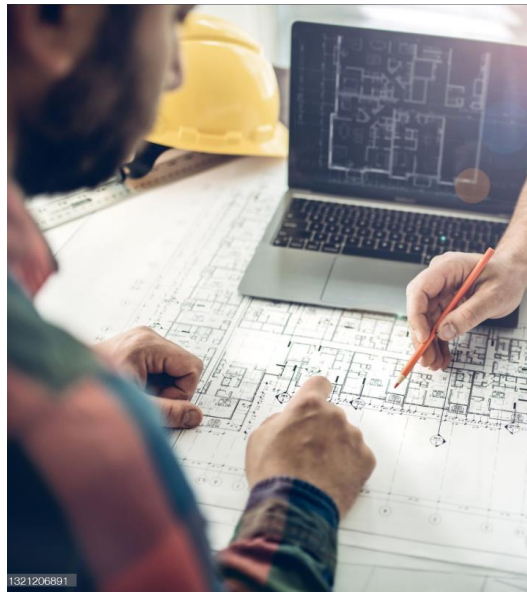




***National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing
(CAD/CAM Supervisor)***



**National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing
(CAD/CAM Supervisor)**



(Curriculum)

National Vocational and Technical Training Commission (NAVTTTC)

Government of Pakistan



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



Table of Contents

Introduction.....	4
Definition/Description of training program (CAD Manager).....	4
Purpose of the training program:	4
Overall objectives of training program:	5
Trainee entry level:	7
Minimum qualification of trainer:	7
Recommended trainer: trainee ratio.....	7
Medium of instruction i.e. language of instruction:	7
Summary template-overview of the curriculum:	9
Module:1 Develop Basic CNC code for milling machine.	11
Module:2 Develop Advance 3D Modelling using CREO Parametric/ Solidworks.....	15
Module:3 Develop Part Assembly using CREO Parametric.....	19
Module:4 Perform CAM operation using Power Mill.	22
Module: 5Apply Animation and Render 3D Model using Lumion	28
Module: 6 Develop 3D Model Using Autodesk 3ds Max	33
Module:7 Design a basic project using BIM Technology.....	37
Module:8 Implement a design for basic project using BIM Technology.....	42
Module:9 Plan a Project in Primavera P6.....	47
Module: 10 Develop a Basic Interior House Plan Using Blocks.....	53
Module:11Develop Entrepreneurial Skills.....	55
Module:12Coordinate a Work Team	58
Module:13 Implement Green skills	63



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



List of Tool, Machinery and Equipment:	66
Members of the Curriculum Development Committee	69
Members of the Curriculum Validation Committee	71



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



Introduction

Definition/Description of training program (CAD/CAM Supervisor)

Construction sector is one of the booming industries of Pakistan. There is an increasing demand of the CAD/CAM Supervisor in CAD/CAM. 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 CAD Supervisor in CAD/CAM 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 & NAVTTTC 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



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



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 & NAVTTTC 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 Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor) 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 CAD/CAM technology across globe

Competencies to be gained after completion of course:

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



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



- Develop Basic CNC code for milling machine
- Develop Advance 3D Modelling using CREO Parametric Solid works
- Develop Part Assembly using CREO Parametric
- Perform CAM operation using Power Mill
- Apply Animation and Render3D Model using Lumion
- Develop 3D Model Using Autodesk 3ds Max
- Design a basic project using BIM Technology
- Implement a design for basic project using BIM Technology
- Plan a Project in Primavera P6
- Develop a Basic Interior House Plan Using Blocks
- Develop Entrepreneurial Skills
- Coordinate a Work Team
- Implement Green skills

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

- CAD/CAM Supervisor
- CAD/CAM Manager



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



Trainee entry level:

The entry level for National Vocational Diploma Level 5 in CAD/CAM (**CAD/CAM Supervisor**) is given below:

Title	Entry requirements
National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)	The entry requirement for this qualification would be level 4 Computer Aided Design & Manufacturing (CAD /CAM)

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.



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



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

The distribution of contact hours is given below:

Total	-	1200 hours
Theory	-	480 hours (40%)
Practical	-	720 hours (60%)
Proposed Course Duration-12 Months		



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



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 5									
1	0720 C/C & M 4-1	Develop basic CNC code for milling machine	CAD /CAM Supervisor	5	Technical	40	60	100	10
2	0720 C/C & M 4-2	Develop advance 3-D modeling using CREO parametric/Solid works		5	Technical	40	60	100	10
3	0720 C/C & M 4-3	Develop part assembly using Creo parametric		5	Technical	40	60	100	10
4	0720 C/C & M 4-4	Perform CAM operation using Power Mill		5	Technical	40	60	100	10
5	0720 C/C & M 4-5	Apply animation and rendering in 3-D model using Lumion		5	Technical	40	60	100	10



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



6	0720 C/C & M 4-6	Develop 3-D model using Autodesk 3ds Max		5	Technical	60	90	150	15
7	0720 C/C & M 4-7	Design a basic project using BIM technology		5	Technical	36	54	90	9
8	0720 C/C & M 4-8	Implement a design for basic project using BIM technology		5	Technical	36	54	90	9
9	0720 C/C & M 4-9	Plan a Project in Primavera P6		5	Technical	60	90	150	150
10	0720 C/C & M 4-10	Develop a basic interior house plan using block		5	Technical	32	48	80	8
11	0720 C/C & M 4-11	Coordinate a Team Work		5	Generic	20	30	50	5
12	0720 C/C & M 4-12	Develop Entrepreneurial Skills		5	Generic	16	24	40	4
13	0720 C/C & M 4-13	Implement Green skill		5	Generic	20	30	50	5
		Total				480	720	1200	120
		Percentage				40%	60%	100	



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



Module:1 Develop Basic CNC Code for Milling Machine

Objective: After the completion of this competency standard, the Trainee will be able to develop skill and competence required to provide skills and knowledge to write basic CNC program for Milling Machine Operation further that you must achieve to set-up machine, work piece, cutting tools and perform basic CNC Milling machine operations.

Duration: 100Hour

Theory: 40Hours

Practice: 60 Hours

Credit Hours: 10

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Determine job requirements.	Trainee will be able to: <ul style="list-style-type: none"> Interpret Drawings to produce program according to specifications determine sequence of operations to produce workpiece according to specification Select Cutting tools according to the operations determined. 	<ul style="list-style-type: none"> Part Drawing components and details Machining parameters Machining operations Machining data entry <p><u>Practical Activity:</u></p> <p>Identify details from Part drawing, machining parameters, and</p>	<p>Theory-06Hrs.</p> <p>Practical- 09Hrs.</p> <p>Total-15 Hrs.</p>	<ul style="list-style-type: none"> Part Drawing Calculator Formula Sheet Computer System Power Mill CAM Software 	Class Room Machining Workshop



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



	<ul style="list-style-type: none"> Calculate Cutting speed and feed rate based on cutting tool and workpiece material. Fill up Process / adjustment sheets with relevant machine, tool and raw material data. 	machining Operations required for machining			
LU2. Write basic CNC Milling Machine program	Trainee will be able to: <ul style="list-style-type: none"> Calculate Coordinates for simple tool path or basic machining functions based on part or product to be machined. Develop standard Program for CNC Milling operations, in accordance with coding standard. 	<ul style="list-style-type: none"> Part profiling and dimensioning Code/ Program development according to drawing/ model geometry <p><u>Practical Activity:</u></p> <p>Write a program for machining of a simple part</p>	Theory-12 Hrs. Practical-15 Hrs. Total-27Hrs.	<ul style="list-style-type: none"> Part Drawing Coding Nomenclature Coding Program Software (Power Mill) 	Class Room Machining Workshop



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



LU3 Edit basic CNC milling Machine programs	Trainee will be able to: <ul style="list-style-type: none"> • Simulate and edit Program according to standard operating procedures. • Save Program according to standard operating procedures. • Import Program to the machine according to standard operating procedures. 	<ul style="list-style-type: none"> • Understand an already working CNC milling machine program • Editing of already coded program <p><u>Practical Activity:</u></p> <p>Introduce changes in an already developed program by introducing new changes in part profile.</p>	<p>Theory-12Hrs.</p> <p>Practical-15 Hrs.</p> <p>Total-27 Hrs.</p>	<ul style="list-style-type: none"> • Part Drawing • Coding Nomenclature • Coding Program Software (PowerMill) 	<p>Class Room</p> <p>Machining Workshop</p>
LU4 Perform Basic CNC Milling Machine Operations	Trainee will be able to: <ul style="list-style-type: none"> • Set-up CNC milling machine, work-piece and cutting tools • Mount Work piece in accordance with standard operating procedures. 	<ul style="list-style-type: none"> • Work piece mounting • Cutting tools adjustment in tool holder devices 	<p>Theory-10 Hrs.</p> <p>Practical-21 Hrs.</p> <p>Total- 31 Hrs.</p>	<ul style="list-style-type: none"> • Part Drawing • Computer System • Coding Nomenclature • Coding Program Software (Power Mill) 	<p>Class Room</p> <p>Machining Workshop</p>



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



	<ul style="list-style-type: none"> • Perform Basic CNC milling operations to produce component as programmed. • Perform Corrective measures/adjustments according to the requirement (if necessary). • Personal protective devices are used in accordance with occupational health and safety (OHS) requirements. • Check and measure work pieces according to the Job. • Defective work pieces are marked, recorded and reported for troubleshooting. 	<p><u>Practical Activity:</u></p> <p>Perform Machining on a work piece as per CNC program</p>		<ul style="list-style-type: none"> • CNC Milling Machine • Cutting Tools • Workpiece 	
--	---	--	--	---	--



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



Module:2 Develop Advance 3D Modelling using CREO Parametric/ Solidworks

Objective: After the completion of this competency standard, the Trainee will be able to provide knowledge and skills regarding advance modeling tools. It also covers working in drawing, assembly modules and creating animation of assembly.

Duration: 100 Hours

Theory: 40 Hours

Practice: 60 Hours

Credit Hours: 10

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Create sweep and helical sweep	Trainee will be able to: <ul style="list-style-type: none"> Create sketch for sweep command as per given requirements. Perform sweep command Remove material using sweep as per specification. Edit sketch of sweep section as per requirements. Edit parameters for sweep as per requirements. 	<ul style="list-style-type: none"> Types of command tool bar: Sketch Model development as per drawing <p><u>Practical Activity:</u></p> <p>Draw and edit a sketch using sweep and helical sweep commands</p>	<p>Theory-06Hrs.</p> <p>Practical-09Hrs.</p> <p>Total-15 Hrs.</p>	<ul style="list-style-type: none"> Part Drawing Computer System 3D Modeling Software (Creo/ Solid works) 	Class Room/Lab



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



	<ul style="list-style-type: none"> • Perform helical sweep as per specifications • Edit the features of helical sweep such as pitch, coil diameter and spring diameter as per given requirements. • Remove material using helical sweep as per given requirements. • Apply material to the 3D model as per given requirements. 				
LU2. Create 3d Model using Blend	Trainee will be able to: <ul style="list-style-type: none"> • Create plans for swept blend • Create sections for blend as per given requirements. • Create parallel blend • Create general blend • Create rotational blend • Edit the sections for blend as per given requirements. 	<ul style="list-style-type: none"> • tool bar (Modify) • Working procedure of a modifying tool <p><u>Practical Activity:</u></p> <p>Use blend command to modify a sketch and also apply various blend options</p>	<p>Theory-12 Hrs.</p> <p>Practical-15 Hrs.</p> <p>Total-27Hrs.</p>	<ul style="list-style-type: none"> • Part Drawing • Computer System • 3D Modeling Software (Creo/ Solid works) 	Class Room/Lab



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



<p>LU3.</p> <p>Create 3d Model using swept blend</p>	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Create plan for swept blend as per given requirements. • Create sections for swept blend as per requirements. • Edit sections of swept blend • Edit parameters of swept blend • Create swept blend 	<ul style="list-style-type: none"> • Using Modify tool bar • Working procedure of a modifying tool <p><u>Practical Activity:</u></p> <p>Use blend command to modify a sketch and also apply various blend options</p>	<p>Theory-12Hrs.</p> <p>Practical-15 Hrs.</p> <p>Total-27 Hrs.</p>	<ul style="list-style-type: none"> • Part Drawing • Computer System • 3D Modeling Software (Creo/ Solid works) 	<p>Class Room/Lab</p>
<p>LU4.</p> <p>Create Drawings of 3D model</p>	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Set drawing layout • Import model to drawing mode • Manage paper template as per given requirements. • Manage/configure the properties of view • Extract view from existing view 	<ul style="list-style-type: none"> • 3D Model to 2D drawing conversion • Development of orthographic views and performing sectioning <p><u>Practical Activity:</u></p>	<p>Theory-10 Hrs.</p> <p>Practical-21 Hrs.</p> <p>Total- 31 Hrs.</p>	<ul style="list-style-type: none"> • Part Drawing • Computer System • 3D Modeling Software (Creo/ Solid works) 	<p>Class Room/Lab</p>



***National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing
(CAD/CAM Supervisor)***



	<ul style="list-style-type: none">• Create default view• Create section view• Create detail view• Annotate the view and apply dimensions• Edit annotations	Create orthographic views of a 3D Model and annotate the views			
--	--	--	--	--	--



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



Module: 3 Develop Part Assembly using CREO Parametric/ Solid works

Objective: After the completion of this competency standard, the Trainee will be able to provide knowledge and skills regarding assembly tools and creating animation of assembly.

Duration:100 Hours

Theory: 40 Hours

Practice: 60Hours

Credit Hours: 10

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Create an Assembly drawing	Trainee will be able to: <ul style="list-style-type: none"> • Import part to assembly module • Apply default constraint to the part as per requirements. • Apply coincident constraint to the part as per requirements. • Apply distance constraint to the part as per requirements. 	<ul style="list-style-type: none"> • Understanding the differences of part and assembly drawing • Development of an assembly drawing from parts using various commands <p><u>Practical Activity:</u></p>	<p>Theory- 16Hrs.</p> <p>Practical- 27 Hrs.</p> <p>Total-33 Hrs.</p>	<ul style="list-style-type: none"> • Part Drawing • Computer System • 3D Modeling Software (Creo/ Solid works) 	Class Room Machining Workshop



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



	<ul style="list-style-type: none"> • Apply parallel constraint to the part as per requirements. • Apply coplanar constraint to the part as per requirements. • Apply center constraint to the part as per requirements. • Explode assembly to view all the parts of assembly. • Edit parts in assembly 	Develop an assembly from parts and edit parts to readjust the assembly.			
LU2. Create Animation of Assembly	Trainee will be able to: <ul style="list-style-type: none"> • Import model into assembly module • Apply animation constraints (e.g., Pin, slider, cylinder, planner, ball) as per requirement of the given assembly • Take the snapshots at different intervals. • Create animation from snapshots 	<ul style="list-style-type: none"> • Importing an assembly model • Take snapshot, create animation <u>Practical Activity:</u> Create animation of this assembly	Theory- 24Hrs. Practical- 33 Hrs. Total-57 Hrs.	<ul style="list-style-type: none"> • Part Drawing • Computer System • 3D Modeling Software (Creo/ Solid works) 	Class Room Machining Workshop



***National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing
(CAD/CAM Supervisor)***



	<ul style="list-style-type: none">• Specify time for the animation• Create video of animation• Save the video				
--	---	--	--	--	--



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



Module:4 Perform CAM operation using Power Mill

Objective: After the completion of this competency standard, the Trainee will be able to develop skill and competence required to use of software in a range of different engineering industries to determine optimal tool paths to reduce time and manufacturing costs as well as reduce tool loads and produce smooth surface finishes. Further the trainee will able to create/export the code in Power mill application to create Job.

Duration:100 Hours

Theory: 40 Hours

Practice: 60 Hours

Credit Hours: 10

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Setup Machining details	Trainee will be able to: <ul style="list-style-type: none"> Import the given 3D model in power mill Define tool as per requirements of machining Define block for the machining Examine the model parameters 	<ul style="list-style-type: none"> Importing Model Setting machining conditions and boundaries <u>Practical Activity:</u>	Theory-04 Hrs. Practical-06 Hrs. Total-10 Hrs.	<ul style="list-style-type: none"> Workshop CNC Milling Machine 	Class Room Machining Workshop



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



	<ul style="list-style-type: none"> Find minimum radius and draft angle of given 3D model Use measuring tool Set feed rates for machining Define rapid moves and heights Define start and end point of machining Define boundaries for machining 	Perform Model import and setting up of machining details			
LU2. Setup work plan and coordinate	<ul style="list-style-type: none"> Import given 3D model to the power mill Select the work plan as per requirements Edit/rotate work plan Define coordinate for the plan as per requirements Edit/rotate coordinates 	<ul style="list-style-type: none"> Import model Editing and rotation of work plan and coordinates <p><u>Practical Activity:</u></p> <p>Set up work plan and coordinates</p>	Theory-06 Hrs. Practical-09 Hrs. Total-15 Hrs..	<ul style="list-style-type: none"> Workshop CNC Milling Machine 	Class Room Machining Workshop



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



LU3. Perform 3D Area clearance	Trainee will be able to: <ul style="list-style-type: none"> • Apply offset area clearance strategy • Apply profile area clearance strategy • Apply raster area clearance strategy • Perform raster machining 	<ul style="list-style-type: none"> • Application of strategies: • Offset, Profile and raster area clearance <p><u>Practical Activity:</u></p> <p>Perform Offset area Clearance, Raster area Clearance and Profile area Clearance</p>	<p>Theory-06 Hrs.</p> <p>Practical-09 Hrs.</p> <p>Total-15Hrs.</p>	<ul style="list-style-type: none"> • Workshop • CNC Milling Machine 	Class Room Machining Workshop
LU4. Create finishing strategy	Trainee will be able to: <ul style="list-style-type: none"> • Apply 3D offset finishing strategy • Apply constant Z- height finishing strategy • Optimize constant Z- height finishing strategy • Apply offset flate finishing strategy 	<ul style="list-style-type: none"> • Application of finishing Strategies <p><u>Practical Activity:</u></p> <p>Apply below mentioned finishing strategies:</p> <p>Offset finishing, Constant Z-height finishing, raster</p>	<p>Theory-03 Hrs.</p> <p>Practical-06 Hrs.</p> <p>Total-09 Hrs.</p>	<ul style="list-style-type: none"> • Workshop • CNC Milling Machine 	Class Room Machining Workshop



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



	<ul style="list-style-type: none"> • Apply raster finishing strategy • Apply radial finishing strategy • Apply pattern finishing strategy • Apply spiral finishing strategy • Apply surface finishing strategy 	finishing, radial finishing, pattern finishing, spiral finishing			
LU5. Perform 2D area clearance machining	Trainee will be able to: <ul style="list-style-type: none"> • Apply face milling strategy • Apply 2D curve area clearance strategy • Perform Drilling strategy 	<ul style="list-style-type: none"> • Face milling process • Curve area drilling strategy <p><u>Practical Activity:</u></p> <p>Perform face milling, 2D curve area and drilling strategies</p>	Theory-06 Hrs. Practical-06 Hrs. Total-12 Hrs..	<ul style="list-style-type: none"> • Workshop • CNC Milling Machine 	Class Room Machining Workshop



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



LU6. Define Postprocessor and NC code	Trainee will be able to: <ul style="list-style-type: none"> Select the appropriate postprocessor as per requirements Create CNC code Save CNC code Edit CNC code as per requirements Simulate the CNC code. 	<ul style="list-style-type: none"> Postprocessor introduction NC coding <u>Practical Activity:</u> Perform NC Coding and simulate	Theory-06Hrs. Practical-09Hrs. Total-15Hrs.	<ul style="list-style-type: none"> Workshop CNC Milling Machine 	Class Room Machining Workshop
LU7. Mini Project	Trainee will be able to: <ul style="list-style-type: none"> Import the 3D model in Power Mill Define stock block for the 3D model Edit the block parameters as per requirements Define plan for the machining as per requirements Define coordinate system Edit the coordinate system as per requirements 	<ul style="list-style-type: none"> Conversion of soft Model into Machining of workpiece <u>Practical Activity:</u> Complete a mini project to illustrate the learning	Theory-09Hrs. Practical-15Hrs. Total-24Hrs.	<ul style="list-style-type: none"> Computer System Power Mill Software Workshop CNC Milling Machine 	Class Room Machining Workshop



***National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing
(CAD/CAM Supervisor)***



	<ul style="list-style-type: none">• Define speed and feed rate• Define rapid moves and heights• Apply 3D area clearance strategy as per requirements• Apply 3D finishing strategy as per requirements• Create the tool path for the strategies• Edit tool path to optimize the machining timing.• Select the appropriate post processor• Create CNC code for the machining• Save the CNC code				
--	---	--	--	--	--



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



Module: 5 Apply Animation and Render 3D Model using Lumion

Objective: After the completion of this competency standard, the Trainee will be able to apply animation and render models by using various tools in Lumion software. You can demonstrate your skills to modify 3D objects and models to enhance esthetics of model to ensure job requirements. You can present a rendered 3D Model to present final outcomes.

Duration: 100 Hours

Theory: 40 Hours

Practice: 60Hours

Credit Hours: 10

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Render Model using Lumion	Trainee will be able to: <ul style="list-style-type: none"> • Install Lumion 3D modeling software. • Import 3D Model to Lumion as per job requirement. • Apply textures to the 3D model as specified. 	<ul style="list-style-type: none"> • 3D modeling in Lumion <ul style="list-style-type: none"> ✓ Import/export ✓ 3D model to 3D flythrough video ✓ Materials ✓ Textures • Boolean operation concepts <ul style="list-style-type: none"> ✓ Addition ✓ Intersection 	Theory- 20Hrs Practical- 24Hrs Total- 44 Hrs	<ul style="list-style-type: none"> • PCs/Laptops • Multimedia Projector • AutoCAD • 3D Max • Paper • Printer • Sketch up • Lumion 	Class Room Lab



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



	<ul style="list-style-type: none"> • Apply light to illuminate model to get the required scene of image. • Apply shadow of 3D object according to the movement of light. • Apply material to the object as per given requirement. • Apply render to the 3D model as per given requirement. • Add scene for different camera views of 3D model as per requirement. • Built environment according to the requirement 	<ul style="list-style-type: none"> ✓ Union • 3D Navigate control ✓ Functions of different camera settings. ✓ Importance of scene creation ✓ Preset views such as isometric, top, bottom, front, left, etc. ✓ Perspective projection and parallel projection ✓ Movement of objects ✓ Constrained Orbit • Material and light control operations ✓ Planner mapping ✓ Texture map ✓ Opacity control 			
--	--	---	--	--	--



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



		<ul style="list-style-type: none"> ✓ Render context ✓ Render sampling <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Apply texture, illumination, shadow, render and scenes to the provided 3D model using Lumion and Sketch up. 			
<p>LU2.</p> <p>Apply animation using Lumion</p>	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Convert given CAD 3D model into 3D flythrough video. • Add motions to clouds and live/moving objects. • Apply directions to the moving objects. • Add timeline to the movement of the object. 	<ul style="list-style-type: none"> • 3D modeling in Lumion ✓ Import/export ✓ 3D model to 3D flythrough video ✓ Materials ✓ Textures • Boolean operation ✓ Addition ✓ Intersection ✓ Union 	<p>Theory- 20Hrs</p> <p>Practical- 36Hrs</p> <p>Total- 56 Hrs</p>	<ul style="list-style-type: none"> • PCs/Laptops • Multimedia Projector • AutoCAD • 3D Max • Paper • Printer • Sketch up • Lumion 	<p>Class Room</p> <p>Lab</p>



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



	<ul style="list-style-type: none"> • Apply movement of shadows according to the movement of light. • Apply setting of camera according to the movement of light and object. 	<ul style="list-style-type: none"> • 3D Navigate control <ul style="list-style-type: none"> ✓ Functions of different camera settings. ✓ Importance of scene creation ✓ Preset views such as isometric, top, bottom, front, left, etc. ✓ Perspective projection and parallel projection ✓ Movement of objects ✓ Constrained Orbit • Material and light control operations <ul style="list-style-type: none"> ✓ Planner mapping ✓ Texture map ✓ Opacity control ✓ Render context 			
--	---	--	--	--	--



***National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing
(CAD/CAM Supervisor)***



		<p>✓ Render sampling</p> <p><u>Practical Activity:</u></p> <p>Add motions, directions, timeline and setting of cameras to the given object.</p>			
--	--	--	--	--	--



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



Module:6 Develop 3D Model Using Autodesk 3ds Max

Objective: After the completion of this competency standard, the Trainee will be able to comprehensive 3ds Max modeling and rendering solution to interior designers, architects and engineers (electrical/mechanical/civil). You can cover the interface and proper workflow for setting up 3ds Max projects with cameras, lighting, and rendering. You can handle more complex scenarios and techniques which are found in 3ds Max.

Duration: 150 Hours

Theory: 60Hours

Practice: 90 Hours

Credit Hours: 15

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Create Objects using geometry and shapes	Trainee will be able to: <ul style="list-style-type: none"> Create/import/link/fetch/merge 2D drawing to make 3D objects according to given specification 	<ul style="list-style-type: none"> Setting of 3D Max Procedure for 2D drawing of the given object Modeling tools <u>Practical Activity:</u> <ul style="list-style-type: none"> Use of geometry and shapes for 2D 	Theory- 15Hrs Practical- 18 Hrs Total- 33Hrs	<ul style="list-style-type: none"> PCs/Laptops Multimedia Projector AutoCAD 3D Max Paper Printer 	Class Room Lab



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



		<ul style="list-style-type: none"> Use Geometry & shapes make 3D objects according to given specification. 	<ul style="list-style-type: none"> objects construction on 3D Max Use of geometry and shapes for 3D objects construction on 3D Max 			
LU2. Modify objects		<p>Trainee will be able to:</p> <ul style="list-style-type: none"> Modify Parameters of 3D objects according to given specification. Apply modifiers for object manipulation to meet the specific requirements. 	<ul style="list-style-type: none"> Use of dialogue box Block editor tab Managing panel authority palettes <p><u>Practical Activity:</u></p> <p>Adjust 3D objects by setting parameters from block authority palette</p>	<p>Theory- 15 Hrs</p> <p>Practical-21 Hrs</p> <p>Total- 36 Hrs</p>	<ul style="list-style-type: none"> PCs/Laptops Multimedia Projector AutoCAD 3D Max Paper Printer 	Class Room Lab



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



LU3. Apply material and textures to objects	Trainee will be able to: <ul style="list-style-type: none"> • Create/assign specified materials and textures to 3D Model. • Edit materials and textures to get realistic outcome 	<ul style="list-style-type: none"> • Material tool • Command line of Solid edit. • Properties of palette for color adding in object <p><u>Practical Activity:</u></p> <p>Add and edit materials and textures to the object using I Render.</p>	<p>Theory-15Hrs</p> <p>Practical- 27 Hrs.</p> <p>Total- 42Hrs</p>	<ul style="list-style-type: none"> • PCs/Laptops • Multimedia Projector • 3D Max • Paper • Printer • I Render 	<p>Class Room</p> <p>Lab</p>
LU4. Render 3D model	Trainee will be able to: <ul style="list-style-type: none"> • Assign/Install Renderer to meet specific outcome as per requirement. • Add scene of 3D model according to specifications 	<ul style="list-style-type: none"> • Installation of render • Steps for rendering given image • Use of V Ray <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Render the 3D model according to required image size or 	<p>Theory-15Hrs</p> <p>Practical- 24Hrs</p> <p>Total-39 Hrs</p>	<ul style="list-style-type: none"> • PCs/Laptops • Multimedia Projector • 3D Max • Paper • Printer • IRender • VRay 	<p>Class Room</p> <p>Lab</p>



***National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing
(CAD/CAM Supervisor)***



	<ul style="list-style-type: none">• Add lights for illumination to get the requisite scene of 3D model.• Assign cameras to execute different views of 3D Model.• Render the 3D model according to required image size or resolution & orientation.	resolution & orientation using Lumion.		<ul style="list-style-type: none">• Lumion	
--	--	--	--	--	--



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



Module: 7 Design a Basic Project using BIM Technology

Objective: After the completion of this competency standard, the Trainee will be able to design project you will be able to produce communication, build team work, apply problem solving techniques and build initiative and enterprise.

Duration: 90 Hours

Theory: 36 Hours

Practice: 54 Hours

Credit Hours: 9

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Produce Communication	Trainee will be able to: <ul style="list-style-type: none"> Listen to and communicate clearly with colleagues, suppliers and contractors Participate in meetings with clients, contractors and other professionals. Explain compliance requirements to clients 	<ul style="list-style-type: none"> Types of Communication Manual Drawing Concepts Designing Concepts 2D and 3D drawing concepts Procedure for detail drawing Entrepreneurship skills 	Theory- 09 Hrs. Practical-09 Hrs Total- 18 Hrs	<ul style="list-style-type: none"> Pencils Eraser Sharpener Note pad Calculator 	Class Room Field visit



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



		<ul style="list-style-type: none"> • Write letters and reports to formalize agreements or clarify project information • Initiate and run meetings with lead contractor and other service contractors • Use industry-specific definitions, language symbols and terminology • Negotiate changes to designs with clients and planners. 	<ul style="list-style-type: none"> • Shop safety practices <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Make a group of 5 students and communicate with clients by attending meetings. • Discuss changes in design with clients and planners. 			
LU2. Teamwork	Build	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Develop constructive and cooperative working relationships with project team members, colleagues, suppliers and 	<ul style="list-style-type: none"> • Types of Communication • Manual Drawing Concepts • Designing Concepts • 2D and 3D drawing concepts 	<p>Theory-09 Hrs</p> <p>Practical- 12 Hrs</p> <p>Total- 21 Hrs</p>	<ul style="list-style-type: none"> • Pencils • Eraser • Sharpener • Note pad • Calculator 	<p>Class Room</p> <p>Field visit</p>



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



	<p>clients as per the job requirement.</p> <ul style="list-style-type: none"> Plan and coordinate with others to work and plan to complete tasks as per the requirement. 	<ul style="list-style-type: none"> Procedure for detail drawing Entrepreneurship skills Shop safety practices <p><u>Practical Activity:</u></p> <p>Make a group of 5 students and plan and coordinate with team members to complete the given task.</p>			
LU3. Apply Problem solving techniques	Trainee will be able to: <ul style="list-style-type: none"> Coordinate input of expert advice as per the requirement of the task. 	<ul style="list-style-type: none"> Types of Communication Manual Drawing Concepts Designing Concepts 	Theory-09 Hrs Practical- 12Hrs Total- 21Hrs	<ul style="list-style-type: none"> Pencils Eraser Sharpener Note pad Calculator 	Class Room Field visit



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



		<ul style="list-style-type: none"> Develop innovative and affordable sustainable design solutions in the workplace environment. Maintain effective relationships with industry professionals 	<ul style="list-style-type: none"> 2D and 3D drawing concepts Procedure for detail drawing Entrepreneurship skills Shop safety practices <p><u>Practical Activity:</u></p> <p>Build up innovative and affordable design solutions of the given project.</p>			
LU4.	Build and enterprise	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> Conduct cost-benefit analysis of design options as per the specification 	<ul style="list-style-type: none"> Types of Communication Manual Drawing Concepts Designing Concepts 2D and 3D drawing concepts 	<p>Theory-09 Hrs</p> <p>Practical-21Hrs</p> <p>Total-30 Hrs</p>	<ul style="list-style-type: none"> Pencils Eraser Sharpener Note pad Calculator 	<p>Class Room</p> <p>Lab/ Field visit</p>



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



	<ul style="list-style-type: none">• Negotiate solutions to design conflicts in accordance to the job requirement• Propose creative design solutions to issues arising on site.	<ul style="list-style-type: none">• Procedure for detail drawing• Entrepreneurship skills• Shop safety practices <p><u>Practical Activity:</u></p> <ul style="list-style-type: none">• Perform cost-benefit analysis.• Suggest creative design solutions to issues arising on site by reviewing site plan of the given project.			
--	---	---	--	--	--



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



Module: 8 Implement a design for basic project using BIM Technology

Objective: After the completion of this competency standard, the Trainee will be able to design project you will be able to plan and organize, Apply Self-management. Develop Building Design and Implement Design using Technology.

Duration: 90 Hours

Theory: 36 Hours

Practice: 54 Hours

Credit Hours: 09

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Planning and organizing	Trainee will be able to: <ul style="list-style-type: none"> Analyze and interpret complex technical compliance requirements and apply these to different project Devise and negotiate solutions to planning and building permit issues Conduct cost-benefit analysis of design options 	<ul style="list-style-type: none"> Manual Drawing Concepts Designing Concepts 2D and 3D drawing concepts Procedure for detail drawing <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> Carryout cost benefit analysis for design on 	<p>Theory- 09 Hrs.</p> <p>Practical-09 Hrs</p> <p>Total- 18 Hrs</p>	<ul style="list-style-type: none"> Pencils Eraser Sharpener Note pad Calculator 	Class Room Lab/ Field visit



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



	<ul style="list-style-type: none"> Perform complex calculations, such as structural requirements and load effects of force and movement on structural elements of buildings Identify site risks and building constraints, and produce design solutions 	<p>structural elements of given project.</p> <ul style="list-style-type: none"> Identify site hazards and propose design solutions of the given project. 			
LU2. Apply Self-management	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> Produce aesthetic, cost-effective, compliant and buildable designs within given timeframes Develop personal methodologies for ensuring project quality 	<ul style="list-style-type: none"> Manual Drawing Concepts Designing Concepts 2D and 3D drawing concepts Procedure for detail drawing <p><u>Practical Activity:</u></p>	<p>Theory-09 Hrs</p> <p>Practical- 12 Hrs</p> <p>Total- 21 Hrs</p>	<ul style="list-style-type: none"> Pencils Eraser Sharpener Note pad Calculator 	<p>Class Room</p> <p>Lab/ Field visit</p>



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



	<p>and for incorporating process improvements</p> <ul style="list-style-type: none"> • Manage detailed input to concurrent design projects at different stages of the process and with diverse sets of regulatory requirements • Integrate safe building practices into the design of a building • Implement energy conservation strategies and cost saving practices 	<ul style="list-style-type: none"> • Develop methodologies for project quality. • Apply energy preservation and cost efficient schemes for the given project. 			
LU3. Develop Building Design	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Apply structural principles and construction technology to the design 	<ul style="list-style-type: none"> • Manual Drawing Concepts • Designing Concepts • 2D and 3D drawing concepts 	<p>Theory-09 Hrs</p> <p>Practical- 12Hrs</p> <p>Total- 21Hrs</p>	<ul style="list-style-type: none"> • Pencils • Eraser • Sharpener • Note pad • Calculator 	<p>Class Room</p> <p>Lab</p>



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



	<p>of a built form plan the building design</p> <ul style="list-style-type: none"> Set up systems and checklists for ensuring a methodical approach to design projects Gather documentation required for design projects, including plans, specifications, drawings, legislation, codes and standards 	<ul style="list-style-type: none"> Procedure for detail drawing <p><u>Practical Activity:</u></p> <p>Perform calculations and gather documentation required for design including plans, specifications, drawings, legislation, codes and standards for the given project.</p>			
LU4. Implement Design using Technology	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> Read and interpret drawings, including architectural, structural, mechanical, hydraulic and electrical drawings 	<ul style="list-style-type: none"> Manual Drawing Concepts Designing Concepts 2D and 3D drawing concepts Procedure for detail drawing 	<p>Theory-09 Hrs</p> <p>Practical-21Hrs</p> <p>Total-30 Hrs</p>	<ul style="list-style-type: none"> Pencils Eraser Sharpener Note pad Calculator 	<p>Class Room</p> <p>Lab</p>



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



	<ul style="list-style-type: none">• Interpret and Interact manuals and marketing information about new technologies, products and systems• Use computer software to produce building designs, manage project participation and conduct general personal business administration• Use relevant tools and equipment, such as measuring and surveying tools and calculators	<u>Practical Activity:</u> <ul style="list-style-type: none">• Execute design drawings, including architectural, structural, mechanical, hydraulic and electrical drawings using BIM technology.			
--	--	---	--	--	--



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



Module: 9 Plan a Project in Primavera P6

Objective: After the completion of this competency standard, the Trainee will be able to Add Project, Create WBS, Create Activities, Create Relationships, and Create Schedule.

Duration: 150Hours

Theory: 60 Hours

Practice: 90 Hours

Credit Hours: 15

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Perform Basic operation in Primavera P6	Trainee will be able to: <ul style="list-style-type: none"> Load & unload primavera P6 Software. Prepare interface of software Customize P6 Screen Layout Create WBS of project in Primavera. 	<ul style="list-style-type: none"> Explain the importance of Primavera P6 Describe interface of software Describe physical performance to customised screen layout. Explain work breakdown structure (WBS) Differentiate 	Total: 32hrs Theory: 11hrs Practical: 21hrs	<div>Consumable</div> <ul style="list-style-type: none"> Notebooks Pencils Erasers Sharpeners Pen <div>Non-Consumable</div> <ul style="list-style-type: none"> White board Multimedia Internet Computer system Printer 	Class room/Computer Lab



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



		<p>different types of values.</p> <ul style="list-style-type: none"> Describe the total float and free float. <p>Practical Activity:</p> <ul style="list-style-type: none"> Load Primavera P6 Software and prepare interface according to the assigned task. Practice to create dummy activity. Practice to identify different types of activities. 			
LU2. Perform Project Activities Scheduling	Trainee will be able to: <ul style="list-style-type: none"> Add Project in Primavera Create Activities of project in Primavera. Create Relationships 	<ul style="list-style-type: none"> Explain Gantt Chart Explain types of activities Describe relationships between activities of project in Primavera Elaborate Activity 	Total: 36hrs Theory: 15hrs Practical: 21hrs	<div>Consumable</div> <ul style="list-style-type: none"> Notebooks Pencils Erasers Sharpeners Pen <div>Non Consumable</div>	Class room/Computer Lab



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



<p>in Primavera P6</p>	<p>between activities of project in Primavera.</p> <ul style="list-style-type: none"> • Create Schedule of activities of project in Primavera. • Display Gantt Chart 	<p>Constraints</p> <ul style="list-style-type: none"> • Differentiate between Work calendar, work/non-work days and working hours • Describe to calculate the activity time and job critical time. • Describe procedure to prepare Gantt chart. <p>Practical Activity</p> <ul style="list-style-type: none"> • Create WBS of assigned task in Primavera. • Prepare a Gantt chart of assigned task in Primavera P6. • Practice to add project in • Practice of creating activities and the relation 		<ul style="list-style-type: none"> • White board • Multimedia • Internet • Computer system • Printer 	
----------------------------	--	--	--	---	--



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



		<p>between activities of project in Primavera P6.</p> <ul style="list-style-type: none"> Practice of creating schedule of activities Primavera P6. Practice to prepare Gantt chart. 			
LU3. Create Activities of project in Primavera.	Trainee will be able to: <ul style="list-style-type: none"> Add constraints of activities of project in Primavera. Create Calendar for activities of project in Primavera. Assign Calendars to activities of project in Primavera. Add Resources to activities of project in Primavera. Assign Resources of activities of project in Primavera. 	<ul style="list-style-type: none"> Explain resources of activities of project Describe baseline process for project. Explain Critical Path Method (CPM) Explain Program Evaluation and Review Technique (PERT) Analysis Describe the procedure to draw the activity diagram for 	Total: 45hrs Theory: 18hrs Practical: 27hrs	<div>Consumable</div> <ul style="list-style-type: none"> Notebooks Pencils Erasers Sharpeners Pen <div>Non Consumable</div> <ul style="list-style-type: none"> White board Multimedia Internet Computer system Printer 	Class room/Computer Lab



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



	<ul style="list-style-type: none">• Add Cost of activities of project in Primavera.• Analyze Resources of activities of project in Primavera.• Perform Baseline process for Project.	<p>CPM. Explain the stages of project execution</p> <p>Practical Activity:</p> <ul style="list-style-type: none">• Practice of adding constraints, creating and assigning calendar to the activities in Primavera P6• Practice of adding and assigning resources of activities in Primavera P6• Practice of adding cost of activities in Primavera P6• Practice of performing baseline process of project.• Draw CPM of assigned project in Primavera P6.• Draw PERT of assigned project in Primavera P6.			
--	--	---	--	--	--



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



LU4. Manage Project in Primavera P6	Trainee will be able to <ul style="list-style-type: none"> • Status the Project • Mitigate the schedule 	<ul style="list-style-type: none"> • Explain impact analysis • Describe mitigation techniques • Explain crash program • Describe the project monitoring and control <p>State the status of the project.</p> <p>Practical Activity: Practice to prepare them mitigate chart.</p>	Total: 37hrs Theory: 16hrs Practical: 21hrs	<div>Consumable</div> <ul style="list-style-type: none"> • Notebooks • Pencils • Erasers • Sharpeners • Pen <div>Non-Consumable</div> <ul style="list-style-type: none"> • White board • Multimedia • Internet • Computer system • Printer 	Class room/Computer Lab
---	--	--	--	--	-------------------------



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



Module: 10 Develop a Basic Interior House Plan Using Blocks.

Objective: After the completion of this competency standard, the Trainee will be able to develop skill and competence required to develop a basic interior house plan.

Duration: 80 Hours

Theory: 32 Hours

Practice: 48 Hours

Credit Hours: 08

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Develop a House Plan using AutoCAD	Trainee will be able to: <ul style="list-style-type: none"> Create boundary wall and draw various zones according to requirements Place doors and windows as per requirements. 	<ul style="list-style-type: none"> Drawing of a plan view and placement of designated elements at their due places <p><u>Practical Activity:</u></p> <p>Develop a house plan and place doors and windows according to drawing</p>	<p>Theory-24 Hrs.</p> <p>Practical-33Hrs.</p> <p>Total-57 Hrs.</p>	<ul style="list-style-type: none"> Computer System AutoCAD Software 	Class Room Machining Workshop



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



<p>LU2.</p> <p>Import Blocks for Furniture Layout</p>	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> Download and import blocks for furniture layout Adjust size and scale according to plan Save the file in required format 	<ul style="list-style-type: none"> Identification of Blocks and Libraries of blocks Placement of furniture etc. related blocks on their designed places <p><u>Practical Activity:</u></p> <p>Download, Save and import blocks in the plan view for design of complete interior</p>	<p>Theory-08 Hrs.</p> <p>Practical-15 Hrs.</p> <p>Total-23 Hrs.</p>	<ul style="list-style-type: none"> Computer System AutoCAD Software 	<p>Class Room</p> <p>Machining Workshop</p>
--	---	---	--	---	---



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



Module 11: Develop Entrepreneurial Skills

Objective: After the completion of this competency standard, the Trainee will be expected to develop a business plan, collect information regarding funding sources, develop a marketing plan and develop basic business communication skills. Trainee's underpinning knowledge regarding entrepreneurial skills will be sufficient to provide you the basis for your work.

Duration: 40 Hours

Theory: 16 Hours

Practice: 24 Hours Credit Hours: 04

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Develop a business plan	Trainee will be able to: <ul style="list-style-type: none"> Conduct a market survey to collect following information: <ul style="list-style-type: none"> i. Customer /demand ii. Tools, equipment, machinery and furniture with rates iii. Raw material iv. Supplier v. Credit / funding sources vi. Marketing strategy vii. Market trends viii. Overall expenses ix. Profit margin 	<ul style="list-style-type: none"> Main elements of business plan Filling the business plan format Enlist specific business terms used in the industry Describe 7Cs of business communication <p><u>Practical Activity</u></p> <p>Develop a business plan</p>	<p>Theory- 04 Hr.</p> <p>Practical- 09Hrs</p> <p>Total- 13 Hrs</p>	<ul style="list-style-type: none"> Internet Laptop/Computer White board Projector screen Multimedia projector 	Classroom



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



	<ul style="list-style-type: none"> • Select the best option in terms of cost, service, quality, sales, profit margin, overall expenses • Compile the information collected through the market survey, in the business plan format 				
LU2. Collect information regarding funding sources	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Identify the available funding sources based on their terms and conditions, maximum loan limit, payback time, interest rate • Choose the best available option according to investment requirement • Prepare documents according to the loan agreement requirement • Include the information of funding sources in the business plan 	<ul style="list-style-type: none"> • Enlist the available funding sources • Explain how to get loan to start a new business • Explain market survey and its tools e.g.: questionnaire, interview, observation etc <p><u>Practical Activity</u></p> <p>Collect information regarding funding sources</p>	<p>Theory- 04 Hr.</p> <p>Practical- 03 Hrs</p> <p>Total- 07 Hrs.</p>	<ul style="list-style-type: none"> • Internet • Laptop/Computer • White board • Projector screen • Multimedia projector 	Classroom



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



LU3. Develop a marketing plan	Trainee will be able to: <ul style="list-style-type: none"> • Make a marketing plan for the business including product, price, placement, promotion, people, packaging and positioning • Include the information of marketing plan in the business plan 	7ps of marketing including product, price, placement, promotion, people, packaging and positioning <u>Practical Activity</u> Develop a marketing plan	Theory- 04 Hr. Practical- 06 Hrs Total- 10 Hrs.	<ul style="list-style-type: none"> • Internet • Laptop/Computer • White board • Projector screen • Multimedia projector 	Classroom
LU4. Develop basic business communication skills	Trainee will be able to: <ul style="list-style-type: none"> • Communicate with internal customers e.g.: labor, partners and external customers e.g.: suppliers, customers etc., using effective communication skills • Use different modes of communication to communicate internally and externally e.g.: presentation, speaking, writing, listening, visual representation, reading etc. • Use specific business terms used in the market 	<ul style="list-style-type: none"> • Description of the market trends for specific product offering • Different modes of communication and their application in the industry <u>Practical Activity</u> Develop basic business communication skills	Theory- 04 Hr. Practical- 06 Hrs. Total- 10 Hrs.	<ul style="list-style-type: none"> • Internet • Laptop/Computer • White board • Projector screen • Multimedia projector 	Classroom



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



Module:12 Coordinate a Work Team

Objective:

After the completion of this competency standard, the Trainee will be able to achieve operational outcomes and effective working relationships through managing and developing individuals and teams.

Duration: 50 Hours

Theory: 20 Hours

Practice: 30 Hours

Credit Hours: 05

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Develop and maintain a cooperative work group	Trainee will be able to: <ul style="list-style-type: none"> Work contributions and suggestions from staff are continually sought and encouraged Contributions to work group operations are acknowledged and suggestions are dealt with constructively 	<ul style="list-style-type: none"> Explain the principles of effective team operation Explain the principles of human resource management Describe the training delivery processes in the workplace Practical Activity Develop and maintain a	Theory- 04 Hrs Practical- 06 Hrs Total- 10 Hrs	<ul style="list-style-type: none"> Internet Laptop/Computer White board Projector screen Multimedia projector 	Classroom



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



	<ul style="list-style-type: none"> Develop staff skills according to work requirements Implement new work practices Address conflict between staff members in accordance with current personnel practices. 	cooperative work group			
LU2. Communicate objectives and required standards	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> Inform the staff of the objectives and standards required Commit to objectives and standards Practices of safe, fair and participative work principals are and promote to staff 	<ul style="list-style-type: none"> Ability to coordinate a work team Evidence of integration of employability skills with workplace tasks and job roles <p><u>Practical Activity</u> Communicate objectives and required standards</p>	<p>Theory- 04 Hrs</p> <p>Practical- 06 Hrs</p> <p>Total- 12 Hrs</p>	<ul style="list-style-type: none"> Internet Laptop/Computer White board Projector screen Multimedia projector 	Classroom
LU3. Provide feedback on performance	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> Give constructive feedback on all aspects of work performance provided to individuals and team 	<ul style="list-style-type: none"> Outline the industry assessment guidelines <p><u>Practical Activity</u></p>	<p>Theory- 04 Hrs</p> <p>Practical- 06 Hrs</p> <p>Total- 12 Hrs</p>	<ul style="list-style-type: none"> Internet Laptop/Computer White board Projector screen Multimedia projector 	Classroom



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



	<ul style="list-style-type: none"> Access and address performance in a fair and timely manner in accordance with relevant guidelines, procedures and natural justice 	Provide feedback on performance			
LU4. Support and participate in development activities	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> Assess training needs of all staff, implemented and promoted Devise an action plan to meet individual and group training and development needs is collaboratively developed, agreed to and implemented Identify specific training needs of individuals Encourage staff in applying skills and knowledge in the workplace Provide training to the required standard on the job Support and encourage staff to attend training 	<ul style="list-style-type: none"> Employee feedback development procedures Employee performance and development activities feedback Mechanism for taking actions after the performance appraisals <p><u>Practical Activity</u> Support and participate in development activities</p>	<p>Theory- 04 Hrs</p> <p>Practical- 06 Hrs</p> <p>Total- 10 Hrs</p>	<ul style="list-style-type: none"> Internet Laptop/Computer White board Projector screen Multimedia 	Classroom



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



	courses and to take up other development opportunities.				
LU5. Provide leadership. direction and guidance to the work group	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Link between the function of the group and the goals of the organization • Participate in decision making routinely to develop, implement and review work of the group and to allocate responsibilities where appropriate • Give opportunities and encouragement to others to develop new and innovative work practices and strategies • Identify conflict and resolve with minimum disruption to work group function • Provide staff with the support and supervision necessary to perform work 	<ul style="list-style-type: none"> • Designing the training modules • Scheduling of trainings & allocation of trainers • Allocation of supportive resources <p><u>Practical Activity</u> Provide leadership. direction and guidance to the work group</p>	<p>Theory- 04Hrs</p> <p>Practical- 06 Hrs</p> <p>Total- 10 Hrs</p>	<ul style="list-style-type: none"> • Internet • Laptop/Computer • White board • Projector screen • Multimedia 	Classroom



***National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing
(CAD/CAM Supervisor)***



	<p>safely and without risk to health</p> <ul style="list-style-type: none">• Allocate tasks within the competence of staff and support with appropriate authority, autonomy and training• Supervise appropriately the changing priorities and situations and takes into account the different needs of individuals and the requirements of the task				
--	--	--	--	--	--



National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



Module:13 Implement Green skills

Objective: This module covers the knowledge and skills required to use advance automation technologies to reduce energy losses. After this competency standard, the trainee will be able to develop knowledge and competence in an efficient way for resource and power management and shifting Towards Green IoT

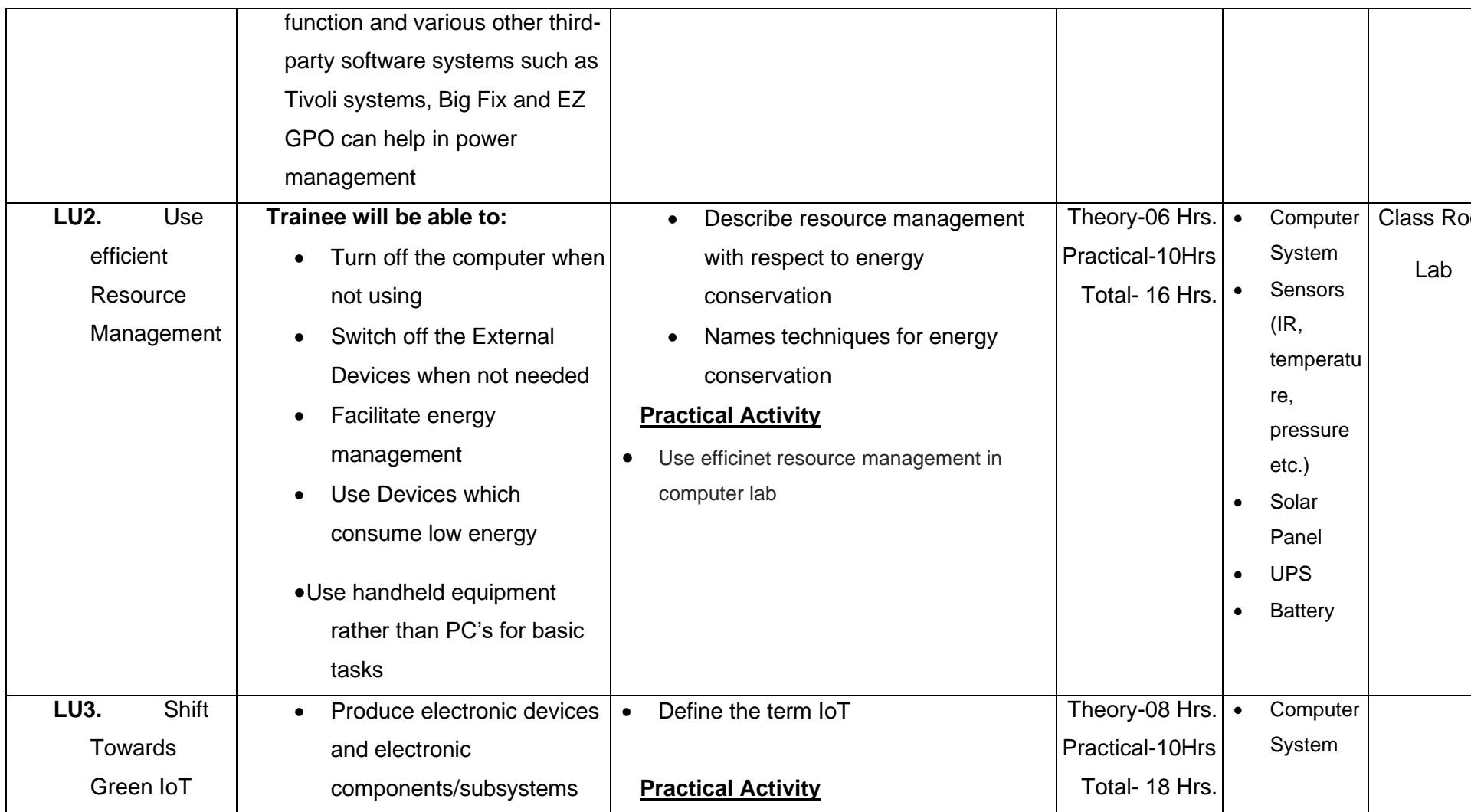
Duration: 50 Hours

Theory: 20 Hours

Practice: 30 Hours

Credit Hours: 05

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Use Power management techniques	Trainee will be able to: <ul style="list-style-type: none"> Use both sides of the paper for printing Reduce the brightness of the screen, saving the battery which in turn helps in saving the power, and most importantly turning off the device when not in use. The use of LED and LCD monitors in place of CRTs Select the blend of group policies, Windows in-built sleep 	<ul style="list-style-type: none"> Describe the importance of green energy with respect to global warming Features of power management Describe power management techniques <p><u>Practical Activity</u></p> <ul style="list-style-type: none"> Implement power management in computer lab 	Theory-06 Hrs. Practical-10Hrs Total- 16 Hrs.	<ul style="list-style-type: none"> Computer System Sensors (IR, temperature, pressure etc.) Solar Panel UPS Battery 	Class Room & Lab





National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing (CAD/CAM Supervisor)



	<p>with minimal impact on the environment</p> <ul style="list-style-type: none"> Minimize the power consumption by technologies and other electronic devices Enable the designing, analysis, and synthesis of green IOT computers, servers, and other related devices Recycle old gadgets and unused electronic devices 	Recycle old electronic gadgets		<ul style="list-style-type: none"> Sensors (IR, temperature, pressure etc.) Solar Panel UPS Battery 	
--	--	--------------------------------	--	---	--



***National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing
(CAD/CAM Supervisor)***



List of Tool, Machinery and Equipment:

SR#	Items/Tools & Equipment	Quantity
1.	Tool pre - setting device (optional)	
2.	Dial indicator	
3.	Dial test indicator	
4.	Gauges (go-no go, pitch, plug, radius, etc.)	
5.	Coordinate measuring machine (CMM) (optional)	
6.	Bevel protractor	
7.	Profile projector	
8.	Surface-texture tester	
9.	Surface-finish comparator	



***National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing
(CAD/CAM Supervisor)***



10.	Steel rule	
11.	CNC Milling Machine	
12.	Power Mill	
13.	3ds Max	
14.	AutoCAD	
15.	Sketch up	
16.	Lumion	

List of Consumable Supplies

SR#	Consumable Supplies	Quantity
1.	PCs/Laptop	25



***National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing
(CAD/CAM Supervisor)***



2.	Solid works/ Cero Parametric	As per requirement
3.	Printer	
4.	Paper	
5.	PCs/Laptops	
6.	Multimedia Projector	



***National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing
(CAD/CAM Supervisor)***



Members of the Curriculum Development Committee

S#	Name	Designation
1	Sadyia Qureshi	Coordinator
2	Aftab Hussain	DACUM Facilitator
3	Ali Raza	DACUM Facilitator
4	Muhammad Abbas Arshad	Site Engineer
5	Muhammad Faizan	Interior/CAD Designer



***National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing
(CAD/CAM Supervisor)***



S#	Name	Designation
6	Syed Farhan Hamid Ali	Sr. Instructor Pak Swiss Training Center Karachi
7	Muhammad Hassan Arshad	Architect Bahria Town
8	Malik Abdul Basit	Consultant (IT & Overseas employment)
9	Javeed Hayat	Consultant (Survey and Research)



***National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing
(CAD/CAM Supervisor)***



Members of the Curriculum Validation Committee

S#	Name	Designation
1	Dr. Muhammad Bakhsh DD IT/CS	Pakistan Academy of rural development, Peshawar
2	Jawaria Qazi Web Admin	PBTE, Lahore
3	Ali Raza	Principal Quaid-e-Azam College of Engineering & Technology Okara
4	Aftab Hussain	DACUM Facilitator
5	Nadeem Zaigham Senior Instructor	P-TEVTA



***National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing
(CAD/CAM Supervisor)***



S#	Name	Designation
6	Muhammad Abbas Arshad Project Engineer	United Engineering Pvt Ltd Jehlum
7	Muhammad Faizan Architectural Designer	Gleaming Architectural
8	Navid Ali Lecturer	KP-TEVTA
9	Amjad Waheed Khan Lecturer	KP-TEVTA
10	Syed Shadab Ali Shah Assistant Professor	KP-TEVTA



***National Vocational Diploma Level 5 in Computer Aided Design & Manufacturing
(CAD/CAM Supervisor)***



S#	Name	Designation
11	Sammar Jan Siddiqui	P-TEVTA
12	Dr. Muhammad Bakhsh DD IT/CS	Pakistan Academy of rural development, Peshawar