

**INDUSTRIAL TRAINING DEPARTMENT
(KERALA STATE)**

No:C2/5737/13

Thycaud, Thiruvananthapuram,
Dated: 4.6.13

From
Secretary SCVT

To
All Govt. ITI Principals.

Sir.

Sub:- Industrial Training Department — Directorate of Training —
Thiruvananthapuram — Inviting suggestions on the draft syllabi for the
trades — CAD operator —Cum Design Assistant (Civil) & CAD operator -
Cum- Design Assistant (Mechanical)

Auto Desk India, Private limited has submitted the syllabi of two
courses for starting the same under SCVT. The said syllabi for the above courses
(CAD operator —Cum Design Assistant (Civil) & CAD operator -Cum- Design Assistant
(Mechanical) are enclosed herewith. You are directed to send your comments/ approval
on the said syllabi on or before 20.06.2013 to this office. If no comments/reply is
received within the stipulated time it will be presumed that you have approved the
syllabi in the present form.

Yours faithfully,


Secretary SCVT/ Additional Director of Training.

Encl: As Stated above

Syllabus for the trade of

**CAD OPERATOR-CUM-DESIGN
ASSISTANT(CIVIL)**

UNDER

CRAFTSMAN TRAINING SCHEME(SCVT)

Designed in 2013

**Government of Kerala
Ministry of Labour & Employment
Directorate of Employment & Training
Thiruvananthapuram**

KERALA

GENERAL INFORMATION

- 1. Name of the Trade: CAD OPERATOR-CUM-DESIGN ASSISTANT(CIVIL)**
- 2. NCO Code No.:**
- 3. Duration of Craftsman Training : 6 months(Full Time)**
- 4. Entry Qualification : 10th Class passed**
- 5. Unit Strength: 20**
- 6. Space Norm: Workshop: 70 sq. metre**
- 7. Power Norms: 4 Kw**
- 8. Instructors Qualification:**

Degree / Diploma in Civil Engineering with 2 years post qualification experience for diploma holders and one year for degree holder

Or, NTC with 5 years post qualification experience.

Or, NAC with 4 years post qualification experience.

And, Proficiency in Auto CAD 2D & 3D Modeling

Syllabus for the trade of CAD OPERATOR-CUM-DESIGN ASSISTANT (Civil)

WEEK No.	THEORY	PRACTICAL
1	Introduction to engineering drawing Units- SI systems, Introduction to Auto CAD; history	Introduction to Auto CAD Create Auto CAD Close Auto CAD Create user folder for AutoCAD files
2	LINES- types, thicknesses Lettering- Styles, heights Projections- orthographic ,isometric	Drawing limits, Units, Limits Co-ordinate system- Relative co ordinate system, Polar co ordinate system ,Use of grid Snap
3	Geometrical constructions-arcs, circles polygons, tangents, conic sections, solids	Drawing simples sketches using Line, Circle, Arc, Ellipse, Polygon, Rectangle, Dynamic input
4	Dimensioning –methods, rules, style creation, arrow size, width , tolerance, extension offset	Editing commands- Erase, Oops, Undo,, Undo, Redo, Move, Copy, Rotate, Array, Mirror, Align File management-New, Qnew, Open, Save, Save as, Close, Exit ,Quit
5	Conventional signs and symbols	Editing commands- Fillet, Chamfer, Scale, Stretch, Offset, Break , Drawing settings, Trim, Extent isometric View- Isoplane
6	Materials of constructions- cement, brick, stone, cement concrete wood, paints, metals, glass, pvc- types and uses	Join, Solid, Donut, Fill, Fillmode Creating detail drawing- Revcloud Perspective Views- One ,Two and three points Perspective view
7	Building constructions- sequence of constructions- Foundations –purpose, types Basement-purpose, DPC- purpose, materials	Object selection method- Select, Qselect Annotations- Text style, Dedit, M text, Scale text, Spell, Table Tabledit Object properties- Colour ,Line type, Lt scale, Line weight, Properties, Match properties Display control- Zoom, Pan Steering wheels,(2D), View, Regen, Dsvviewer, Viewers
8	Masonry- purpose, types Scaffolding- types, purpose structures	Layer management- Adding / Removing layers, Layer status, Layer status manager
9	, Lintel & Sunshade- purpose, types, and shapes, component parts Arches- technical terms, various type and sizes	Hatching utilities- Bhatch, Hatch, hatchedit Grip editing Inquiry commands- Id, Dist, List, Radius, Angle, Area, Volume Lengthen
10	Roofs- uses- pitched roofs, flat roofs, curved roofs, component parts of roofs , roof covering,	Dimension-Linear, Aligned, Radius, Diameter, Centre mark, Angle, Arc length, Continuous, Baseline, Tolerance, Dimension space, Dimension Break, Inspection, Joggled radius, Ordinate dimension Leader, Q leader

11	Doors and windows – features, types Floors, types of floorings	Mleader, M leader style, Add leader, Aliign Leader lins, Collect Leader Dimedit, dimtedit, Dimension associate Dimension style Construction lines-X lines, Ray
12	Staircase- types according to turning, materials, different balusters, handrails ,component parts ,planning of staircase, requirements	Filter Group, Cal,Block, Wblock, Insert, Dynamic block Parametric Drawings- Geometric Constraints, Dimensional Constraints Dynamic Block with Parametric constraints
13	RCC structures- Types of slabs, columns, beams , staircase, piles – their reinforcement detailing – Bending of bars- formwork	Defining & Editing attributes- Attdef, Attedit, Eattedit, attedit, Attdia, Atttext, Eatttext Action recorder Divide, Measure, Mslide, Vslide, Script, Slide library Ole concepts—Ole links, Olescale, Insertobj Hyper link Copy copybase, copylink, paste clip, paste special, paste special paste block, paste original
14	Wall finishes – Internal and external finishes- plaster and painting, permanent finishes	External reference,- Xref, Xblind, Circular Xref, Refedit Underlay, Design centre-, Tool Pallettes, Etransmit, Xplode Introduction to plotting, pagr setup, plot style, plot
15	Residential building Principles of planning	Publish, 2D and 3D drafting, Markup Manager, Publish to Web Layout Management, Floating View port
16	Orientation of building – Local building by laws as per National Building code, Types of residential building, rooms, services, utilities which constitute dwelling house	Need of 3 rd dimension ,The conventions of Auto Cad, Co ordinate sytemin 3D, Types of 3D Modelling, Surface Modelling, rulesurf, Tabsurf, Revsurf, edgesurf Hide, Shade, Shademode
17	Interior design of work space, living space ,public space, shop interior, reception interior, restaurant interior, office interior, surface treatment with colours	Surfe Modelling-3D face, Edge, Pface, 3DPoly, 3Dmesh, Planesurf, Vpoint, Ddvpoint, Plan, View Cubic, Vport Solid Primitives-Box,wedge,cylinder, cone, sphere, torus, pyramid/ region, extrude, revolve, union, subtract
18	Preparation of service plans Site plan-land data, site measurements, set backs as per building rules	Intersect, interfere, polysolid, sweep, helix, loft, press/pull, UCS, UCS icon, Dynamic UCS, UCSman
19	Electrical plan- showing wiring, points fittings, total power requirements	Mesh primitives, working with gizmos, mve, rotate, scale,sub object filters smooth object, refine mesh, facetres, add/remove crease, split Mesh face, convertto solid, convert to surface

20	Plumbing plan- showing drainage lines, sewage lines, sewage disposal , sanitary fittings and supply lines Rain water drainage and harvesting schemes	Fillet, hamfer, 3D array, mirron 3D, rotate 3D ,3D rotate,3Dalign, slice, ,section, section plane, live section, section plane job
21	Assignments	Solidedit, massprop, solview, soldraw, solprof, flatsot, 3D orbit, 3D corbit , Dview, camera, 3D walk,3Dfly, 3D distace3D wivel
22	Details of various civil engineering structures-Roads, railways, bridges, dams & cross drainage works, reservoirs, water supply and sanitary projects and installations	R pref, Geographiclocation, Suproperties, materials Rene environment, Background Dialog box, image, image attach, image adjust, image clip, image frame, image quality, transprancy, draw order, export/import
23	Details of various civil engineering structures-Roads, railways, bridges, dams & cross drainage works, reservoirs, water supply and sanitary projects	Drawings of various civil engineering projects and case studies.
24	Project work	Project work with Practical Modeling
25	REVISION	REVISION
26	TEST	EVALUTION

COURSE STRUCTURE

Auto Cad 2D & 3D (Civil)

Duration : 6 Months-Full Time

Sl No	Components	Subjects	Time per Week
1	Lecture Class	Theory	2 Hrs X 5 = 10 Hrs
2	Practical	Cad Lab	5 Hrs X 5 = 25 Hrs
3	Library	Project Reference	2 Hrs

Final Test

Sl No	Test Details	Max Marks	Time in Hours
1	Concepts of Civil Engineering(Theory)	100	2
2	Practical-CAD	200	4
3	Project-Viva	100	30 Minutes

Equipment and furniture for CAD Training

Sl. No	Name of the tools/Equipment	Quantity
1.	Personal Computer, compatibility with CAD with 19" colour monitor. Processor : Intel i7, Speed : Up to 3.90GHz, Processor cache : 8MB L3, Mother Board : Intel Desktop Board DZ77GA, Chipset : Intel Z77 Express Chipset, System memory : 8 GB (2x4GB), Hard disk : 1TB, DVD ROM, Video card : Intel HD4000 Graphics, Operating system : Windows 7/Windows 8.	20 Nos.
2.	Server System & Software with latest configuration-19" Monitor (One Socket Tower, Intel Xeon X 3430 (Quad Core), 2.4Ghz 8MB Cache, 1333 MHz, 2x4 GB Memory, 1x300GB SAS 15k RPM, 3.5" Hot Swap DVD ROM, Integrated RAID 01)	1 No.
3.	LCD Projector with mounting accessories	1 No.
4.	CAD software 2013 (20 user licensed latest version)	1 No.
5.	Architectural Desktop Software 20 user licensed latest version.	1 No.
6.	Ms-Office licensed latest version.	1 No.
7.	LAN and Broadband Internet connectivity with Modem/Hub/Ethernet etc 24 port	1 No.
8.	Inkjet/Laser Printer (A3 size)	1 No.
9.	Plotter A0(A-zero)	1 No.
10.	UPS – 0.5 KVA(21 Nos) or 10 KVA Online(2 hrs back up)	1 No.
11.	Computer table	21 Nos.
12.	Operator Chair	21 Nos.
13.	Printer table	2 No.
14.	Storage cabinet	1 No.
15.	Book shelf	1 No.
16.	Air conditioner 1.5 ton	4 Nos.

Syllabus for the trade of

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ASSISTANT (Mechanical)**

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WEEK NO.	THEORY	PRACTICAL
1	General safety precautions and importance of trade. Introduction and importance of trade. Install Auto CAD graphical user interface and inventor's interface.	Create Auto CAD short cut at desktop, Open Auto CAD, close Auto CAD, create user folder for Auto CAD files. Opening and settings for new file with units, limits etc
2	Importance of drawing limits <u>with related standard drawing sheet sizes</u> and to set Drawing limits accordingly using co-ordinate systems, snap and grids in Auto CAD. Understanding Line command. Circle command, Arc, and other. Elipse, Polyline, Pedit command and all other draw commands.	Set limits, Absolute co-ordinate, relative co-ordinate, polar co-ordinate and Direct distance entry systems. Draw line, circle and arcs with different command. Practice exercises on OSNAP snapping modes.
3	Modify commands, editing commands, erase the entities, using different types of selection like windows, all and single entity methods	All modification commands like erase, copy, move, offset, divide, trim, explode etc...
4	<u>Different types of lines and its application. Study of different geometrical shapes like polygons.</u> Definition of Ellipse, Parabola, Hyperbola, different methods of their construction, Helix and Spiral.	Formatting a line feature with different attributes such as line types, thickness, colour etc. Construction of ellipse parabola and hyperbola, construction of elipse arc, helix and spiral.
5	Dimensioning techniques, symbols for machining and surface finish. Units of dimensioning, method of dimensioning and common features limit, fit tolerance. Tolerance dimensioning.	Create two dimensional drawing with rectangle, circle and arc. Draw different plane figures. Dimensioning settings and method of dimensioning for plain figures.
6	Projection and Its types. Principle of orthographic projection, first angle and third angle projections. Concepts about horizontal and vertical planes.	Making multiview projection of solids by using Otrack,Ortho. modes. First angel, third angel projection with dimension of machine parts.
7	Types of pictorial projection such as perspective, Isometric and Oblique. Method of making Isometric projection and Isometric drawings. Auto Cad setting for Isometric drawing. Use of F5,F6,F7,F8,F9 functional keys. Fundamental isometric drawings, creation of isometric views.	Create Isometric drawings of various solid patterns. Circular shapes, spherical parts etc in isometric drawing are to be practiced. Method of dimensioning an isometric drawing. Use of functional keys of F5,F6,F7,F8,F9. Use of F5 for isometric planes drawing cube using isometric planes set up and isocircle.
8	Concept and application of oblique Perspective projections. Definition, location of station point etc in Perspective projection. Layer creation – use and application	Oblique projection of solids, and machine parts, prespective projection of solids. Layers, modifying layers, freezing layers make ON and OFF layers. Import line types. Layer creation, loading of lines, line types scale, locking of different layer, line weight.

9	Importance of sectional views. Types of sectional views and their uses. Parts not shown in section. Conventional methods & symbols for different materials used in engineering.	Sectional views-different types of sections. Hatch inside and island. Hatch alone boundary by different patterns.
10	Texts and its importance. Styles used in eng. drawing. Multi line text and its editing.	Text style creations, use different fonts, set different height, modify the properties of text, save different text styles by a name. M text with in a window scaling a multiline, rotating a multiline with style features. Write text drawings, use multiline editors, use different styles of text, use different fonts in a text editor. Insert different symbols in a M text. Justify the texts.
11	Create blocks of standard patterns, insert block patterns, scale the blocks, match the properties of blocks, Auto CAD design center usage, dragging the center blocks, attach the attributes to blocks, explod the blocks, polylines.	Create a block by drawing a washer or thread of a particular size. Save the blocks as a universal blocks. Insert other drawings as blocks into the drawing file. Specify the scale while inserting drawings, use Auto CAD design center for inserting blocks, set attributes for inserting the blocks, save the blocks with attributes explode the blocks.
12	Create layouts, differentiate layout with paper set up, multiple lay outs for multiple views, drag the window to a layout, drag the extent to a layout create template for different paper sizes, save the templates, use templates for opening a new drawing, use attributes in a template, use text attributes in a template.	create template for A4,A3,A0 size papers. Create titile blocks for these size. Use attributes in this templates, Save the templates, create new drawings using this templates by assigning them as defaults. Create new layouts printing. Freeze layers for plotting filtered drawings scale the plots for different values of drawings units and printing metric units select the plot by window extents, display etc..
13	Introduction to UCS, differentiate WCS and UCS create UCS planes, rotate UCS along X axis and Z axis.	Use UCS command for changing the co-ordinate system, exercise to study the UCS command rotation of X,Y and Z axis. Use UCS 3 point method for creation a new custom mode UCS.
14	Screw thread, terms and nomenclature, types of screw thread, proportion and their uses, thread conventions types of bolts and nuts their proportions, uses different types locking devices.	Screw threads with BIS conventions, nuts, bolts, washers, and locking devices with BIS conventions.
15	Different types of machine screws cap screws and their specifications. Different types of foundation bolts, purpose, terms, different types keys and proportions use of cotters, pins and circlips	Machine screws, cap screws, studs and set screws, foundation bolts with BIS conventions keys, cotters, circlips and pins with BIS conventions

16	Type of fastening materials, Types of rivets, their proportions and uses type of riveted joints, terms and proportions of riveted joints conventional representation. Causes of failure of riveted joints, efficiency of riveted joints	Type of rivets, types of riveted joints with BIS conventions. Prepare working drawing of a riveted structure as per conventional system.
17	Description of welded joints and their representation indication of welding symbols on drawing as Per BIS.	Welded joints. Use of welding symbols. Working drawing of welded structures.
18	Introduction of 3D solid views. Create Region, create boundary, Differentiate region and Boundary. Use Boolean Operation For UNION, SUBTRACTION, INTERSECTION. Use EXTRUDE, REVOLVE for composite solids	Create composite solids using Boolean addition, subtraction, and intersection by joining the primitives. Sketch revolved solid like bottle, cylinder and pulleys.
19	study solids primitives like cube, wedge, box, cylinder, cone, sphere, Torus, uses of facetres for shade mode of solids	Use of simple solid Auto CAD commands for creating basic primitives like cube, box, cylinder, wedge, cone, sphere, pyramid for use .use facetres command for proper shading, view them in different shade modes
20	Type of Assembly drawing different types of detailed drawing and preparation of bill of bearing, types of bearings, Roller and Ball bearing including tapered roller bearing and material used	Working Drawing of a simple bearing a foot step bearing, pedestal bearing. Details and assembly drawing of a angular plammer block.
21	Necessity of coupling. Type uses and proportion of different type of coupling . Materials used for couplings	working drawing of coupling such as muff coupling, flange coupling ,friction grip coupling etc.
22	Use of gears in transmission of power, Different types of gears. Cast gears and machined gears	Drawing of gears such as spur, helicut, bevel and worm whed.
23	Introduction to computer Dos, Windows etc.	Practice on computer useful software of MS word, MS Excel, ms office and operating system software.
24	Project work	Project work
25	Revision and Test	Revision and Test

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