

**National Competency Standard level 5 Diploma for Computer Aided  
Design & Manufacturing  
(CAD/CAM Supervisor)**



**National Vocational & Technical Training Commission (NAVTTTC)**

## ACKNOWLEDGEMENTS

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- *Dr. Muqeen ul Islam*, Director General (Skills, Standards and Curricula) NAVTTTC
- *Mr. Muhammad Naeem Akhtar*, Senior Technical Advisor TSSP-GIZ,
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- *Mr. Muhammad Fayaz Soomro*, Deputy Director (SS&C Wing) NAVTTTC

NAVTTTC team under the leadership of Dr. Muqeen ul Islam initiated development of CBT & A based qualifications of diploma level-5 as a reform project of TVET sector in November 2018 and completed 27 NVQF diplomas of Level-5 in September, 2019. It seems worth highlighting that during this endeavor apart from developing competency standards/curricula in conventional trades new dimensions containing high-tech trades in TVET sector in the context of generation IR 4.0 trades have also been developed which inter alia includes Robotics, Mechatronics, artificial intelligence, industrial automation, instrumentation and process control. Moreover, trades like entrepreneurship, green/environmental skills and variety of soft/digital skill have also been developed to equip the Pakistani youth with skills set as per requirement of the global trends. These skills have been made integral part of all the 27 diplomas.

Nobody has been more important in the pursuit of this project than Dr. Nasir Khan, Executive Director, NAVTTTC, whose patronage and support remain there throughout the development process and lastly to thanks specially to Syed Javed Hassan, Chairman NAVTTTC and Raja Saad Khan, Deputy Team Lead TSSP-GIZ who made it happened in this challenging time.

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## 1. Introduction

CAD/CAM is the most popular software with the highest overall job-market demand. CAD designing is very important and very helpful for an individual and employer in all over the globe. More over individual can also get CAD certification which is an industry recognized credential that can help an individual to succeed in his/her design career—providing benefits to both individual and employer. Certification provides reliable validation of skills and knowledge and can lead to accelerated professional development, improved productivity, and enhanced credibility.

In connection of Market job demand to meet the demand of industry there is a need to strength and promote productive working relationship between the training provider and the industry in order to enhance quality of training delivery, enterprise competitiveness and access to decent employment.

That's why existing NVQF for AutoCAD trade have been identified for review and the further development of the missing levels, skills sets and industry demanded occupational competencies. Further this occupation has been developed in response to the demands of labor market and national priorities with the involvement of industry at key stages in the development process.

The main elements in the development of this qualification include; competency standards, structure, level, time allocation in credit hours, Tools and equipment's as per National Vocational Qualification Framework (NVQF) Development Manual 1 using the competency-based training and assessment (CBT&A) approach.

## 2. Purpose of the Qualification

NVQF qualifications are comprehensible packages of competency standards related to defined occupations. They are developed in response to the demands of labor market and national priorities with the involvement of industry at key stages in the development process.

The purpose of these qualifications is to standardized competency standard for level-5 across the globe for VET practitioners who will serve as key elements in enhancing quality of training and assessment. Also, to set and identify duties and tasks for the usual purpose of earning a living.

The specific objectives of developing these qualifications are as under:

- To set a high-profile standard profession for the industry to generate standard outputs.
- To validate an individual skill, knowledge and understanding regarding relevant occupations.
- In a Competency-Based Training (CBT), these qualifications provide overall course guidelines in relation to teaching and learning and act as the key instrument in supporting standardized formal, non-formal and informal training.
- Improve the professional competence of TVET practitioners/instructional to fulfilled Job market demand.
- Capacitate the instructional staff in modern CBT&A tools, methodologies and processes as envisaged under NVQF.
- Provide flexible pathways and progressions in training and assessment field.
- Establish a standardized and sustainable system of training for TVET practitioners/instructional staff in the country.

### 3. Summary of competency standards

Sr No	Competency Standards	Occupation	NVQF Level	Category	Estimated Contact Hours			Cr Hr
					Th	Pr	Total	
Level 5								
1	Develop basic CNC code for milling machine	CAD/CAM Supervisor	5	Technical	40	60	100	10
2	Develop advance 3-D modeling using CREO parametric/Solid works		5	Technical	40	60	100	10
3	Develop part assembly using Creo parametric		5	Technical	40	60	100	10
4	Perform CAM operation using Power Mill		5	Technical	40	60	100	10
5	Apply animation and rendering in 3-D model using Lumion		5	Technical	40	60	100	10
6	Develop 3-D model using Autodesk 3ds Max		5	Technical	60	90	150	15
7	Design a basic project using BIM technology		5	Technical	36	54	90	9
8	Implement a design for basic project using BIM technology		5	Technical	36	54	90	9
9	Plan a Project in Primavera P6		5	Technical	60	90	150	150
10	Develop a basic interior house plan using block		5	Technical	32	48	80	8
11	Coordinate a Team Work		5	Generic	20	30	50	5
12	Develop Entrepreneurial Skills		5	Generic	16	24	40	4
13	Implement Green skill		5	Generic	20	30	50	5
	Total				480	720	1200	120
	Percentage (%)				40%	60%	100	

#### 4. Date of Validation

The level 5 of National Diploma of Level-5, in “CAD/CAM Supervisor” has been validated by the Qualifications Validation Committee (QVC) members on 27-29th May, 2019 and will remain valid for ten years i.e., **29<sup>th</sup> May, 2029**

#### 5. Date of Review

The level 5 of National Diploma of Level-5, in “Computer Aided Design & Manufacturing CAD/CAM Supervisor” has been validated by the Qualifications Validation Committee (QVC) members on 27-29th May, 2019 and shall be reviewed after three years i.e., **30<sup>TH</sup> May, 2022**

#### 6. Codes of Qualifications

The International Standard Classification of Education (ISCED) is a framework for assembling, compiling and analyzing cross-nationally comparable statistics on education and training. ISCED codes for these qualifications are assigned as follows:

ISCED Classification for Computer Aided Design & Manufacturing - Level 5	
Code	Description
<b>0720 C/C &amp; M 4</b>	National Diploma of Level-5, in “Computer Aided Design & Manufacturing (CAD/CAM Supervisor)”

## 7. Members of Qualifications Development Committee

The following members participated in the qualification development of this qualification:

Sr.No.	Name & Designation	Organization
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
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.	Javed Hayat	Consultant (Survey and Research)

## 8. Members of Qualification Validation Committee

The following members participated in the validation of this qualification:

Sr.No.	Name & Designation	Organization
1.	<b>Dr. Muhammad Bakhsh</b> <b>DD IT/CS</b>	Pakistan Academy of rural development, Peshawar
2.	<b>Jawaria Qazi</b> <b>Web Admin</b>	PBTE, Lahore
3.	<b>Ali Raza</b>	Principal Quaid-e-Azam College of Engineering & Technology Okara
4.	<b>Aftab Hussain</b>	DACUM Facilitator
5.	<b>Nadeem Zaigham</b> <b>Senior Instructor</b>	P-TEVTA
6.	<b>Muhammad Abbas Arshad</b> <b>Project Engineer</b>	United Engineering Pvt Ltd Jehlum
7.	<b>Muhammad Faizan</b> <b>Architectural Designer</b>	Gleaming Architectural
8.	<b>Navid Ali</b> <b>Lecturer</b>	KP-TEVTA
9.	<b>Amjad Waheed Khan</b> <b>Lecturer</b>	KP-TEVTA
10.	<b>Syed Shadab Ali Shah</b> <b>Assistant Professor</b>	KP-TEVTA
11.	<b>Summar Jan Siddiqui</b>	P-TEVTA
12.	<b>Fayaz A Soomro</b> <b>Deputy Director (Technical Education)</b>	NAVTTTC

## 9. Entry Requirements

The entry requirements for National Diploma Level 5, in Computer Aided Design & Manufacturing (CAD/CAM Supervisor) are

- National Vocational Certificate of Level 4, in “Computer Aided Design & Manufacturing (CAD/CAM Technician)”



## DETAIL OF COMPETENCY STANDARDS

### 0720 C/C & M 4.A

### Develop Basic CNC Code for Milling Machine

#### Overview:

This competency standard is designed 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.

Competency Units	Performance Criteria
<b>CU1.</b> Determine job requirements	<b>P1.</b> Interpret Drawings to produce program according to specifications <b>P2.</b> determine sequence of operations to produce work piece according to specification <b>P3.</b> Select Cutting tools according to the operations determined. <b>P4.</b> Calculate Cutting speed and feed rate based on cutting tool and work piece material. <b>P5.</b> Fill up Process / adjustment sheets with relevant machine, tool and raw material data.
<b>CU2.</b> Write basic CNC milling Machine program.	<b>P1.</b> Calculate Coordinates for simple tool path or basic machining functions based on part or product to be machined. <b>P2.</b> Develop standard Program for CNC Milling <b>operations</b> , in accordance with coding standard.
<b>CU3.</b> Edit basic CNC milling Machine programs.	<b>P1.</b> Simulate and edit Program according to standard operating procedures. <b>P2.</b> Save Program according to standard operating procedures. <b>P3.</b> Import Program to the machine according to standard operating procedures.
<b>CU4.</b> Perform Basic CNC milling Machine Operations	<b>P1.</b> Set-up CNC milling machine, work-piece and cutting tools <b>P2.</b> Mount Work piece in accordance with standard operating procedures. <b>P3.</b> Perform Basic CNC milling operations to produce component as programmed. <b>P4.</b> Perform Corrective measures/adjustments according to the requirement (if necessary). <b>P5.</b> Personal protective devices are used in accordance with occupational health and safety (OHS) requirements. <b>P6.</b> Check and measure work pieces according to the Job. <b>P7.</b> Defective work pieces are marked, recorded and reported for troubleshooting.

## **Knowledge & Understanding**

This competency standard will provide knowledge related to:

- **Drawing interpretation**
  - Standard drawing scales, symbols and abbreviations
  - Orthographic and isometric drawings
  - Assembly and detailed drawings
  - Interpreting tolerances
  - Geometrical Tolerances (form and position)
  - Surface condition (surface finish/texture)
  - Limits and fits
  - Shop mathematics
  - Four fundamental operations
  - Fractions and decimals
  - Percentages and ratios
  - Conversion of units (English to metric)
  - Pythagorean theorem
  - Basic trigonometric function
  - Materials and related science
  - Classification and mechanical properties of engineering materials
  - Milling machine operations
  - Calculation of cutting speed, rpm, feed rate
  - Classification/selection of cutting tools and tool
  - Geometry
  - Tool offset
  - Milling operation processes
- **Shop safety practices**
  - Safe working habits
  - Identification of hazardous areas
  - Protective clothing and devices
  - Safe handling of tools, equipment and materials
  - Housekeeping
  - First-aid
  - Fire extinguishers
- **Measurements**
  - Linear measuring tools (vernier, micrometer)
  - Angular measuring tools
  - Geometrical tolerances checking tools
  - Surface finish measuring instrument

## **Critical Evidence(s) Required**

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Determined job requirements
- write basic CNC milling machine program
- edited basic CNC milling machine program
- simulate CNC program
- Performed work piece set-up
- Performed trial cut on work piece

### List of Tools and Equipment

Sr.No.	Description
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
10.	Steel rule
11.	CNC Milling Machine

## 0720 C/C & M 4. B Develop Advance 3D Modelling using CREO Parametric /Solid works

### Overview:

This competency standard is designed to provide knowledge and skills regarding advance modeling tools. It also covers working in drawing, assembly modules and creating animation of assembly.

Competency Unit	Performance Criteria
<b>CU1.</b> Create sweep and helical sweep	<b>P1</b> Create sketch for sweep command as per given requirements. <b>P2</b> Perform sweep command <b>P3</b> Remove material using sweep as per specification. <b>P4</b> Edit sketch of sweep section as per requirements. <b>P5</b> Edit parameters for sweep as per requirements. <b>P6</b> Perform helical sweep as per specifications <b>P7</b> Edit the features of helical sweep such as pitch, coil diameter and spring diameter as per given requirements. <b>P8</b> Remove material using helical sweep as per given requirements. <b>P9</b> Apply material to the 3D model as per given requirements.
<b>CU2.</b> Create 3d using Blend	<b>P1</b> Create plans for swept blend <b>P2</b> Create sections for blend as per given requirements. <b>P3</b> Create parallel blend <b>P4</b> Create general blend <b>P5</b> Create rotational blend <b>P6</b> Edit the sections for blend as per given requirements.
<b>CU3.</b> Create 3d using swept blend	<b>P1.</b> Create plan for swept blend as per given requirements. <b>P2.</b> Create sections for swept blend as per requirements. <b>P3.</b> Edit sections of swept blend <b>P4.</b> Edit parameters of swept blend <b>P5.</b> Create swept blend
<b>CU4.</b> Create Drawings of 3D model	<b>P1.</b> Define drawing layout <b>P2.</b> Import model to drawing mode <b>P3.</b> Manage paper template as per given requirements. <b>P4.</b> Manage/configure the properties of view <b>P5.</b> Extract view from existing view <b>P6.</b> Create default view <b>P7.</b> Create section view

- P8.** Create detail view
- P9.** Annotate the view and apply dimensions
- P10.** Edit annotations

### **Knowledge & understanding:**

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes the knowledge of:

- Sweep and helical sweep
- Blend and swept blend
- Drawing
  - Drawing views
  - Section views
  - Details views
  - Annotation
- Types of assembly
  - Top-Down approach
  - Bottom-up approach
  - Assembly constraints
- Animation
- Animation constraints

### **Critical Evidence Required:**

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Produce 3D model having feature of sweep and sweep cut, edit the parameters of the model according to requirements.
- Produce helical springs and helical cuts and editing the parameters as per requirements.
- Producing assembly as per requirements
- Producing drawing, section drawing, and detail drawings as per requirements.
- Produce the animation of the given assembly and create video of the animation.

### **List of Tool & Equipment**

S. No	Tools
1.	PCs/Laptop
2.	Solid works/ Cero Parametric
3.	Printer
4.	Paper

## 0720 C/C & M 4.C Develop Part Assembly using CREO Parametric

### Overview:

This competency standard is designed to provide knowledge and skills about developing part assembly using CREO parametric. It also covers working in assembly drawing and creating animation of assembly.

Competency Unit	Performance Criteria
<b>CU1.</b> Create an Assembly drawing	<b>P1</b> Import part to assembly module <b>P2</b> Apply default constraint to the part as per requirements. <b>P3</b> Apply coincident constraint to the part as per requirements. <b>P4</b> Apply distance constraint to the part as per requirements. <b>P5</b> Apply parallel constraint to the part as per requirements. <b>P6</b> Apply coplanar constraint to the part as per requirements. <b>P7</b> Apply center constraint to the part as per requirements. <b>P8</b> Explode assembly to view all the parts of assembly. <b>P9</b> Edit parts in assembly
<b>CU2.</b> Create Animation of Assembly	<b>P1</b> Import model into assembly module <b>P2</b> Apply animation constraints (e.g. Pin, slider, cylinder, planner, ball) as per requirement of the given assembly <b>P3</b> Take the snapshots at different intervals. <b>P4</b> Create animation from snapshots <b>P5</b> Specify time for the animation <b>P6</b> Create video of animation <b>P7</b> Save the video

### Knowledge & understanding:

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes the knowledge of:

- Sweep and helical sweep
- Blend and swept blend
- Drawing
  - Drawing views
  - Section views
  - Details views
  - Annotation
- Types of assembly
  - Top-Down approach
  - Bottom-up approach
  - Assembly constraints

- Animation
- Animation constraints

### **Critical Evidence Required:**

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Produce 3D model having feature of sweep and sweep cut, edit the parameters of the model according to requirements.
- Produce helical springs and helical cuts and editing the parameters as per requirements.
- Producing assembly as per requirements
- Producing drawing, section drawing, and detail drawings as per requirements.
- Produce the animation of the given assembly and create video of the animation.

### **List of Tool & Equipment**

<b>S. No</b>	<b>Tools</b>
<b>5.</b>	PCs/Laptop
<b>6.</b>	Solid works/ Cero Parametric
<b>7.</b>	Printer
<b>8.</b>	Paper

## 0720 C/C & M 4.D Perform CAM Operation using Power Mill

### Overview:

This competency standard will provide skills and knowledge related 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 be able to create/export the code in Power mill application to create Job.

Competency Unit	Performance Criteria
<b>CU1.</b> Setup Machining details	<b>P1</b> Import the given 3D model in power mill <b>P2</b> Define tool as per requirements of machining <b>P3</b> Define block for the machining <b>P4</b> Examine the model parameters <b>P5</b> Find minimum radius and draft angle of given 3D model <b>P6</b> Use measuring tool <b>P7</b> Set feed rates for machining <b>P8</b> Define rapid moves and heights <b>P9</b> Define start and end point of machining <b>P10</b> Define boundaries for machining
<b>CU2.</b> Setup work plan and coordinate	<b>P1</b> Import given 3D model to the power mill <b>P2</b> Select the work plan as per requirements <b>P3</b> Edit/rotate work plan <b>P4</b> Define coordinate for the plan as per requirements <b>P5</b> Edit/rotate coordinates
<b>CU3.</b> Perform 3D Area clearance	<b>P1</b> Apply offset area clearance strategy <b>P2</b> Apply profile area clearance strategy <b>P3</b> Apply raster area clearance strategy <b>P4</b> Perform raster machining
<b>CU4.</b> Create finishing strategy	<b>P1</b> Apply 3D offset finishing strategy <b>P2</b> Apply constant Z- height finishing strategy <b>P3</b> Optimize constant Z-height finishing strategy <b>P4</b> Apply offset flate finishing strategy <b>P5</b> Apply raster finishing strategy <b>P6</b> Apply radial finishing strategy <b>P7</b> Apply patter finishing strategy <b>P8</b> Apply spiral finishing strategy <b>P9</b> Apply surface finishing strategy
<b>CU5.</b> Perform 2D area clearance machining	<b>P1</b> Apply face milling strategy <b>P2</b> Apply 2D curve area clearance strategy <b>P3</b> Perform Drilling strategy
<b>CU6.</b> Define Postprocessor and NC code	<b>P1</b> Select the appropriate postprocessor as per requirements <b>P2</b> Create CNC code <b>P3</b> Save CNC code <b>P4</b> Edit CNC code as per requirements <b>P5</b> Simulate the CNC code.



**CU7. Mini Project**

- P1** Import the 3D model in Power Mill
- P2** Define stock block for the 3D model
- P3** Edit the block parameters as per requirements
- P4** Define plan for the machining as per requirements
- P5** Define coordinate system
- P6** Edit the coordinate system as per requirements
- P7** Define speed and feed rate
- P8** Define rapid moves and heights
- P9** Apply 3D area clearance strategy as per requirements
- P10** Apply 3D finishing strategy as per requirements
- P11** Create the tool path for the strategies
- P12** Edit tool path to optimize the machining timing.
- P13** Select the appropriate post processor
- P14** Create CNC code for the machining
- P15** Save the CNC code

### Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes the knowledge of:

- Software GUI
  - Tool bars
  - Menus
  - Viewing Option
- Define stock
- Step over
- Step down
- Differentiate between High-efficiency roughing and rest-roughing
- Rest Machining
- Define 3-axis roughing programs
- Describe purpose of small cutter
- Define Tip Radius
- Define Tool Family
- Elaborate 3D offset
- Patterns concept

### Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Create workplace and level setting for the Job

- Apply Roughing/ Area Clearance strategy
- Apply Finishing tool-path strategy
- Export CNC code to develop job.

#### LIST OF TOOLS AND EQUIPMENT

Sr .No.	Description
1.	PCs/Laptops
2.	Multimedia Projector
3.	Power Mill
4.	USB

## 0720 C/C & M 4.E Apply Animation and Render 3D Model using Lumion

### Overview:

This competency standard is designed to provide skills and knowledge 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.

Competency Units	Performance Criteria
<b>CU1.</b> Render Model using Lumion.	<b>P1.</b> Install Lumion 3D modeling software. <b>P2.</b> Import 3D Model to Lumion as per job requirement. <b>P3.</b> Apply textures to the 3D model as specified. <b>P4.</b> Apply light to illuminate model to get the required scene of image. <b>P5.</b> Apply shadow of 3D object according to the movement of light. <b>P6.</b> Apply material to the object as per given requirement. <b>P7.</b> Apply render to the 3D model as per given requirement. <b>P8.</b> Add scene for different camera views of 3D model as per requirement. <b>P9.</b> Built environment according to the requirement.
<b>CU2.</b> Apply animation using Lumion	<b>P1.</b> Convert given CAD 3D model into 3D flythrough video. <b>P2.</b> Add motions to clouds and live/moving objects. <b>P3.</b> Apply directions to the moving objects. <b>P4.</b> Add timeline to the movement of the object. <b>P5.</b> Apply movement of shadows according to the movement of light. <b>P6.</b> Apply setting of camera according to the movement of light and object.

### Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes the knowledge of:

- **3D modeling in Lumion**
  - Import/export
  - 3D model to 3D flythrough video
  - Materials
  - Textures
- **Boolean operation concepts**
  - Addition

- Intersection
- 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**
  - Planner mapping
  - Texture map
  - Opacity control
  - Render context
  - Render sampling

### Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Rendered 3D prototype Model including materials, lights, scene and different camera views.

### LIST OF TOOLS AND EQUIPMENT

Sr.No.	Description
1.	PCs/Laptops
2.	Multimedia Projector
3.	3ds Max
4.	AutoCAD
5.	Paper
6.	Printer
7.	Sketch up
8.	Lumion
9.	Revit

## 0720 C/C & M 4.F Develop 3D Model Using Autodesk 3ds Max

### Overview:

This competency standard is designed to provide a 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.

Competency Units	Performance Criteria
<b>CU1.</b> Create Objects using geometry and shapes	<b>P1.</b> Create/import/link/fetch/merge 2D drawing to make 3D objects according to given specification <b>P2.</b> Use Geometry & shapes to make 3D objects according to given specification.
<b>CU2.</b> Modify objects	<b>P1.</b> Modify Parameters of 3D objects according to given specification. <b>P2.</b> Apply modifiers for object manipulation to meet the specific requirements.
<b>CU3.</b> Apply material and textures to objects	<b>P1.</b> Create/assign specified materials and textures to 3D Model. <b>P2.</b> Edit materials and textures to get realistic outcome.
<b>CU4.</b> Render 3D model	<b>P1.</b> Assign/Install Renderer to meet specific outcome as per requirement. <b>P2.</b> Add scene of 3D model according to specifications <b>P3.</b> Add lights for illumination to get the requisite scene of 3D model. <b>P4.</b> Assign cameras to execute different views of 3D Model. <b>P5.</b> Render the 3D model according to required image size or resolution & orientation.

### Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes the knowledge of:

- 3D prototype models for presentations.
- Principles of lighting and rendering.
- Modeling techniques.
- Materials, textures and colors.
- Reflection and Refraction.
- Cameras and navigation of 3D environment.

### Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Rendered 3D prototype Model including materials, textures, colors, viewports, lights, scene and different camera views.

## LIST OF TOOLS AND EQUIPMENT

S. No.	Description
1.	PCs/Laptops
2.	Multimedia Projector
3.	3ds Max
4.	AutoCAD
5.	Paper
6.	Printer
7.	IRender
8.	VRay
9.	Lumion

## 0720 C/C & M 4.G Design a Basic Project using BIM Technology

### Overview:

This competency standard is designed to provide skills and knowledge to design project you will be able to produce communication, build team work, apply problem solving techniques and build initiative and enterprise.

Competency Units	Performance Criteria
<b>CU1.</b> Produce Communication	<b>P1.</b> Listen to and communicate clearly with colleagues, suppliers and contractors <b>P2.</b> Participate in meetings with clients, contractors and other professionals. <b>P3.</b> Explain compliance requirements to clients <b>P4.</b> Write letters and reports to formalize agreements or clarify project information <b>P5.</b> Initiate and run meetings with lead contractor and other service contractors <b>P6.</b> Use industry-specific definitions, language symbols and terminology <b>P7.</b> Negotiate changes to designs with clients and planners.
<b>CU2.</b> Build Teamwork	<b>P1.</b> Develop constructive and cooperative working relationships with project team members, colleagues, suppliers and clients as per the job requirement. <b>P2.</b> Plan and coordinate with others to work and plan to complete tasks as per the requirement.
<b>CU3.</b> Apply Problem solving techniques	<b>P1.</b> Coordinate input of expert advice as per the requirement of the task. <b>P2.</b> Develop innovative and affordable sustainable design solutions in the workplace environment. <b>P3.</b> Maintain effective relationships with industry professionals
<b>CU4.</b> Build Initiative and enterprise	<b>P1.</b> Conduct cost-benefit analysis of design options as per the specification <b>P2.</b> Negotiate solutions to design conflicts in accordance to the job requirement <b>P3.</b> Propose creative design solutions to issues arising on site

### Knowledge & Understanding

This competency standard will provide knowledge related to:

- Types of Communication
- 7 Cs
- Manual Drawing Concepts

- Designing Concepts
- 2D, 3D drawing concepts
- Detail drawing
- Entrepreneurship
- Shop safety practices
  - Safe working habits
  - Identification of hazardous areas
  - Protective clothing and devices
  - Safe handling of tools, equipment and materials
  - housekeeping
  - First-aid
  - Fire extinguishers
- Measurements
  - Survey techniques
  - Linear measuring tools
  - Angular measuring tools
  - Geometrical tolerances checking tools
  - Surface finish measuring instrument

### **Critical Evidence(s) Required**

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Explain compliance requirements to clients
- Write letters and reports to formalize agreements or clarify project information
- Initiate and run meetings with lead contractor and other service contractors
- Plan and coordinate with others to work and plan to complete tasks as per the requirement
- Maintain effective relationships with industry professionals
- Conduct cost-benefit analysis of design options as per the specification

### **List of Tool & Equipment**

S. No	Tools
1.	PCs/Laptop
2.	Solid works/ Cero Parametric
3.	Printer
4.	Paper



## 0720 C/C & M 4.H Implement a design for Basic Project Using BIM Technology

### Overview:

This competency standard is designed to provide skills and knowledge to design project you will be able to plan and Organize, Apply Self-management. Develop Building Design and Implement Design using Technology

Competency Units	Performance Criteria
<b>CU1.</b> Planning and organizing	<b>P1.</b> Analyse and interpret complex technical compliance requirements and apply these to different project <b>P2.</b> Devise and negotiate solutions to planning and building permit issues <b>P3.</b> Conduct cost-benefit analysis of design options <b>P4.</b> Perform complex calculations, such as structural requirements and load effects of force and movement on structural elements of buildings <b>P5.</b> Identify site risks and building constraints, and produce design solutions
<b>CU2.</b> Apply Self-management	<b>P1.</b> Produce aesthetic, cost-effective, compliant and buildable designs within given timeframes <b>P2.</b> Develop personal methodologies for ensuring project quality and for incorporating process improvements <b>P3.</b> Manage detailed input to concurrent design projects at different stages of the process and with diverse sets of regulatory requirements <b>P4.</b> Integrate safe building practices into the design of a building <b>P5.</b> Implement energy conservation strategies and cost saving practices
<b>CU3.</b> Develop Building Design	<b>P1.</b> Apply structural principles and construction technology to the design of a built form plan the building design <b>P2.</b> set up systems and checklists for ensuring a methodical approach to design projects <b>P3.</b> Gather documentation required for design projects, including plans, specifications, drawings, legislation, codes and standards
<b>CU4.</b> Implement Design using Technology	<b>P1.</b> Interpret and Interact manuals and marketing information about new technologies, products and systems <b>P2.</b> Use computer software to produce building designs, manage project participation and conduct general personal business administration

**P3.** Use relevant tools and equipment, such as measuring and surveying tools and calculators

## Knowledge & Understanding

This competency standard will provide knowledge related to:

- Manual Drawing Concepts
- Designing Concepts
- 2D, 3D drawing concepts
- Detail drawing
- Shop safety practices
  - Safe working habits
  - Identification of hazardous areas
  - Protective clothing and devices
  - Safe handling of tools, equipment and materials
  - housekeeping
  - First-aid
  - Fire extinguishers
- Measurements
  - Survey techniques
  - Linear measuring tools
  - Angular measuring tools
  - Geometrical tolerances checking tools
  - Surface finish measuring instrument

## Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Conduct cost-benefit analysis of design options as per the specification
- Perform complex calculations, such as structural requirements and load effects of force and movement on structural elements of buildings
- Develop personal methodologies for ensuring project quality and for incorporating process improvements
- Gather documentation required for design projects, including plans, specifications, drawings, legislation, codes and standards
- Use computer software to produce building designs, manage project participation and conduct general personal business administration

## List of Tool & Equipment

S. No	Tools
1.	PCs/Laptop
2.	Printer
3.	Paper

## 0720 C/C & M 4.I Plan a Project in Primavera P6

**Overview:** This competency standard deal with learning the competencies needed to plan a project in Primavera P6. You can perform basic operation, project activities scheduling and resources costing and planning Primavera P6. You will manage project in Primavera P6. Your underpinning knowledge will be sufficient to provide you the basis for your work.

Competency Units	Performance Criteria
<b>CU1.</b> Perform Basic operation in Primavera P6	<b><i>You must be able to:</i></b> <b>P1.</b> Load & unload primavera P6 Software. <b>P2.</b> Prepare interface of software <b>P3.</b> Customize P6 Screen Layout <b>P1</b> Create WBS of project in Primavera.
<b>CU2.</b> Perform Project Activities Scheduling in Primavera P6	<b><i>You must be able to:</i></b> <b>P1.</b> Add Project in Primavera <b>P2.</b> Create Activities of project in Primavera. <b>P3.</b> Create Relationships between activities of project in Primavera. <b>P4.</b> Create Schedule of activities of project in Primavera. <b>P5.</b> Display Gantt Chart
<b>CU3.</b> Perform Project Resources Costing & Planning in Primavera P6	<b><i>You must be able to:</i></b> <b>P1.</b> Add constraints of activities of project in Primavera. <b>P2.</b> Create Calendar for activities of project in Primavera. <b>P3.</b> Assign Calendars to activities of project in Primavera. <b>P4.</b> Add Resources to activities of project in Primavera. <b>P5.</b> Assign Resources of activities of project in Primavera. <b>P6.</b> Add Cost of activities of project in Primavera. <b>P7.</b> Analyze Resources of activities of project in Primavera. <b>P8.</b> Perform Baseline process for Project.
<b>CU4.</b> Manage Project in Primavera P6	<b><i>You must be able to:</i></b> <b>P1.</b> Status the Project <b>P2.</b> Mitigate the schedule

### Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes the knowledge of:

- Physical performance to Customized screen layout
- Activity Constraints
- Work calendar, work/non-work days, working hours
- Roles and Hourly Rates
- Baselines and describe their use in evaluating project performance
- Stages of project execution
- Project monitoring and control

### **Critical Evidence(s) Required**

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Managed Project - project progress, planned baseline, Resource leveling and describe its purpose, comparison graphically, project progress for a specified time period

### **List of Tool & Equipment**

S. No	Tools
1.	PCs/Laptop
2.	Primavera-6
3.	Printer
4.	Paper

### **Tools & Equipment**

- Computer with mouse and keyboard
- Primavera P6 software installed

## 0720 C/C & M 4.J Develop a Basic Interior House Plan Using Blocks

### Overview:

This competency standard will provide skills and knowledge related to develop a basic interior house plan and furniture Layout using “ready-to-use” Blocks.

Competency Unit	Performance Criteria
<b>CU1.</b> Develop a House Plan using AutoCAD	<b>P1</b> Create boundary wall and draw various zones according to requirements <b>P2</b> Place doors and windows as per requirements
<b>CU2.</b> Import Blocks for Furniture Layout	<b>P1</b> Download and import blocks for furniture layout <b>P2</b> Adjust size and scale according to plan <b>P3</b> Save the file in required format

### Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes the knowledge of:

- Software GUI
  - Tool bars
  - Menus
  - Viewing Option
- Using AutoCAD Tool bars and Working Layouts
- Downloading Blocks
- Importing and Placing Blocks on allocated spaces

### Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Download blocks
- Import blocks
- Adjust according to plan
- Save in relevant format for re-use

### LIST OF TOOLS AND EQUIPMENT

Sr .No.	Description
1.	PCs/Laptops
2.	AutoCAD software
3.	Internet Source

## 0720 C/C & M 4.K Develop Entrepreneurial Skills

**Overview:** 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.

Competency Unit	Performance Criteria
<b>CU-1.</b> Develop a business plan	<p><b>P1.</b> Conduct a market survey to collect following information:</p> <ul style="list-style-type: none"> <li>i. Customer /demand</li> <li>ii. Tools, equipment, machinery and furniture with rates</li> <li>iii. Raw material</li> <li>iv. Supplier</li> <li>v. Credit / funding sources</li> <li>vi. Marketing strategy</li> <li>vii. Market trends</li> <li>viii. Overall expenses</li> <li>ix. Profit margin</li> </ul> <p><b>P2.</b> Select the best option in terms of cost, service, quality, sales, profit margin, overall expenses</p> <p><b>P3.</b> Compile the information collected through the market survey, in the business plan format</p>
<b>CU-2.</b> Collect information regarding funding sources	<p><b>P1.</b> Identify the available funding sources based on their terms and conditions, maximum loan limit, payback time, interest rate</p> <p><b>P2.</b> Choose the best available option according to investment requirement</p> <p><b>P3.</b> Prepare documents according to the loan agreement requirement</p> <p><b>P4.</b> Include the information of funding sources in the business plan</p>
<b>CU-3.</b> Develop a marketing plan	<p><b>P1.</b> Make a marketing plan for the business including product, price, placement, promotion, people, packaging and positioning</p> <p><b>P2.</b> Include the information of marketing plan in the business plan</p>
<b>CU-4.</b> Develop basic business	<p><b>P1.</b> Communicate with internal customers e.g.: labor, partners and external customers e.g.: suppliers, customers etc., using effective communication skills</p>

communication skills	<p><b>P2.</b> Use different modes of communication to communicate internally and externally e.g.: presentation, speaking, writing, listening, visual representation, reading etc.</p> <p><b>P3.</b> Use specific business terms used in the market</p>
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### Knowledge and understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out the tasks covered in this competency standard. This includes the knowledge of:

- K1.** Main elements of business plan
- K2.** Filling the business plan format
- K3.** Enlist specific business terms used in the industry
- K4.** 7Cs of business communication
- K5.** Funding resources
- K6.** Marketing trends

### Critical Evidence(s) Required

The candidate needs to produce following critical evidences in order to competent in this competency standard.

### LIST OF TOOLS AND EQUIPMENT

Sr .No.	Description
1.	PCs/Laptops
2.	White board
3.	Internet Source
4.	Multimedia

## 0720 C/C & M 4.L Coordinate a Work Team

**Overview:** 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.

Competency Unit	Performance Criteria
<b>CU-1.</b> Develop and maintain a cooperative work group	<b>P1.</b> Work contributions and suggestions from staff are <b>P2.</b> continually sought and encouraged <b>P3.</b> Contributions to work group operations are acknowledged and <b>P4.</b> suggestions are dealt with constructively <b>P5.</b> Develop staff skills according to work requirements <b>P6.</b> Implement new work practices <b>P7.</b> Address conflict between staff members in accordance with current <b>P8.</b> personnel practices
<b>CU-2.</b> Communicate objectives and required standards	<b>P1.</b> Inform the staff of the objectives and standards <b>P2.</b> required <b>P3.</b> Commit to objectives and standards <b>P4.</b> Practices of safe, fair and participative work principals are and promote to staff
<b>CU-3.</b> Provide feedback on performance	<b>P1.</b> Give constructive feedback on all aspects of work performance provided <b>P2.</b> to individuals and team <b>P3.</b> Access and address performance in a fair and timely manner in <b>P4.</b> accordance with relevant guidelines, procedures and natural justice
<b>CU-4.</b> Support and participate in development activities	<b>P1.</b> Assess training needs of all staff, implemented and promoted <b>P2.</b> Devise an action plan to meet individual and group training <b>P3.</b> and development needs is collaboratively developed, <b>P4.</b> agreed to and implemented <b>P5.</b> Identify specific training needs of individuals <b>P6.</b> Encourage staff in applying skills and knowledge in the workplace <b>P7.</b> Provide training to the required standard on the job <b>P8.</b> Support and encourage staff to attend training courses and to take up development opportunities.
<b>CU-5.</b> Provide leadership. direction and guidance to the work group	<b>P1.</b> Link between the function of the group and the <b>P2.</b> goals of the organization <b>P3.</b> Participate in decision making routinely to develop, implement and review work of the group and to allocate responsibilities where appropriate <b>P4.</b> Give opportunities and encouragement to others to develop new and innovative work practices and strategies <b>P5.</b> Identify conflict and resolve with minimum disruption to work group function <b>P6.</b> Provide staff with the support and supervision necessary to perform work safely and without risk to health <b>P7.</b> Allocate tasks within the competence of staff and support with appropriate authority, autonomy and training <b>P8.</b> Supervise appropriately the changing priorities and situations and takes into account the different needs of individuals and the requirements of the task

## Knowledge and understanding



The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out the tasks covered in this competency standard. This includes the knowledge of:

**K7.**principles of effective team

**K8.**principles of human resource management

**K9.**industry assessment guidelines

**K10.**Employee performance and development activities

### **Critical Evidence(s) Required**

The candidate needs to produce following critical evidences in order to competent in this competency standard.

### **LIST OF TOOLS AND EQUIPMENT**

<b>Sr .No.</b>	<b>Description</b>
<b>1.</b>	PCs/Laptops
<b>2.</b>	White board
<b>3.</b>	Internet Source
<b>4.</b>	Multimedia

## 0720 C/C & M 4.M Implement Green skills

### Overview:

This competency standard covers the skills and knowledge 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

Competency Units	Performance Criteria
<b>CU1.</b> Use Power management techniques	<b>P1.</b> Use both sides of the paper for printing <b>P2.</b> 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. <b>P3.</b> The use of LED and LCD monitors in place of CRTs <b>P4.</b> Select the blend of group policies, Windows in-built sleep function and various other third-party software systems such as Tivoli systems, Big Fix and EZ GPO can help in power management
<b>CU2.</b> Use efficient Resource Management	<b>P1.</b> Turn off the computer when not using <b>P2.</b> Switch off the External Devices when not needed <b>P3.</b> Facilitate energy management <b>P4.</b> Use Devices which consume low energy <b>P5.</b> Use handheld equipment rather than PC's for basic tasks
<b>CU3.</b> Shift Towards Green IoT	<b>P1.</b> Produce electronic devices and electronic components/subsystems with minimal impact on the environment <b>P2.</b> Minimize the power consumption by technologies and other electronic devices <b>P3.</b> Enable the designing, analysis, and synthesis of green IOT computers, servers, and other related devices <b>P4.</b> Recycle old gadgets and unused electronic devices

### Knowledge and understanding

- Define the term IoT
- Describe the importance of green energy with respect to global warming
- Enlist any four appliances used in household for green energy
- Enlist any four techniques used for energy saving in industry

### Tools and Equipment

SN	Tools
1	Sensors (IR, temperature, pressure etc.)
2	Solar Panel
3	UPS
4	Battery

### Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- ✓ Use Power management techniques
- ✓ Use efficient Resource Management
- ✓ Shift Towards Green IoT

## **NOTIFICATION**

**No. F. 5(13)/2018-DD (TE):** In pursuance of sub-section (d) of section-6" Functions of the Commission" National Vocational & Technical Training Commission (NAVTTTC) Act-2011, NAVTTTC is pleased to approve and notify following qualifications in twenty (20) trades for Level 1-5 under National Vocational Qualification Framework (NVQF), which have been developed in compatibility with latest global trends in the fields and fulfilling requirements of competency based training and assessment (CBT&A) system. The qualifications have been developed and validated in collaboration with TEVTAs, QABs, industry and other relevant stakeholders: -

<b>S#</b>	<b>National Vocational Qualifications</b>
1.	National Qualification Level-5 diploma in Automobile Technology
2.	National Qualification Level-5 diploma in Civil Technology
3.	National Qualification Level-5 diploma in Construction Technology
4.	National Qualification Level-5 diploma in Information & Commutation Technology (ICT)
5.	National Qualification Level-5 diploma in Garment Manufacturing Technology
6.	National Qualification Level-5 diploma in Electrical Technology
7.	National Qualification Level-5 diploma in Electronics Technology
8.	National Qualification Level-5 diploma in Instrumentation Technology
9.	National Qualification Level-5 diploma in Computer Aided Design & Manufacturing (CAD /CAM)
10.	National Qualification Level-5 diploma in Mechanical Technology
11.	National Qualification Level-5 diploma in Graphics Designing
12.	National Qualification Level-5 diploma in Heating, Ventilation, Air-conditioning & Refrigeration (HVACR) Technology
13.	National Qualification Level-5 diploma in Media Production
14.	National Qualification Level-5 diploma in Hotel Management
15.	National Qualification Level-5 diploma in Professional Chef
16.	National Qualification Level-5 diploma in Tourism Management
17.	National Qualification Level-5 diploma in Hair & Beauty Services
18.	National Qualification Level-5 diploma in Fashion Designing
19.	National Qualification Level-5 diploma in Ceramics Technology
20.	National Qualification Level-5 diploma in Telecom Technology

2. All the TVET related institutions / organizations are required to implement aforementioned qualifications so that a uniform and standardized TVET qualification system is established in Pakistan and efforts are made for international equivalence / recognition of these qualifications.
3. Competency Standards of the above enlisted qualifications can be accessed at NAVTTC's website ([www.navttc.org](http://www.navttc.org)).



**(Muqeem Islam)**

Director General (Skill Standards & Curricula)

Phone: 051-9215385

**Distribution:**

1. Federal Secretary, Ministry of Federal Education & Professional Training, Govt of Pakistan
2. Federal Secretary, Ministry of Overseas Pakistanis and Human Resource Development, Govt of Pakistan, Islamabad
3. Federal Secretary, Ministry of Industry and Production, Govt of Pakistan, Islamabad
4. Federal Secretary, Ministry of Textile Industry, Govt of Pakistan, Islamabad
5. Federal Secretary, Ministry of Commerce, Govt of Pakistan, Islamabad
6. Federal Secretary, Ministry of Railway, Govt of Pakistan, Islamabad
7. Federal Secretary, Ministry of Climate Change, Govt of Pakistan, Islamabad
8. Federal Secretary, Ministry of Religious Affairs, Govt of Pakistan, Islamabad
9. Federal Secretary, Ministry of Communication, Govt of Pakistan, Islamabad
10. Federal Secretary, Ministry of Aviation Division, Govt of Pakistan, Islamabad
11. Federal Secretary, Ministry of Science & Technology, Govt of Pakistan, Islamabad
12. Chairperson, Punjab Technical Education and Vocational Training Authority (P-TEVTA), Lahore
13. Managing Director, Khyber Pakhtunkhwa Technical Education and Vocational Training Authority (KP-TEVTA),
14. Managing Director, Sindh Technical Education and Vocational Training Authority (S-TEVTA), Karachi
15. Chairman, Azad Jammu & Kashmir, Technical Education and Vocational Training Authority (AJ&K TEVTA), Muzafarabad
16. Director TVET Cell, Gilgit Baltistan, Gilgit
17. Director General, Punjab Vocational Training Council (PVTC), Punjab

18. Managing Director, Technology Upgradation and Skill Development Company (TUSDEC)  
Lahore
19. Project Director, Punjab Skill Development Program (PSDP) Lahore
20. CEO, Punjab Skill Development Fund, Lahore
21. Rector, UNTECH University Islamabad
22. National Deputy Leader, GIZ Islamabad
23. PS to Minister of Federal Education & Professional Training, Govt of Pakistan
24. PS to Special Adviser to the Prime Minister on Youth Affairs, Prime Minister's Office,  
Islamabad
25. Chairperson, Federal of Pakistan Chamber of Commerce and Industry (FPCCI), Karachi
26. Conveyor, Sector Skills Council (Textile/ Construction/ Renewable Energy/ Hospitality and  
Tourism)
27. Director Technical Education and Vocational Training Authorities (TEVTA), Balochistan
28. Chairman, Pakistan Tourism Development Corporation, Lahore
29. Chairman, PCSIR Headquarters, Islamabad
30. Director General, Pakistan Forest Institute, Peshawar
31. Chairman, Wafaq ul Madaris, Multan
32. Director General, Staff Welfare, Islamabad
33. Director General, NISTE Capital Administration and Development Division, Islamabad
34. Director General, National Training Bureau, Islamabad
35. Chairmen, Provincial Technical Education Boards
36. Chairmen, Provincial Trade Testing Boards
37. Secretary, IBCC, Islamabad: *with the request that National qualifications of Level 5 diploma  
in the aforementioned trades may be considered equivalent to Diploma of Associate  
Engineer/HSSC after inclusion of compulsory courses in the light of IBCC general  
requirement.*

**Copy for information to: -**

1. DG (P&D)/(A&F)/ (A&C) (S&C) NAVTTC
2. Director General(s), NAVTTC Regional Office(s).
3. Sr. Technical Advisor, TSSP-GIZ
4. Staff Officer to Chairman, NAVTTC
5. PS to Executive Director, NAVTTC Islamabad
6. Concerned File/ Office Copy