	Time in hrs.
1.	Construction of scales and diagonal scales	4
2.	Basic Navigational Chart Work Practice Introduction of a navigational chart. Various type of navigational chart. Parallel Ruler and instruments used. Measurement of distance, sea miles, International nautical mile, geographical mile.	6
3.	Great circle, parallels of latitude and Longitudes. Important features of Mercator chart. Simple plotting of position and measurement of distance. Variation, Deviation, Conversion of compass course to true course.	6
4.	Conversion of true course to compass course. Calculation involving deviation, variation, and compass error. A few terms associated with chart work, symbols and Abbreviations	4
5.	True bearing, compass bearing, abeam bearing. Current, wind and its effects. Allowing current and leeway.	5
6.	To counter act current and wind. Find actual current experienced.	4
7.	Method of fixing the ship position by bearing and depth, bearing and distance by vertical sextant angle, horizontal angle or Radar Given:	5

	course steered engines speed direction and rate of current wind and leeway to find course and speed made good. Give: Initial position / final position to find set and rate of drift Transfer position line and simple running fix.	
8.	ADVANCED NAVIGATIONAL CHART WORK PRACTICE Transfer of position line and running fix with current. Running fix with current and leeway.	4
9.	Transfer to position line while makes more than one course to given running fix. To find course to steer to counteract the current and leeway.	4
10.	To find course to steer and speed to steer in order to maintain the required ETA in prevailing current. Three bearing method to find course made good	4
11.	To find CMG direction by three bearing of same object from different position.[only set is given rate is not known]	6
12.	To find CMG direction by three bearing of same object from different position[both set and rate is given]	6
13.	Dipping and rising bearing of lights[dipping range or rising range]	5
14.	To find true set and drift [actual set and rate of current experienced]	4
15.	Tide problems	4
16.	To arrive with a given point right ahead at extreme range.	4
17.	Nautical publications.	5
TOTAL		80

TOOLS & EQUIPMENTS

LIST OF TOOLS AND EQUIPMENT FOR ENGINEERING DRAWING			
S No.	Name of the items	Specification	Quantity
1.	Drawing instrument box	Containing - Compass with pencil point, divider, protractor, scale, etc.	01 set per trainee
2.	Set square celluloid 45°	250 X 1.5 mm	01 no. per trainee
3.	Set square celluloid 30°-60°	250 X 1.5 mm	01 no. per trainee
4.	French-curves (set of 12 celluloid)		4sets.
5.	T-Square or Mini drafter	750mm	01 no. per trainee
6.	Drawing board IS: 1444	700mm x 500 mm	01 no. per trainee
7.	Almirah steel	As required	As required