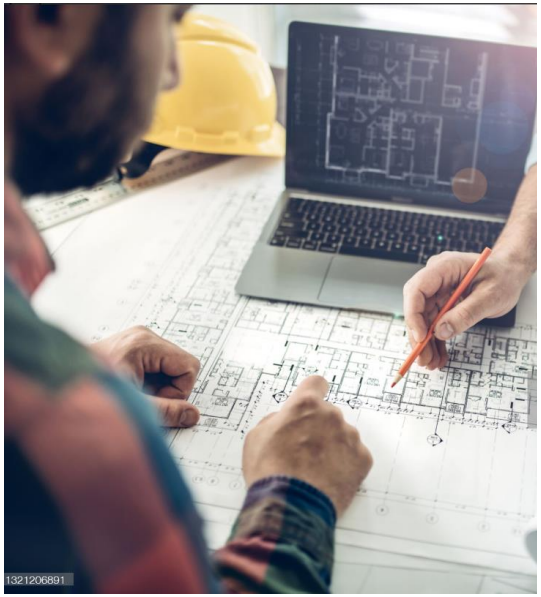
National Vocational Certificate Level 2 in Computer Aided Design & Manufacturing (CAD /CAM)

(Junior Draftsman)



(Curriculum)

National Vocational and Technical Training Commission (NAVTTC)

Government of Pakistan

National Vocational Certificate Level 2 in Computer Aided Design & Manufacturing (CAD /CAM) (Junior Draftsman)

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Introduction

Definition/Description of training program (Junior Draftsman)

Construction sector is one of the booming industries of Pakistan. There is an increasing demand of the Junior draftsman in CAD/CAM Technology. Therefore, the skills are required to be inducted in the future generation. If an individual is planning to pursue a career in construction, this program will be helpful in targeting various commercial and non-commercial projects etc. If an individual is planning to take up junior draftsman in CAD/CAM Technology course, this course will help him weigh their choices better.

Keeping in view of the above the competency based national vocational qualifications have been developed by GIZ & NAVTTC to train the unskilled human resource on the technical and entrepreneurial skills to be employed / self-employed and inevitably set sustainable impact on their lives by increasing their livelihood income.

Training Course is based on competency standards which are defined by the industry and the traditional role of a trainer changes and shifts towards the facilitation of training. A trainer encourages and assists trainees to learn for themselves. Trainees are likely to work in groups (pairs) and all doing something different. Some are doing practical tasks in the computer Lab, some writing, some not even in the classroom or computer lab but in another part of the building doing safety exercise. As trainees learn at different pace they might be at different stages in their learning, thus learning must be tailored to suit individual needs. The following facilitation methods (teaching strategies) are generally employed.

Purpose of the training program:

The purpose of the training is to provide skilled manpower to improve the existing construction industry. More than 96 % of the Pakistani manpower is working in GCC countries where Saudi Arabia (50.90%)) and UAE (33.10%) are the largest destination countries followed by Oman (7.26%), Kuwait (1.90%), Bahrain

(1.58%), and Qatar (1.41%). The overseas Pakistanis are playing a pivotal role to support the economy in the form of remittances. For this purpose, new qualifications have been developed by GIZ & NAVTTC on CBT&A mode in order to train the unskilled human resource with employable skills.

Overall objectives of training program:

The main objectives of the National Vocational Certificate Level 2 in CAD/CAM Technology (Junior Assistant) are as follows:

- Improve the professional competence of software skills
- Capacitate the local community and trainers in modern CBT training, methodologies and processes as envisaged under NVQF
- Provide flexible pathways and progressions in the designing
- Enable the trainees to perform their duties in efficient manner
- Establish a standardized and sustainable system of training for Computer Aided Design & Manufacturing across globe

Competencies to be gained after completion of course:

At the end of the course, the trainee has attained the following core competencies:

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1. Perform Basic Manual Drawing
2. Construct different engineering curves
3. Perform free hand sketching (isometric)
4. Construct Multi-view drawings (sectioning)
5. Develop 2D Drawings in AutoCAD
6. Perform Basic Computer Operations

7. Follow Safety Rules at Site
8. Perform Basic Communication Skills

Possible available job opportunities, available immediately and later in the future:

- Junior Draftsman
- Senior Draftsman

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Trainee entry level:

The entry level for National Vocational Certificate Level 2 in CAD/CAM Technology **(Junior Draftsman)** is given below:

Title	Entry requirements
National Vocational Certificate Level 2 in Computer Aided Design & Manufacturing (CAD/CAM) **(Junior Draftsman)**	The entry requirement for this qualification would be Middle or equivalent

Minimum qualification of trainer:

A. Must be a holder of DAE/Level 5 Diploma in CAD/CAM with at least 2 years relevant experience

OR

B. B.Sc. Technology (Civil) / B.E Civil /BSc Civil Engineering

Recommended trainer: trainee ratio

The recommended maximum trainer: trainee ratio for this program is 1 trainer for 25 trainees.

Medium of instruction i.e., language of instruction:

Instructions will be in Urdu/ English/ Local language.

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Duration of the course (Total time, Theory & Practical time):

The distribution of contact hours is given below:

Total - 600 hours

Theory - 120hours (20%)

Practical - 480 hours (80%)

Proposed Course Duration-6 Months

Sequence of modules:

1. Perform Basic Manual Drawing
2. Construct different engineering curves
3. Perform free hand sketching (isometric)
4. Construct Multi-view drawings (sectioning)
5. Develop 2D Drawings in AutoCAD
6. Perform Basic Computer Operations
7. Follow Safety Rules at Site
8. Perform Basic Communication Skills

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Summary template-overview of the curriculum:

Following is the structure of the course:

Sr No	Code	Competency Standards	Occupation	NVQF Level	Category	Estimated Contact Hours			Cr Hr.
						Th	Pr	Total	
Level 2									
1	0720 C/C & M 1-A	Perform Basic Manual Drawing	**Junior Draftsman**	2	Technical	12	48	60	6
2	0720 C/C & M 1-B	Construct different engineering curves		2	Technical	12	48	60	6
3	0720 C/C & M 1-C	Perform free hand sketching (isometric)		2	Technical	15	65	80	8
4	0720 C/C & M 1-D	Construct Multi-view drawings (sectioning)		2	Technical	15	65	80	8

5	0720 C/C & M 1-E	Develop 2D Drawings in AutoCAD		2	Technical	28	112	140	14
6	0720 C/C & M 1-F	Perform Basic Computer Operations		2	Functional	12	48	60	6
7	0720 C/C & M 1-G	Follow Safety Rules at Site		2	Functional	12	48	60	6
8	0720 C/C & M 1-H	Perform Basic Communication Skills		2	Functional	14	46	60	6
		Total				**120**	**480**	**600**	**60**
		Percentage				**20**	**80**	**100**	

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Module: 1- Perform Basic Manual Drawing

Objective: After the completion of this competency standard, the Trainee will be able to Draw single stroke capital vertical lettering, Draw single stroke capital inclined lettering, Draw horizontal, vertical and inclined lines, Use of compass, circles, half circles, radius, Drawing Center lines, centers, curves, and crossing of lines, Construction of parallel-lines, perpendicular, bisects line, angles and equal division of lines, Draw round corners, circles elements, quadrilaterals inside and outside circle and Construction of angles and triangles.

Duration: 60 Hours **Theory: 12 Hours** **Practice: 48 Hours** **Credit Hours: 6**

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Draw single stroke capital vertical lettering.	**Trainee will be able to:** • Prepare Drawing sheet. • Select the tools. • Use Proper pencil for lettering with holding techniques. • Draw Boundary lines as per standards. • Make title bar • Draw upper and lower lines for lettering according to standards.	• Types of drawing sheets • Type of drawing tools • Division and marking of drawing sheet as per standard • Proportion of drawing letters (i.e., width to height) • Types of Single Stroke Capital vertical lettering **Practical Activity:** • Draw a letter in Gothic style as per instruction	**Theory –** 2 Hrs **Practical –** 6 Hrs **Total –** 8 Hrs	• Drawing Board • Drawing Box • Drawing Sheets • T scale • Set Squares • Pencils (HB, H, 2H)	Class Room Drafting Lab

	• Start Writing Vertical Lettering with different style like Gothic, Roman and free hand lettering.				
LU2. Draw single stroke capital inclined lettering.	**Trainee will be able to:** • Prepare Drawing sheet. • Select the tools. • Draw Boundaries lines as per standards. • Make title bar • Draw upper and lower lines for lettering according to standards. • Start Writing inclined Lettering with different style like Gothic, Roman and free hand lettering.	• Types of drawing sheets • Type of drawing tools • Division and marking of drawing sheet as per standard • Types of Single Stroke Capital inclined lettering (upper and lower case) • Angle for lettering inclination (i.e., 67.5 degree from the horizontal) **Practical Activity:** • Draw a letter in Roman style as per instruction	**Theory –** 2 Hrs **Practical –** 6 Hrs **Total –** 8 Hrs	• Drawing Board • Drawing Box • Drawing Sheets • T scale • Set Squares • Pencils (HB, H, 2H)	Class Room / Drafting Lab
LU3. Draw engineering drawing lines.	**Trainee will be able to:** • Prepare Drawing sheet. • Select the tools. • Draw Boundaries lines as per standards. • Make title bar	• Types of drawing sheets • Type of drawing tools • Division and marking of drawing sheet as per standard • Types of engineering drawing lines	**Theory –** 2 Hrs **Practical –** 6 Hrs **Total –** 8 Hrs	• Drawing Board • Drawing Box • Drawing Sheets • T scale • Set Squares • Pencils (HB, H, 2H)	Class Room / Drafting Lab

	• Divide the sheets in different equal parts. • Draw the engineering drawing lines including part outlines, section lines, hidden lines, centre lines, dimension lines, extension lines, cutting plane, break lines.	**Practical Activity:** • Draw an object and draw centre line, dimension lines			
LU4. Draw different types of circles, half circles, radius with compass	**Trainee will be able to:** • Prepare Drawing sheet. • Select the tools. • Draw Boundaries lines as per standards. • Make title bar • Divide the sheets in different equal parts. • Draw different diameters circles and half circles.	• Types of drawing sheets • Type of drawing tools • Division and marking of drawing sheet as per standard • Names and parts of circle (Centre, Radius, Diameter, Chord, Circumference, Arc, Tangent, Secant) **Practical Activity:** • Draw a complete circle with compass as per given diameter. • Draw a half circle with compass as per given radius.	**Theory –** 1 Hrs **Practical –** 9 Hrs **Total –** 10 Hrs	• Drawing Board • Drawing Box • Drawing Sheets • T scale • Set Squares • Pencils (HB, H, 2H)	Class Room / Drafting Lab

LU5. Draw different lines	**Trainee will be able to:** • Prepare drawing sheet. • Select the tools. • Draw Boundaries lines as per standards. • Make title bar • Divide the sheets in different equal parts. • Draw center lines • Draw parallel-lines • Draw perpendicular & bisects line • Draw equal division of lines • Draw crossing line	• Types of drawing sheets • Type of drawing tools • Division and marking of drawing sheet as per standard • Types of lines including center, parallel, perpendicular, bisecting **Practical Activity:** • Draw a center line of a horizontal line • Draw a line and divide it into 4 equal parts • Draw 2 parallel lines and draw a line cutting them perpendicularly	**Theory –** 1Hrs **Practical –** 6 Hrs **Total –** 7Hrs	• Drawing Board • Drawing Box • Drawing Sheets • T scale • Set Squares • Pencils (HB, H, 2H)	Class Room / Drafting Lab
LU6. Draw round corners, circles elements, quadrilaterals	**Trainee will be able to:** • Prepare Drawing sheet. • Select the tools. • Draw Boundaries lines as per standards. • Make title bar • Divide the sheets in different equal parts.	• Types of drawing sheets • Type of drawing tools • Division and marking of drawing sheet as per standard • Types of circle elements • Quadrilateral and its elements	**Theory –** 2 Hrs **Practical –** 9 Hrs **Total –** 11Hrs	• Drawing Board • Drawing Box • Drawing Sheets • T scale • Set Squares • Pencils (HB, H, 2H)	

	• Draw different diameter circles. • Draw a quadrilateral as per given dimension	**Practical Activity:** • Draw circles with given radius • Draw quadrilateral having 2 angles of 120 degree			Class Room / Drafting Lab
LU7. Draw different types of triangl	**Trainee will be able to:** • Prepare Drawing sheet. • Select the tools. • Draw Boundaries lines as per standards. • Make title bar • Divide the sheets in different equal parts. • Draw Equilateral Triangle, Isosceles triangle, Scalene Triangle, Right Triangle, Obtuse Triangle, cute Triangle.	• Types of drawing sheets • Type of drawing tools • Division and marking of drawing sheet as per standard • Types of triangles (equilateral, isosceles, scalene, right angle, acute, obtuse) **Practical Activity:** • Draw a triangle with 60 degrees • Draw a scalene triangle • Draw an acute triangle	**Theory –** 2 Hrs **Practical –** 6 Hrs **Total –** 8 Hrs.	• Drawing Board • Drawing Box • Drawing Sheets • T scale • Set Squares • Pencils (HB, H, 2H)	Class Room / Drafting Lab

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Module:2- Construct Different Engineering Curves

Objective: After the completion of this competency standard, the Trainee will be able to construct inscribe and circumscribe figures, Construct a pentagon, Hexagon and Octagon by circumscribe method, Construct a pentagon, Hexagon and Octagon by inscribe method, Construct a Tangents of circles (Inside & Outside) when the centre of the given circle is known and when the circle of centre is not known, Construct an Ellipse by Concentric Circle Method, Rectangle Method, Oblong Method, Arcs of Circle Method, Rhombus Method and Basic Locus Method, Construct a parabola curve by Rectangle Method, Method of Tangents(Triangle Method) and Basic Locus Method, Construct a hyperbola curve, Construct a Archimedean Spiral curve, Construct a involutes curve of square rectangle hexagon and circle and Construct of cycloid, epicycloids, and hypocycloid.

Duration: 60 Hours **Theory: 12 Hours** **Practice: 48 Hours** **Credit Hours: 6**

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Construct inscribe and circumscribe figures.	**Trainee will be able to:** • Prepare Drawing sheet. • Select the tools. • Draw Boundaries lines as per standards. • Make title bar • Divide the sheets in different equal parts. • Draw square, triangle and hexagon inside & outside the	• Types of drawing sheets • Type of drawing tools • Division and marking of drawing sheet as per standard • Different geometrical shapes i.e., triangle, square, rectangle, circle • Inscribe & circumscribe circles	**Theory –** 1Hrs **Practical –** 5 Hrs **Total –** 6 Hrs	• Drawing Board • Drawing Box • Drawing Sheets • Pencils (HB, H, 2H)	Class Room / Drafting Lab

	circle, according to given dimension.	**Practical Activity:** • Draw an inscribe circle with triangle • Draw a circumscribe circle with square			
LU2. Draw polygons by circumscribe method.	**Trainee will be able to:** • Prepare Drawing sheet. • Select the tools. • Draw Boundaries lines as per standards. • Make title bar • Divide the sheets in different equal parts. • Draw various polygons (Pentagon, Hexagon, Heptagon, Octagon)	• Types of drawing sheets • Type of drawing tools • Division and marking of drawing sheet as per standard • Different geometrical shapes i.e., square, pentagon, hexagon • Circumscribe circles **Practical Activity:** • Draw a circumscribe circle with pentagon	**Theory –** 1 Hrs **Practical –** 5 Hrs **Total –** 6 Hrs	• Drawing Board • Drawing Box • Drawing Sheets • Pencils (HB, H, 2H)	Class Room / Drafting lab
LU3. Draw polygons by inscribe method	**Trainee will be able to:** • Prepare Drawing sheet. • Select the tools. • Draw Boundaries lines as per standards.	• Types of drawing sheets • Type of drawing tools • Division and marking of drawing sheet as per standard	**Theory-** 1 Hrs **Practical-** 5 Hrs **Total –** 6Hrs	• Drawing Board • Drawing Box • Drawing Sheets • Pencils (HB, H, 2H)	

	• Make title bar • Divide the sheets in different equal parts. • Draw pentagon, Hexagon and Octagon.	• Different geometrical shapes i.e., square, pentagon, hexagon etc • Inscribe circles **Practical Activity:** • Draw an inscribe circle with Hexagon			Class Room / Drafting Lab
LU4. Construct Tangents of circles (Inner & External)	**Trainee will be able to:** • Prepare Drawing sheet. • Select the tools. • Draw Boundaries lines as per standards. • Make title bar • Divide the sheets in different equal parts. • Draw inner tangents of two circles when the centre of the circle is known. • Draw inner tangents of two circles when the centre of the circle is unknown • Draw external tangent of a circle when the centre of the circle is known	• Types of drawing sheets • Type of drawing tools • Division and marking of drawing sheet as per standard • Different circles with known and unknown centres • Drawing tangents inside and outside circle with known and unknown centre **Practical Activity:** • Draw an inner tangent of two circles with given / known diameter	**Theory –** 2 Hrs **Practical -** 5Hrs **Total –** 7 Hrs	• Drawing Board • Drawing Box • Drawing Sheets • Pencils (HB, H, 2H)	Class Room / Drafting Lab

	• Draw external tangent of a circle when the centre of the circle is known				
LU5. Draw Ellipse	**Trainee will be able to:** • Prepare Drawing sheet. • Select the tools. • Draw Boundaries lines as per standards. • Make title bar • Divide the sheets in different equal parts. • Draw an Ellipse by Concentric Circle. • Draw an Ellipse by Rectangle Method • Draw an Ellipse by Oblong Method • Draw an Ellipse by Arcs of Circle Method • Draw an Ellipse by Rhombus Method. • Draw an Ellipse by Basic Locus Method	• Types of drawing sheets • Type of drawing tools • Division and marking of drawing sheet as per standard • Ellipse, its types and drawing of ellipse with different methods **<u>Practical Activity:</u>** • Draw an ellipse of given size by rectangle method • Draw an ellipse of given size by oblong method • Draw an ellipse of given size by Rhombus method	**Theory-** 1 Hrs **Practical-** 5 Hrs **Total-** 6 Hrs	• Drawing Board • Drawing Box • Drawing Sheets • Pencils (HB, H, 2H)	Class Room / Drafting Lab

LU6. Draw a parabola curve	**Trainee will be able to:** • Prepare Drawing sheet. • Select the tools. • Draw Boundaries lines as per standards. • Make title bar • Divide the sheets in different equal parts. • Draw a parabola curve by Rectangle • Draw a parabola curve by Method of Tangents (Triangle Method) • Draw a parabola curve by Basic Locus Method	• Types of drawing sheets • Type of drawing tools • Division and marking of drawing sheet as per standard • Drawing of Parabola curves by different methods **Practical Activity:** • Draw a parabola curve of given size by rectangle method • Draw a parabola curve of given size by Basic Locus method	**Theory-** 1 Hrs **Practical-** 5 Hrs **Total-** 6 Hrs	• Drawing Board • Drawing Box • Drawing Sheets • Pencils (HB, H, 2H)	Class Room / Drafting Lab
LU7. Draw a hyperbola curve	**Trainee will be able to:** • Prepare Drawing sheet. • Select the tools. • Draw Boundaries lines as per standards. • Make title bar • Divide the sheets in different equal parts. • Draw hyperbola curves	• Types of drawing sheets • Type of drawing tools • Division and marking of drawing sheet as per standard • Drawing of Hyperbola curves **Practical Activity:** • Draw a Hyperbola curve of given data	**Theory-** 1 Hrs **Practical-** 4Hrs **Total-** 5Hrs	• Drawing Board • Drawing Box • Drawing Sheets • Pencils (HB, H, 2H)	Class Room / Drafting Lab

LU8. Draw an Archimedean Spiral curve	**Trainee will be able to:** • Prepare Drawing sheet. • Select the tools. • Draw Boundaries lines as per standards. • Make title bar • Divide the sheets in different equal parts. • Draw Archimedean spiral curve.	• Types of drawing sheets • Type of drawing tools • Division and marking of drawing sheet as per standard • Drawing of Archimedean spiral curve. **Practical Activity:** • Draw an Archimedean spiral curve with the given data	**Theory-** 1 Hrs **Practical-** 4 Hrs **Total-** 5 Hrs	• Drawing Board • Drawing Box • Drawing Sheets Pencils (HB, H, 2H)	Class Room / Drafting Lab
LU9. Draw involute curve	**Trainee will be able to:** • Prepare Drawing sheet. • Select the tools. • Draw Boundaries lines as per standards. • Make title bar • Divide the sheets in different equal parts. • Draw involute curve by square • Draw involute curve by rectangle • Draw involute curve by hexagon • Draw involute curve by circle.	• Types of drawing sheets • Type of drawing tools • Division and marking of drawing sheet as per standard • Drawing of Involute curves by different methods **Practical Activity:** • Draw an involute curve of given data by hexagon method	**Theory –** 1 Hrs **Practical-** 4 Hrs **Total –** 5 Hrs	• Drawing Board • Drawing Box • Drawing Sheets • Pencils (HB, H, 2H)	Class Room / Drafting Lab

		• Draw an involute curve of given data by circle			
LU10. Draw of cycloid, epicycloid, and hypocycloid	**Trainee will be able to:** • Prepare Drawing sheet. • Select the tools. • Draw Boundaries lines as per standards. • Make title bar • Divide the sheets in different equal parts. • Draw the generating circle and the base line equal to the circumference of the generating circle • Divide the circle and the base line in to equal number of parts • Complete the cycloid, epicycloids, and hypocycloid.	• Types of drawing sheets • Type of drawing tools • Division and marking of drawing sheet as per standard • Drawing of generating circle and base line • Division of circle and base line in equal parts • Drawing of cycloid and its types i.e., epicycloids, and hypocycloid. **Practical Activity:** • Draw a generating circle of given data • Divide circle and baseline into equal parts • Draw an epicycloid with given data	**Theory-** 2 Hrs **Practical-** 6 Hrs **Total-** 8 Hrs	• Drawing Board • Drawing Box • Drawing Sheets • Pencils (HB, H, 2H)	Class Room / Drafting Lab

Module:3- Perform Free Hand Sketching (Isometric)

Objective: After the completion of this competency standard, the Trainee will be able to construct the free hand sketching of isometric views of an object/drawing.

Duration: 80 Hours **Theory: 15 Hours** **Practice: 65 Hours** **Credit Hours: 8**

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Identify various sides of an isometric views, show solid and hidden parts of it	**Trainee will be able to:** • Select an isometric view. • Identify its Top, Front and Side view • Identify any solid or hidden profile in the isometric view/drawing	• Division and marking of drawing sheet as per standard • Drawing of isometric view/drawing of an object • Drawing of solid and hidden profile of an object drawing **Practical Activity:** • Make an object drawing and draw its isometric view	**Theory –** 7 Hrs **Practical-** 32 Hrs **Total –** 39 Hrs	• Drawing Board • Drawing Box • Drawing Sheets • Pencils (HB, H, 2H)	Class Room / Drafting Lab

		• Draw an object drawing and show its sectioning with solid & hidden lines			
LU2. Construct Top, Front & Side views from an isometric view of an object/drawing	**Trainee will be able to:** • Select the angle of projection (1st or 3rd angle) • Draw the Top view of object from its isometric view • Draw the Front view of object from its isometric view • Draw the Side view of object from its isometric view • Cross check the views for any correction according to standards.	• Division and marking of drawing sheet as per standard • Drawing of isometric view/drawing of an object in 1st angle or 3rd angle projection • Drawing of Top, Front, Side views of an object **Practical Activity:** • Draw Top, Front and Side views from isometric drawing of an object	**Theory –** 8 Hrs **Practical –** 33Hrs **Total –** 41Hrs	• Drawing Board • Drawing Box • Drawing Sheets • Pencils (HB, H, 2H)	Class Room / Drafting Lab

Module:4- Construct Multi-View Drawings (Sectioning)

Objective: After the completion of this competency standard, the Trainee will be able to sketch Orthographic projection 1st angle, Sketch Orthographic projection 3rd angle, Sketch Oblique Drawing, Construct multi view drawing of Simple Bearing, Construct multi view drawing of Open Bearing, Sketch prism, Sketch cone and Draw pyramid.

Duration:80 Hours **Theory:15 Hours** **Prctical:65 Hours** **Credit Hours:8**

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Sketch Orthographic projection in 1st angle of Projection	**Trainee will be able to:** • Prepare Drawing sheet. • Select the tools. • Draw Boundaries lines as per standards. • Make title bar • Divide the sheets in equal parts. • Draw plan view in 1st angle of projection by orthographic projection • Draw Top view in 1st angle of projection by orthographic projection	• Division and marking of drawing sheet as per standard • Drawing of views different views (Top, Front, Side) of an object with Orthographic Projection in 1st angle **Practical Activity:** • Draw Top view with orthographic projection of an object in 1st angle • Draw side view with orthographic projection of an object in 1st angle	**Theory –** 1Hrs **Practical -** 6 Hrs **Total –** 7 Hrs	• Drawing Board • Drawing Box • Drawing Sheets • T scale	Class Room / Drafting Lab

	• Draw front view in 1st angle of projection by orthographic projection • Draw side view in 1st angle of projection by orthographic projection				
LU2. Sketch Orthographic projection 3rd angle of Projection	**Trainee will be able to:** • Prepare Drawing sheet. • Select the tools. • Draw Boundaries lines as per standards. • Make title bar • Divide the sheets in equal parts. • Draw plan view in 3rd angle of projection by orthographic projection • Draw Top view in 3rd angle of projection by orthographic projection • Draw Front view in 3rd angle of projection by orthographic projection • Draw Side view in 3rd angle of projection by orthographic projection	• Division and marking of drawing sheet as per standard • Drawing of views different views (Top, Front, Side) of an object with Orthographic Projection in 3rd angle **Practical Activity:** • Draw Front view with orthographic projection of an object in 3rd angle • Draw side view with orthographic projection of an object in 3rd angle	**Theory –** 2 Hrs **Practical –** 6 Hrs **Total –** 8 Hrs	• Drawing Board • Drawing Box • Drawing Sheets • T scale	Class Room / Drafting Lab

LU3. Sketch Oblique View Drawing	**Trainee will be able to:** • Prepare Drawing sheet. • Select the tools. • Draw Boundaries lines as per standards. • Make title bar • Divide the sheets in equal parts • Draw the oblique view of the given object at receding axis of 30 degree or 45 degrees	• Division and marking of drawing sheet as per standard • Drawing of oblique view of an object (with representation of height, width, and depth) • **Practical Activity:** • Draw oblique view of given object at receding axis of 30 degree	**Theory-** 1Hrs **Practical -** 5Hrs **Total –** 6 Hrs	• Drawing Board • Drawing Box • Drawing Sheets • T scale	Class Room / Drafting Lab
LU4. Construct multi view drawing of Simple Bearing	**Trainee will be able to:** • Prepare Drawing sheet. • Select the tools. • Draw Boundaries lines as per standards. • Make title bar • Divide the sheets in equal parts. • Draw plan view of simple bearing • Draw front view of simple bearing • Draw side view of simple bearing	• Division and marking of drawing sheet as per standard • Drawing of different views (Top, Front, Side, Plan) of a simple bearing **Practical Activity:** • Draw Front view of simple bearing • Draw Side view of simple bearing	**Theory –** 1 Hrs **Practical –** 5 Hrs **Total –** 6 Hrs	• Drawing Board • Drawing Box • Drawing Sheets • T scale	Class Room / Drafting Hall

LU5. Construct multi view drawing of Open Bearing	**Trainee will be able to:** • Prepare Drawing sheet. • Select the tools. • Draw Boundaries lines as per standards. • Make title bar • Divide the sheets in equal parts. • Draw plan view of open bearing • Draw front view of open bearing • Draw side view of open bearing	• Division and marking of drawing sheet as per standard • Drawing of different views (Top, Front, Side, Plan) of an open bearing **Practical Activity:** • Draw Top view of an open bearing • Draw Plan view of an open bearing	**Theory-** 1 Hrs **Practical-** 5 Hrs **Total-** 6 Hrs	• Drawing Board • Drawing Box • Drawing Sheets • T scale	Class Room / Drafting Hall
LU6. Sketch prism	**Trainee will be able to:** • Prepare Drawing sheet. • Select the tools. • Draw Boundaries lines as per standards. • Make title bar • Divide the sheets in equal parts. • Sketch prism	• Selection of drawing sheet • Division and marking of drawing sheet as per standard • Sketching of prism • Parts of prism **Practical Activity:** • Sketch the prism as per the given dimensions	**Theory-** 1 Hrs **Practical-** 3 Hrs **Total-** 4Hrs	• Drawing Board • Drawing Box • Drawing Sheets • T scale	Class Room / Drafting Hall

LU7. Sketch cone	**Trainee will be able to:** • Prepare Drawing sheet. • Select the tools. • Draw Boundaries lines as per standards. • Make title bar • Divide the sheets in equal parts. • Start with a horizontal oval • Draw the two sides of a triangle which meets at a common point	• Selection of drawing sheet • Division and marking of drawing sheet as per standard • Sketching of cone • Parts of cone **Practical Activity:** • Sketch the cone as per the given data	**Theory-** 1 Hrs **Practical-** 3 Hrs **Total-** 4 Hrs	• Drawing Board • Drawing Box • Drawing Sheets • T scale	Class Room / Drafting Hall
LU8. Draw pyramid	**Trainee will be able to:** • Select the tools. • Draw Boundaries lines as per standards. • Make title bar • Divide the sheets in equal parts. • Sketch pyramid	• Selection of drawing sheet • Division and marking of drawing sheet as per standard • Sketching of pyramid • Parts of cone **Practical Activity:** • Sketch the pyramid as per the given data	**Theory-** 1 Hrs **Practical-** 3 Hrs **Total-** 4 Hrs	• Drawing Board • Drawing Box • Drawing Sheets • T scale	Class Room / Drafting Hall

LU9. Draw the full section	**Trainee will be able to:** • Prepare Drawing sheet. • Select the tools. • Draw Boundaries lines as per standards. • Make title bar • Divide the sheets in equal parts. • Draw the object/part • Draw the cutting plane line which passes fully through the object/part • Draw the section-lined areas which are portions that have been in actual contact with the cutting-plane	• Selection of drawing sheet • Division and marking of drawing sheet as per standard • Drawing of an object for making its sectioning to show inner parts details • Knowledge of cutting plane line, section-lined **Practical Activity:** • Draw the complete or full section view of given object	**Theory –** 1 Hrs **Practical –** 6 Hrs **Total –** 7 Hrs	• Drawing Board • Drawing Box • Drawing Sheets • T scale	Class Room / Drafting Hall
LU10 Draw the half section	**Trainee will be able to:** • Prepare Drawing sheet. • Select the tools. • Draw Boundaries lines as per standards. • Make title bar • Divide the sheets in equal parts. • Draw the object/part	• Selection of drawing sheet • Division and marking of drawing sheet as per standard • Drawing an object and making its half sectioning for showing its inner parts • Knowledge of cutting plane line, section-lined	**Theory-** 1 Hrs **Practical –** 6 Hrs **Total-** 7 Hrs	• Drawing Board • Drawing Box • Drawing Sheets • T scale	

	• Draw the cutting-plane line which cuts halfway through the part/object • Remove one quarter (1/4th) of the material	**Practical Activity:** • Draw the half section view of an object by removing 1/4th section / material of the given object			Class Room / Drafting Hall
LU11. Draw the offset section	**Trainee will be able to:** • Prepare Drawing sheet. • Select the tools. • Draw Boundaries lines as per standards. • Make title bar • Divide the sheets in equal parts. • Draw the object/part • Draw offset Section views by bend the cutting plane at right angles to pass through the desired internal features	• Selection of drawing sheet • Division and marking of drawing sheet as per standard • Drawing of an object and making of offset section views of object • Knowledge of internal features of object **Practical Activity:** • Draw the offset section view of an object	**Theory-** 1 Hrs **Practical –** 6Hrs **Total-** 7 Hrs	• Drawing Board • Drawing Box • Drawing Sheets • T scale	Class Room / Drafting Hall
LU12. Draw the broken section	**Trainee will be able to:** • Prepare Drawing sheet. • Select the tools. • Draw Boundaries lines as per standards.	• Selection of drawing sheet • Division and marking of drawing sheet as per standard	**Theory-** 1Hrs **Practical –** 6Hrs **Total-** 7 Hrs	• Drawing Board • Drawing Box • Drawing Sheets • T scale	Class Room / Drafting Hall

	• Make title bar • Divide the sheets in equal parts. • Draw the object/part in an orthographic view • Remove a small amount of material to show the interior details (without using a cutting-plane line)	• Drawing of an object in orthographic view and making of broken section • Knowledge of internal features of object (without using cutting plane line) **Practical Activity:** • Draw an object and make its broken section view			
LU13. Draw the rotated/revolved section	**Trainee will be able to:** • Prepare Drawing sheet. • Select the tools. • Draw Boundaries lines as per standards. • Make title bar • Divide the sheets in equal parts. • Draw the object • Show a cross-section of an area turned • 90 degrees or perpendicular to the object	• Selection of drawing sheet • Division and marking of drawing sheet as per standard • Drawing of an object with rotated/revolved section • Knowledge of internal features of object **Practical Activity:** • Draw an object and make its rotated / revolved section view	**Theory-** 2 Hrs **Practical –** 6 Hrs **Total-** 8 Hrs	• Drawing Board • Drawing Box • Drawing Sheets • T scale	Class Room / Drafting Hall

Module:5- Develop 2D Drawings in AutoCAD

Objective: After the completion of this competency standard, the trainee will be able to to install software and create new file and create basic drawing. This competency standard is designed to provide skills and knowledge to create 2 Dimensional drawings by using various tools and commands. You can create and modify objects and drawings in AutoCAD to meet specific intentions according to job requirements.

Duration: 140 Hours **Theory: 28 Hours** **Practice: 112 Hours** **Credit Hours: 14**

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Develop 2D Objects	**Trainee will be able to:** • Setup & save drawing interface for required specifications. • Setup user interface settings for required specifications. • Create 2D objects with given measurements. • Edit 2D Objects to meet set standards.		**Theory-** 14 Hrs. **Practical-** 60 Hrs. **Total-** 74Hrs.	• Computer • AutoCAD Software • Note book • Multimedia • Pen • White board • White board marker • duster	Classroom / lab

LU2. Prepare Final Set of 2D Drawings	**Trainee will be able to:** • Develop 2D Drawing with given project specification and measurements. • Plot drawing on scale according to required size & orientation.		**Theory-** 14 Hrs. **Practical-** 52 Hrs. **Total-** 66 Hrs.	• Computer • AutoCAD Software • Note book • Multimedia • Pen • White board • White board marker • Duster	Classroom / lab

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Module: 6-Perform Basic Computer Operations

Objective: This competency standard will provide skills and knowledge related to basic computer hardware, software, applications and troubleshooting. You will be able to demonstrate your skills in operating a computer system and software such as MS Word, MS PowerPoint, MS Excel as well as installation and troubleshooting of operating system and software.

Duration: 60 Hours **Theory: 12 Hours** **Practice: 48 Hours** **Credit Hours: 6**

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Configure Computer System	**Trainee will be able to:** • Connect computer components and peripherals as per requirement. • Install Drivers and applications according to the software specification. • Troubleshoot Applications to trace and fix faults in a specific application to bring it in a running condition. • Follow health, safety and security procedures to ensure safe working environment.	• Types of settings ✓ Unit ✓ Limits setting ✓ Object snap setting • User coordinate system **Practical Activity:** • Select a template, change basic drawing setting	**Theory-** 3 Hrs. **Practical-** 9 Hrs. **Total-** 12 Hrs.	• Computer • Note book • Multimedia • Pen • White board • White board marker • Duster	Classroom / lab

		• save the file in other formats			
LU2. Create a Document using MS Word	**Trainee will be able to:** • Compose a document as per the requirement. • Format Word Document according to given requirements. • Print Word Documents according to requirements.	• Angles and lines in AutoCAD • Differentiate between absolute, relative, and polar system • MTEXT commands • point styles. • Lines, colours, weight. **Practical Activity:** • Set a desired workspace setting and create a rectangle, and triangle	**Theory-** 3 Hrs. **Practical-** 12 Hrs. **Total-** 15 Hrs.	• Computer • Note book • Multimedia • Pen • White board • White board marker • Duster	Classroom / lab

		• Draw multiple lines and apply different line weight and styles			
LU3. Preparer a Worksheet using MS Excel	**Trainee will be able to:** • Develop a worksheet as per given data. • Format the worksheet according to given criteria. • Apply Formulas according to the requirement. • Generate Charts/Graphs according to the given data.	• Drafting settings (Units, Limits, Snap, Auto On & Off) • Describe Design centre feature- Scale and paper sizes • Dimension style and text size **<u>Practical Activity:</u>** • Apply drafting settings (Units, Limits, Snap, Auto On & Off) • Draw rectangle, square and ellipse • Create title block layout	**Theory-** 3 Hrs. **Practical-** 15 Hrs. **Total-** 18 Hrs.	• Computer • Note book • Multimedia • Pen • White board • White board marker • Duster	Classroom / lab

		• Set layout in different paper sizes			
LU4. Prepare a presentation using MS PowerPoint	**Trainee will be able to:** • Insert Slides with different Layouts according to requirements of presentation. • Insert text, tables, images, etc. according to the requirement. • Apply a set of effects to animate the slide according to requirement. • Apply Slide Transitions on Slides according to requirement. • Apply Sound Effects on Objects/text/images according to requirement. • Present a presentation according to 7Cs of communication.	• Explain types of presentation format • Describe short Keys of MS power point **Practical Activity:** • Practice of inserting slides different layout according to the requirement of presentation. • Practice of inserting text, tables, images into the slides. • Practice of applying effects, slide transition and sound effects according to requirement.	**Theory-** 3 Hrs. **Practical-** 12 Hrs. **Total-** 15 Hrs.	• Computer • Note book • Multimedia • Pen • White board • White board marker • Duster	Classroom / lab

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Module: 7 Follow Safety Rules at Site

Objective: This competency standard covers the skills and knowledge required to maintain personal health, hygiene and safety. Your underpinning knowledge will be sufficient to provide you the basis for your work.

Duration: 60 Hours **Theory: 12 Hours** **Practice: 48 Hours** **Credit Hours:6**

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Maintain occupational safety and health at workplace	***You must be able to:*** **1.** Identify the safety signs and symbols **2.** Erect barricades, hoardings, signage in the hazardous areas **3.** Maintain housekeeping **4.** Report unsafe condition to immediate supervisor (shift position)	• Knowledge of different types of hazards • Explain unsafe working conditions • Understanding of health and safety signs and symbols • Explain housekeeping • Understanding of different methods of dealing with hazard	**Total** 6hrs **Theory:** 2 hrs **Practical:** 4 hrs	Consumable • Notebooks • Pencils • Erasers • Sharpeners • White Board Marker Non Consumable • White board • Multimedia	• Class Room Simulated environment

		Practical Activity: • Practice to identify the physical hazards in mock situation and apply control measures, safety sign and barricade.			
LU2. Use Personal Protective and Safety Equipment (PPE)	***You must be able to:*** **1.** Identify risk associated with job to be done **2.** Select PPE according to job **3.** Wear PPE according to job **4.** Store PPE at Designated place after use	• Describe the types of Personal protective equipment (PPEs) • Describe the procedure to identify risk associated with job to be done • Importance of personal protective equipment	**Total:** 9 hrs **Theory:** 3hrs **Practical:** 6hrs	Consumable • Notebooks • Pencils • Erasers • Sharpeners • White Board Marker Non Consumable • White board • Multimedia PPEs (Safety glasses, Ear muffs/ear plugs, Protective Gloves, Cap, Safety shoes etc.)	• Class Room Simulated environment

		• Describe the Maintenance and cleaning of PPEs • Describe the procedure to wear full body harness **Practical Activity:** • Demonstrate to select PPEs for specific job. • Practice to wear full body harness and anchorage			
LU3. Perform Communication Signals	***You must be able to:*** **1.** Identify different types of communication hand signals. **2.** Use appropriate hand signals as per situation.	• Understanding of different types of communication signals • Explain different types of hand signals	**Total** 6hrs **Theory:** 2 hrs **Practical:** 4 hrs	Consumable • Notebooks • Pencils • Erasers • Sharpeners • White Board Marker Non Consumable • White board	• Class Room Simulated environment

		• Explain the importance of hand signals **Practical Activity:** • Demonstrate the hand signals for different activities		• Multimedia Safety manuals	
LU4. Carry out Basic first aid treatment	***You must be able to:*** **1.** FollowCOVID-19 SOP's **2.** Identify basic elements for first aid kit **3.** Maintain a fully stacked first aid kit **4.** Check expiry date of medicines ***5.*** Perform mock first aid treatment for minor injuries	• Describe the ABC of first aid • Describe the first aid procedure for minor cut • Describe components of first aid kit **Practical Activity:** • Demonstrate mock exercise of first aid treatment for minor cut	**Total** 19 hrs **Theory:** 4 hrs **Practical:** 15 hrs	Consumable • Notebooks • Pencils • Erasers • Sharpeners • White board marker Non Consumable • White board • Multimedia • Computer	• Class Room Simulated environment

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Module:8 Perform Basic Communication Skills

Objective: This competency standard covers the skills and knowledge required to assist in the development of communication competence by providing information regarding different forms of communication and their appropriate use. Your underpinning knowledge will be sufficient to provide you the basis for your work.

Duration: 60 Hours **Theory: 12 Hours** **Practice: 48 Hours** **Credit Hours:6**

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Demonstrate the basic Communication skills	***You must be able to:*** **1.** Demonstrate the listening skills **2.** Demonstrate the reading skills **3.** Demonstrate the writing skills **4.** Demonstrate the speaking skills	• Knowledge of communication skills (7Cs of effective communication) • Describe verbal and non-verbal communication • Explain reporting techniques **Practical Activity:** • Practice to listen to the audio and write down	**Total:** 15 hrs **Theory:** 5hrs **Practical:** 10hrs	Consumable • Notebooks • Pencils • Erasers • Sharpeners • White board marker Non-Consumable White board	• Class Room

		Practice to note down the instructions given by the supervisor			
LU2. Follow Supervisor's instructions	***You must be able to:*** **1.** Carry out the instructions of the supervisor **2.** Report to the supervisor as per organizational SOPs given standards.	• Explain the note taking procedure • Understanding of the standard procedure to prepare the report **Practical Activity:** • Prepare different office reports	**Total:** 15 hrs **Theory:** 4hrs **Practical:** 11hrs	Consumable • Notebooks • Pencils • Erasers • Sharpeners • White board marker Non-Consumable White board	• Class Room

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List of Tool, Machinery and Equipment:

SR#	Items/Tools & Equipment	Quantity
1.	First Aid Kit	01
2.	Computer	26
3.	Multimedia	01
4.	Clip Board	30
5.	Structural drawing (3D Blocks)s	15
6.	Scale cards	30
7.	Drawing boards	26
8.	Printer	1

9.	Architechural scale	25
10.	Different curves	25
11.	Set saqure	25

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List of Consumable Supplies

SR#	Consumable Supplies	Quantity
1.	PPEs Surgical Face Masks	2 Boxes
2.	Stationary	As per requirement
3.	Drawing pencils (Different Nos)	100
4.	Clutch pencils	25
5.	Pointer	25
6.	Printer paper	As per requirement
7.	Safety sign boards	As per requirement

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Members of the Curriculum Development Committee

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2	**Aftab Hussain**	DACUM Facilitator
3	**Ali Raza**	DACUM Facilitator
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9	**Javeed Hayat**	Consultant (Survey and Research)

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