

Government of Pakistan

National Vocational and Technical Training Commission

Prime Minister Hunarmand Pakistan Program

"Skills for All"



Course Contents / Lesson Plan

Course Title: Advanced Auto CAD (Civil/Electrical)

Duration: 6 Months

Trainer Name	
Course Title	Advanced Auto CAD (Civil/Electrical)
Objectives and Expectations of the Course	<p>Objectives: To prepare the trainees to work as a Professional Product Designer/Programmer in a wide variety of product manufacturing-related industries and has a strong emphasis on Digital Manufacturing related problems.</p> <p>The overall objective of this program is to produce employees who can provide sufficient assistance to their supervisors in creating 3D AutoCAD drawings. Then certified of this program will also be able to become entrepreneurs. However, this will require providing additional input on entrepreneurship development for the one who is willing to start his/her own business. (Not included in the curriculum).</p> <p>The aim of the course for AutoCAD (Civil/Electrical) curriculum is to develop drawing related skills through practical (action-oriented work). Action orientation can be understood as the willingness and ability of a student to act in different situations in a socially responsible manner.</p> <p>Teaching staff will support the student in developing his/her willingness and ability, through their managerial, technical knowledge and capabilities, to solve tasks and problems that are goal-oriented. They will need to use student-centered, practical oriented methods. They will also need to develop a program of practical assessment that reflects the learning outcomes stated in this curriculum.</p> <p>The student will develop the ability as an individual to clarify issues, think through, and assess development opportunities. He/she should learn to consider requirements and constraints in day to day routine life and to develop his/her projects/products.</p> <p>Teaching staff will also support students in developing characteristics such as articulateness, assertiveness, prudent self-reliance, resilience, responsibility, and a sense of duty and negotiation tactics.</p> <p>This curriculum can serve as a quality improvement initiative geared to helping institution build their capacity to produce resources for AutoCAD. By leveraging the guided discussions, activities, resources, and other materials in these training, the participant will build his/her knowledge, skills, and abilities related to:</p> <ul style="list-style-type: none"> • Knowledge about 2D and 3D design environment • Differentiation between different types of layouts • Explanation of problem-solving techniques • Practical experience in designing drawings (Surfaces, Solids, Rendering)

- Understanding of the coordinates
- Ability to deal with clients
- Information about light functions
- Practical experience of command line usage
- Adequate presentation skills
- Team coordination skills

Main Expectations:

In short, the course under reference should be delivered by professional instructors in such a robust hands-on manner that the trainees are comfortably able to employ their skills for earning money (through wage/self-employment) at its conclusion.

This course thus clearly goes beyond the domain of the traditional training practices in vogue and underscores an expectation that a market-centric approach will be adopted as the main driving force while delivering it. The instructors should therefore be experienced enough to be able to identify the training needs for the possible market roles available out there. Moreover, they should also know the strengths and weaknesses of each trainee to prepare them for such market roles during/after the training.

i. Specially designed practical tasks to be performed by the trainees have been included in the Annexure-I to this document. The record of all tasks performed individually or in groups must be preserved by the management of the training Institute clearly labeling name, trade, session, etc so that these are ready to be physically inspected/verified through monitoring visits from time to time. The weekly distribution of tasks has also been indicated in the weekly lesson plan given in this document.

ii. To materialize the main expectations, a special module on Job Search & Entrepreneurial Skills has been included in the latter part of this course (5th & 6th month) through which, the trainees will be made aware of the Job search techniques in the local as well as international job markets (Gulf countries). Awareness around the visa process and immigration laws of the most favored labor destination countries also form a part of this module. Moreover, the trainees would also be encouraged to venture into self-employment and exposed to the main requirements in this regard. It is also expected that a sense of civic duties/roles and responsibilities will also be inculcated in the trainees to make them responsible citizens of the country.

iii. A module on Work Place Ethics has also been included to highlight the importance of good and positive behavior at the workplace in the line with the best practices elsewhere in the world. An outline of such qualities has been given in the Appendix to this document. Its importance should be conveyed in a format that is attractive and interesting for the trainees such as through PPT slides +short video documentaries. Needless to say that if the training provider puts his heart and soul into these otherwise non-technical components, the image of the Pakistani workforce would undergo a positive transformation in the local as well as international job markets.

To maintain interest and motivation of the trainees throughout the course, modern techniques such as:

- Motivational Lectures
- Success Stories
- Case Studies

These techniques would be employed as an additional training tool wherever possible (these are explained in the subsequent section on Training Methodology). Lastly, evaluation of the competencies acquired by the trainees will be done objectively at various stages of the training and a proper record of the same will be maintained. Suffice to say that for such evaluations, practical tasks would be designed by the training providers to gauge the problem-solving abilities of the trainees.

(i) Motivational Lectures

The proposed methodology for the training under reference employs motivation as a tool. Hence besides the purely technical content, a trainer is required to include elements of motivation in his/her lecture. To inspire the trainees to utilize the training opportunity to the full and strive towards professional excellence. Motivational lectures may also include general topics such as the importance of moral values and civic role & responsibilities as a Pakistani. A motivational lecture should be delivered with enough zeal to produce a deep impact on the trainees. It may comprise of the following:

- Clear Purpose to convey the message to trainees effectively.
- Personal Story to quote as an example to follow.
- Trainees Fit so that the situation is actionable by trainees and not represent a just idealism.
- Ending Points to persuade the trainees on changing themselves.

A good motivational lecture should help drive creativity, curiosity, and spark the desire needed for trainees to want to learn more.

The impact of a successful motivational strategy is amongst others commonly visible in increased class participation ratios. It increases the trainees' willingness to be engaged on the practical tasks for a longer time without boredom and loss of interest because they can see in their mind's eye where their hard work would take them in short (1-3 years); medium (3 -10 years) and long term (more than 10 years).

As this tool is expected that the training providers would make arrangements for the regular well planned motivational lectures as part of a coordinated strategy interspersed throughout the training period as suggested in the weekly lesson plans in this document.

Motivational sessions can be organized on the following topics or can be presented virtually; the links are mentioned in **Annex-II**.

- Work Ethics
- Problem Solving
- Communication

(ii) Success Stories

Another effective way of motivating the trainees is using Success Stories. Its inclusion in the weekly lesson plan at regular intervals has been recommended till the end of the training.

A success story may be disseminated orally, through a presentation or using a video/documentary of someone that has risen to fortune, acclaim, or brilliant achievement. A success story shows how a person achieved his goal through hard work, dedication, and devotion. An inspiring success story contains compelling and significant facts articulated clearly and easily comprehensible words. Moreover, it is helpful if it is assumed that the reader/listener knows nothing of what is being

	<p>revealed. The optimum impact is created when the story is revealed in the form of:-</p> <ul style="list-style-type: none"> • Directly in person (At least 2-3 cases must be arranged by the training institute) • Through an audio/ videotaped message (2-3 high-quality videos must be arranged by the training institute) <p>It is expected that the training provider would collect relevant high-quality success stories for inclusion in the training as suggested in the weekly lesson plan given in this document.</p> <p>The suggestive structure and sequence of a sample success story and its various shapes can be seen in Annexure-III.</p> <p>(iii) Case Studies</p> <p>Where a situation allows, case studies can also be presented to the trainees to widen their understanding of the real-life specific problem/situation and to explore the solutions.</p> <p>In simple terms, the case study method of teaching uses a real-life case example/a typical case to demonstrate a phenomenon in action and explain theoretical as well as practical aspects of the knowledge related to the same. It is an effective way to help the trainees comprehend in depth both the theoretical and practical aspects of the complex phenomenon in depth with ease. Case teaching can also stimulate the trainees to participate in discussions and thereby boost their confidence. It also makes the classroom atmosphere interesting thus maintaining the trainee interest in training till the end of the course.</p> <p>Depending on suitability to the trade, the weekly lesson plan in this document may suggest case studies be presented to the trainees. The trainer may adopt a PowerPoint presentation or video format for such case studies whichever is deemed suitable but only those cases must be selected that are relevant and of a learning value.</p> <p>The Trainees should be required and supervised to carefully analyze the cases. For the purpose, they must be encouraged to inquire and collect specific information/data, actively participate in the discussions, and intended solutions to the problem/situation.</p> <p>Case studies can be implemented in the following ways: -</p> <ol style="list-style-type: none"> i. A good quality trade-specific documentary (At least 2-3 documentaries must be arranged by the training institute) ii. Health & Safety case studies (2 cases regarding safety and industrial accidents must be arranged by the training institute) <p>Field visits(At least one visit to a trade-specific major industry/ site must be arranged by the training institute)</p> <p>AutoCAD Terminologies</p> <p>There are some basic terms that trainees will want to review before using AutoCAD. Some terms have links to give trainee more information; can be seen in Annexure-IV.</p>
<p>Learning Outcome of the Course</p>	<p>Knowledge Proficiency Details</p> <ul style="list-style-type: none"> • Knowledge of PLM (Product Lifecycle Management) principles and capabilities

	<p>with particular emphasis on the CAD (computer-aided design) & CAM (Computer Aided Manufacturing).</p> <ul style="list-style-type: none">• Knowledge of digitalizing the products manufacturing.• Knowledge of the DFM (Design for Manufacturing) & DFA (Design for Assembling)• Knowledge of programming on digital data through software, to machine a physical component. <p>Skills Proficiency Details</p> <ul style="list-style-type: none">• Ability to understand Design intent in the product, for applying in Manufacturing.• Hands-on experience to develop Solid Modeling and techniques.• Capable to apply concepts of parametric modeling with 3D surfacing and Understand geometric constraints.• Capable to apply concepts to develop drawings and techniques to apply GD&T (Geometric Dimensioning and Tolerances).• Able to understand and make Template drawings, Dimensioning methodology, 2D Orthographic Projections, Section and Auxiliary Views• Manufacturing methodology of product.• Able to perform programming of CNC turning and CNC Multi-Axis milling through CAM (Computer Aided Manufacturing) software.• Ability to generate cutting tool path and G&M codes file.• Capable of analyzing tool path defects, and detect gouges in CAM (Computer Aided Manufacturing) to secure component.
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<p>Course Execution Plan</p>	<p>The total duration of the course: 6 months (26 Weeks) Class hours: 4 hours per day Theory: 20% Practical: 80% Weekly hours: 20 hours per week</p> <p>Total contact hours: 600 hours</p>
<p>Companies Offering Jobs in the respective trade</p>	<ul style="list-style-type: none"> • Honda • Toyota • TUSDEC • GTDMC • KTDMC • BOSS • NDC (National Development Complex) • KotSteel Pvt Ltd • ZNJ hygienic • Pak Fan • AMTC • Super Asia • UAE CNC Industries • Magna Ind., • Alba Engineering Company • Anwar Khawaja Composites • Azeem Engineering • Boss Plastic • Fatima Fertilizer • Chenab Eng works & foundry • Qadbros Engineering (Pvt) Ltd. • Panther Tyres & Tubes • F.T.M.M • Green Land Engineering • PAEC

- Pak Fan (Wahid Ind)
- KSA CNC Industries
- OGDCL
- Darson Industries (Pvt) Ltd.
- Diamond Engineering Works
- Gondal Precasting Industries
- K.B. International
- Master Poly Plastic
- Mughal Engineering, Gujranwala
- Tariq Engineering Products
- Tetra Link Technologies
- Indus Plastic
- Packages Intl
- Manan Shahid Co.
- Climax
- Qatar CNC Industries
- SNGPL
- HMC
- SABRO Islamabad
- Shahsons Pakistan (Pvt) Ltd.
- Services Industries Ltd
- Spell Lahore
- Slandered Engineering
- Syed Engineering
- Faisal Sanitary
- KotSteel Pvt Ltd
- Tetra Link Technologies
- Omar Jibran Co.,
- FICO Co.,
- Oman CNC Industries
- Pakistan Railways

Job Opportunities	<p>Trainees can be employed in government / semi-government / private (MNC's) organizations. Experienced resources may advance through promotions with the same employer or by moving to more advanced positions with other employers. They can become:</p> <ul style="list-style-type: none"> • Product Designer • CAD Operator • Product developer • Draftsman • Assistant Architect • Associate Architect • Architect (Civil and Electrical) <p>There are good prospects of traveling within Pakistan and abroad. The employment outlook in this occupation will be influenced by a wide variety of factors including:</p> <ul style="list-style-type: none"> • Employment turnover (work opportunities generated by people leaving existing positions). • Occupational growth (work opportunities resulting from the creation of new positions that never existed before) • Size of the industry • The flexibility of the applicant (concerning the location and schedule of work).
No of Students	25
Learning Place	Classroom / Lab
Instructional Resources	<ul style="list-style-type: none"> • https://www.cadalyst.com/software-tutorials <p>CAD tips video gallery with clips that teach you how to perform specific tasks in AutoCAD.</p> <ul style="list-style-type: none"> • http://www.cadtutor.net/ <p>Tips and articles for AutoCAD, 3ds Max, and associated software applications.</p> <ul style="list-style-type: none"> • https://tutorial45.com/autocad-tutorial/ <p>Provides a set of free AutoCAD tutorials including practice exercises, lists of</p>

AutoCAD commands, 3D projects.

- <https://allaboutcad.com/blog/>

Several categories include drawing, editing, text and dimensions, 3D, plotting and presentation, troubleshooting, AutoCAD customization, and layers. With the number of resources available.

- <https://www.computeraideddesignguide.com/>

Computer-Aided Design Guide is a blog on all things CAD. Here you'll find all AutoCAD related articles organized into a comprehensive list that makes for a good free AutoCAD tutorial resource.

- <https://cadsetterout.com/>

The CAD Setter Out is another blog with all AutoCAD posts gathered under the AutoCAD tutorials category.

- <https://blocks.draftsperson.net/>

Draftsperson.net provides a set of free AutoCAD tutorials, tips and tricks, and articles.

- <https://www.cadoasis.com/>

Cad Oasis offers some free AutoCAD tutorials specifically designed to introduce AutoCAD functions to CAD users.

- <https://lynn.blogs.com/>

Lynn Allen's blog is an extremely valuable AutoCAD learning and news resource adequate for both beginners and experienced CAD users.

- <https://autocadtips1.com/>

AutoCAD Tips is a blog that provides helpful AutoCAD tips for everyday users.

- <https://www.cad-notes.com/category/autocad/>

This blog is a treasure trove of AutoCAD learning material.

- <https://thecadgeek.com/>

The CAD Geek aims to empower CAD professionals with informative and timely posts on AutoCAD and other CAD software.

- <https://through-the-interface.typepad.com/>

Through the Interface is one of Autodesk's blogs with over 900 articles on AutoCAD.

- <https://beingcivil.typepad.com/>

Being Civil is one of AutoDesk's blogs on AutoCAD Civil 3D.

Scheduled Week	Module Title	Learning Units	Remarks
Week 1	Introduction	<ul style="list-style-type: none"> • Motivational Lecture (<i>For further detail please see Page No: 4 and Annex-II</i>) • Course Introduction • Success stories (<i>For further detail please see Page No: 4&5 and Annex-III</i>) • Job market • Course Applications • Institute/work ethics 	Home Assignment & Task – 1 Task – 2 <i>(For details, please see Annex-I)</i>
Week 2	Introduction to AutoCAD Part-1	<ul style="list-style-type: none"> • The interface of Auto CAD • Application of Auto CAD in Engineering • Installation of Auto CAD • Creating file, drawing units, and drawing setting • Description of Menus & Toolbars • Save AutoCAD drawing files in different file formats (DWG, PDF, JPG). • Types of Coordinate System • Dimensions & Text • 2d and 3d Commands 	Task – 3 Task – 4 Task – 5 Task – 6 <i>(For details, please see Annex-I)</i>
Week 3	Introduction to AutoCAD Part-2	<ul style="list-style-type: none"> • Practice to Install Auto CAD, create, copy, rename, save & delete files • Practice to apply Drafting setting, i.e. Dimension style, Text style & height, units, Drawing Limits 	Task – 7 Task – 8 Task – 9 <i>(For details,</i>

		<ul style="list-style-type: none"> • Practice to prepare A4, A3, A2, A1 size typical drawing Layout Templates • Practice to apply Coordinate system to Draw different Geometrical Shapes (Quadrilaterals, triangle, Regular Polygons, Circle, ellipse)By using Draw Toolbar & Command Aliases • Practice to apply Coordinate system to Draw mechanical parts By using of Draw Toolbar & Command Aliases • Practice to use Standard & Modify Tool Bar to Modify Objects and Command Aliases • Practice to use Dimension Tool Bar &Command Aliases 	<i>please see Annex-I)</i>
Week 4	Prepare the Final Set of 2D Drawings	<ul style="list-style-type: none"> • Use appropriate command and tools to develop 2D Drawing • Develop 2D Drawing with given project specifications and measurements • Create a title block layout as required • Plot drawing on a scale according to required size and orientation 	Task – 10 Task – 11 Task – 12 <i>(For details, please see Annex-I)</i>
Week 5	Fundamentals of Engineering Drawing	<ul style="list-style-type: none"> • Motivational Lecture <i>(For further detail please see Page No: 4 and Annex-II)</i> • Draw types of Lines • Draw types of Angles • Draw types of Geometrical Shapes (Quadrilateral, Circle, Triangle, Polygon, Geometrical Solids) 	Task – 13 Task – 14 Task – 15 Task – 16 Task – 17 <i>(For details,</i>

			<i>please see Annex-I)</i>
Week 6	Orthographic Projection	<ul style="list-style-type: none"> • Basic Principles of Orthographic projection • Detailing of views (3d Drawings) 	Task – 18 Task – 19 <i>(For details, please see Annex-I)</i>
Week 7	Develop 3D Objects	<ul style="list-style-type: none"> • Setup & save 3D Drawing Interface for required specifications • Setup 3D User Interface settings for required specifications • Create 3D Objects with given measurements • 3D Modeling in AutoCAD, 3D solids, Surfaces o Meshes o Wireframe Objects, Differentiate between Surface Modeling and Solid Modeling, 3D Face and Edges 	Task – 20 Task – 21 Task – 22 Task – 23 Task – 24 <i>(For details, please see Annex-I)</i>
Week 8	Manipulate 3D Objects 3D Editing Tools	<ul style="list-style-type: none"> • Modify 3D Objects in line with the requirements • Make customized 3D Models according to the requirements of the given job • Convert 3D Face Objects into Single Mesh Objects 	Task – 25 Task – 26 Task – 27 <i>(For details, please see Annex-I)</i>
Week 9	Render 3D Model Part-1	<ul style="list-style-type: none"> • Motivational Lecture <i>(For further detail please see Page No: 4 and Annex-II)</i> 	Task – 28 Task – 29

		<ul style="list-style-type: none"> • Apply the material to the required 3D Model as per the given specifications • Apply lights to get the requisite scene of the required 3D model • 	Task – 30 <i>(For details, please see Annex-I)</i>
Week 10	Render 3D Model Part-2	<ul style="list-style-type: none"> • Assign cameras to execute different views of required 3D Model • Render and print the 3D model according to the required size and orientation 	Task – 31 Task – 32 <i>(For details, please see Annex-I)</i>
Week 11	Plan, Elevation & Section Part -1	<ul style="list-style-type: none"> • Introduction of Types of Text • Blocks • Symbols • Design Library 	Task – 33 Task – 34 Task – 35 <i>(For details, please see Annex-I)</i>
Week 12	Plan, Elevation & Section Part -2	<ul style="list-style-type: none"> • Practice to insert Text, symbols, fixtures from Design Library in the Drawing 	Task – 36 Task – 37 <i>(For details, please see Annex-I)</i>
Week 13	3D Solids, views & Rendering	<ul style="list-style-type: none"> • Motivational Lecture <i>(For further detail please see Page No: 4 and Annex-II)</i> • Introduction to Rendering its features(shadows, lights) 	Task – 38 Task – 39 Task – 40

		<ul style="list-style-type: none"> • Introduction to camera 	Task – 41 Task – 41A <i>(For details, please see Annex-I)</i>
Week 14	3D Solids, views & Rendering	<ul style="list-style-type: none"> • Practice to draw 3D rendered view of the following; Office chair, Office table, Rostrum, Round Table, Book Rack, sofa & bed, etc 	Task – 42 Task – 43 Task – 44 Task – 45 Task – 46 <i>(For details, please see Annex-I)</i>
Week 15	Mid-Term Assignment/Exam		Task – 47 <i>(For details, please see Annex-I)</i>
Week 16	Electrical Schematic Drawing	<ul style="list-style-type: none"> • Wire Numbers • Component Tagging • Electrical control circuits • Schematic symbol libraries editing commands 	Task – 48 Task – 48A <i>(For details, please see Annex-I)</i>
Week 17	Working with PLC	<ul style="list-style-type: none"> • Motivational Lecture <i>(For further detail</i> 	Task – 49

	symbols	<p><u>please see Page No: 4 and Annex-II)</u></p> <ul style="list-style-type: none"> • Insert PLC (Parametric) • Insert PLC(full units) • Insert Individual PLC I/O points 	<p>Task – 50</p> <p><i>(For details, please see Annex-I)</i></p>
Week 18	Creating Custom Symbols	<ul style="list-style-type: none"> • Creation of Schematic symbols • Naming conversion • Icon menu wizard • Auto CAD Electrical database 	<p>Task – 51</p> <p><i>(For details, please see Annex-I)</i></p>
Week 19	Submission Drawing Civil	Prepare presentation Drawing of a Residential Building	<p>Task – 52</p> <p><i>(For details, please see Annex-I)</i></p>
Week 20	Submission Drawing Civil	Prepare presentation Drawing of a Residential Building	<p>Task – 53</p> <p><i>(For details, please see Annex-I)</i></p>
Week 21	<p>Employable Project/Assignment (6 weeks i.e. 21-26) besides regular classes.</p> <p>OR</p>	<ul style="list-style-type: none"> • Motivational Lecture <i>(For further detail please see Page No: 4 and Annex-II)</i> • Guidelines to the Trainees for selection of students employable project like final year project (FYP) • Assign Independent project to each Trainee 	<p>Task – 54</p> <p>Task – 55</p> <p>Task – 55A</p> <p><i>(For details,</i></p>

	<p>On the job training (2 weeks)</p>	<ul style="list-style-type: none"> • A project-based on trainee’s aptitude and acquired skills. • Designed by keeping in view the emerging trends in the local market as well as across the globe. • The project idea may be based on entrepreneurs. • Leading to successful employment. • The duration of the project will be 6 weeks • Ideas may be generated via different sites such as: <ul style="list-style-type: none"> • https://1000projects.org/ • https://nevonprojects.com/ • https://www.freestudentprojects.com/ • https://technofizi.net/best-computer-science-and-engineering-cse-project-topics-ideas-for-students/ • Final viva/assessment will be conducted on project assignments. • At the end of the session, the project will be presented in a skills competition • The skill competition will be conducted on zonal, regional, and national levels. • The project will be presented in front of Industrialists for commercialization • The best business idea will be placed in the NAVTTC business incubation center for commercialization. • ----- <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • On the job training for 2 weeks: 	<p><i><u>please see Annex-I)</u></i></p>
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		<ul style="list-style-type: none"> • Aims to provide 2 weeks of industrial training to the Trainees as part of the overall training program • Ideal for the manufacturing trades • As an alternative to the projects that involve expensive equipment • Focuses on increasing Trainee’s motivation, productivity, efficiency, and quick learning approach. 	
Week 22	Terminal Plan Drawing	<ul style="list-style-type: none"> • Insert Terminal symbols • Multiple level Terminal • Insert Terminals • DIN Rail command 	Task – 56 <i>(For details, please see Annex-I)</i>
Week 23	Electrical Drawing	<ul style="list-style-type: none"> • Panel layout • Creating a drawing of Electrical circuits & control • Managing & uploading the electrical design 	Task – 57 Task – 58 <i>(For details, please see Annex-I)</i>
Week 24	Presentation Drawing Electrical	<ul style="list-style-type: none"> • Prepare presentation Drawing of an Electrical circuit 	Task – 59 <i>(For details, please see Annex-I)</i>
Week 25	Submission Drawing	<ul style="list-style-type: none"> • Motivational Lecture <i>(For further detail</i> 	Task – 60

	Electrical	<p><i>please see Page No: 4 and Annex-II)</i></p> <ul style="list-style-type: none"> • Introduction & components of Submission Drawing 	<p>Task – 61</p> <p><i>(For details, please see Annex-I)</i></p>
Week 26	Entrepreneurship and Final Assessment in project	<ul style="list-style-type: none"> • Job Market Searching • Self-employment • Freelancing sites • Introduction • Fundamentals of Business Development • Entrepreneurship • Startup Funding • Business Incubation and Acceleration • Business Value Statement • Business Model Canvas • Sales and Marketing Strategies • How to Reach Customers and Engage CxOs • Stakeholders Power Grid • RACI Model, SWOT Analysis, PEST Analysis • SMART Objectives • OKRs • Cost Management (OPEX, CAPEX, ROCE, etc.) • Final Assessment 	<p>Task – 62</p> <p>Task – 63</p> <p>Task – 64</p> <p>Task – 65</p> <p>Task – 66</p> <p>Task – 67</p> <p>Task – 68</p> <p>Task – 69</p> <p><i>(For details, please see Annex-I)</i></p>

Annexure-I:
Tasks For Certificate in Advanced Auto CAD (Civil/Electrical)

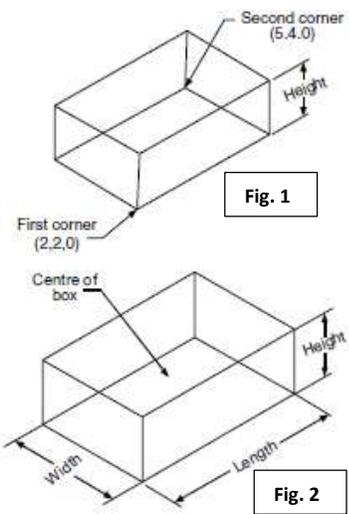
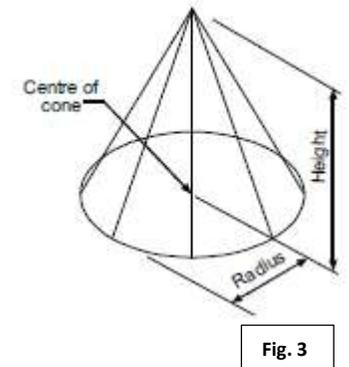
Task No.	Task	Description	Week
1	Introduction	<ul style="list-style-type: none"> • Course Introduction • Success stories <i>(For further detail please see Page No: 4&5 and Annex-III)</i> • Job market • Course Applications • Take ownership of the decisions/actions he/she makes or fails to make and their consequences. (Role Play) • Show high regard for resources entrusted to him/her. Including subordinates, tangible assets (equipment), company profile. • Make decisions and act impartially/objectively free from self-interest. (Quantified Self-assessment can be performed e.g. case study.) The area like a conflict of interest • Understand the truth and act truthfully in conduct/communication e.g. daily attendance register. 	Week-1
2	Demonstrate Ethics and Professional Conduct	<ul style="list-style-type: none"> • Motivational Lecture <i>(For further detail please see Page No: 4 and Annex-II)</i> 	
3	Using and Install AutoCAD software	<ul style="list-style-type: none"> • Install the latest software version of AutoCAD. • Create New Template • Save the File 	
4	Create basic manual shapes	<ul style="list-style-type: none"> • Draw single stroke capital vertical lettering • Draw single stroke capital inclined lettering • Draw horizontal, vertical, and inclined lines • Draw circles, half-circles, radius with the compass • Draw Lines 	Week-2

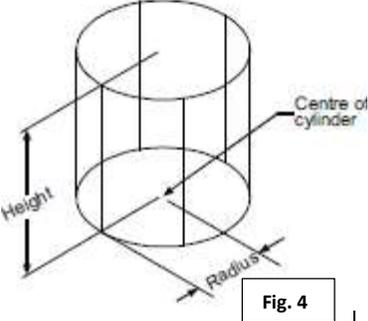
Task No.	Task	Description	Week
		<ul style="list-style-type: none"> • Draw round corners, circles elements, quadrilaterals inside, and outside the circle. • Construct angles and triangles 	
5	Create a New File and Create Basic Drawings	<ul style="list-style-type: none"> • Create Drawing • Select/Set units (ISO/BS) as per requirements • Select/Set Text type and its size as per requirement • Select Coordinate System as per requirements • Draw a rectangle using the line command • Draw an ARC • Draw a circle with the given requirements • Draw a circle with the 3-P touching the outer corner of the Equilateral Triangle. • Use the Erase Command 	
6	Working with toolbar and menu	<ul style="list-style-type: none"> • Creating new toolbar • Placing commands to a toolbar • Loading toolbar • Working with menu • Arranging menu in workspace • Contextual menu 	
7	Create a drawing sheet	<ul style="list-style-type: none"> • Select the drawing units (ISO/BS) from the menu as per the requirements. • Prepare A4, A3, A2, A1 size typical drawing Layout Templates • Prepare a Drawing sheet. • Select the tools according to the task. • Draw Boundaries lines as per standards. 	
8	Draw basic geometrical shapes	<ul style="list-style-type: none"> • Make a title bar • Draw plan view, front view, and side view of 1st angle for orthographic projection • Draw plan view, front view, and side view of 3rd angle for orthographic projection • Draw a rectangle using the line command • Draw an ARC by using the ARC command • Draw a circle with the radius and dia value. • Draw a circle with a 3-Point touching the outer corner of the Equilateral Triangle. 	Week-3

Task No.	Task	Description	Week
		<ul style="list-style-type: none"> • Draw a circle with Ttr (Tangent, Tangent Radius) option in circle command. • Draw a Hexagon with Inscribe and Circumscribe option in a polygon command. • Draw an Ellipse with the ellipse command. 	
9	Construct Multi-View Drawings by using draw tool and commands in AutoCAD	<ul style="list-style-type: none"> • Sketch Orthographic projection in 1st angle of Projection • Sketch Orthographic projection 3rd angle of Projection • Sketch Oblique Drawing • Construct multi-view drawing of Simple Bearing • Construct multi-view drawing of open Bearing • Draw pyramid. 	
10	Control the displays in drawings	<ul style="list-style-type: none"> • Create and save AutoCAD drawing files. • Create a title block layout as required • Use the AutoCAD visual reference commands. i.e. <ul style="list-style-type: none"> ○ Precision ○ Zoom Extent ○ Drawing LIMITS ○ Status Bar ○ GRID Display ○ PAN Realtime 	
11	Create basic drawings	<ul style="list-style-type: none"> • Draw using Line and Circle commands • Define Positions using the Basic Entry methods. • Format • Units Setup • LINE command • Coordinates • Interactive Input method • SNAP Option • World space • User coordinate system • World coordinate system • UCS icon Display • TTR, circle • Relative Coordinate • Coordinate systems • Cartesian coordinate system • Absolute coordinates • Positions, defining • LINE, Close option 	Week-4

Task No.	Task	Description	Week
		<ul style="list-style-type: none"> • CIRCLE command • TTT, circle • ARC command 	
12	Manipulate objects as desire	<ul style="list-style-type: none"> • Use the ERASE command • Use the AutoCAD Pan Real-time option • Select window 	
13	Demonstrate Ethics and Professional Conduct	<ul style="list-style-type: none"> • Motivational Lecture <i>(For further detail please see Page No: 4 and Annex-II)</i> 	
14	Fundamentals of Engineering Drawing	<ul style="list-style-type: none"> • Drawing Instruments and Sheet Layout • Types of lines and freehand sketching • Lettering and methods of dimensioning 	
15	GEOMETRICAL CONSTRUCTION	<ul style="list-style-type: none"> • Polygon • Bisecting a Straight Line • To Divide a Line Into Any Number of Equal Parts • To Bisect an Angle between two Given Lines • To Draw an arc Tangential To Lines 	Week-5
16	Draw types of Geometrical Shapes	<ul style="list-style-type: none"> • Construction of Regular Pentagons • Construction of Regular Hexagon • Construction of Regular Octagon • Conic Section • Ellipse • Circle • Quadrilateral 	
17	Scales	<ul style="list-style-type: none"> • Introduction to scale • Size of Scale • Units of Measurements • Representative Fraction (R.F.) 	
18	Orthographic Projection	<ul style="list-style-type: none"> • Introduction to Projection • Methods of Projection • Orthographic Projection • Types of Orthographic Projection • Selection of Views • Spacing of Views 	
19	Detailing of views (3d Drawings)	<ul style="list-style-type: none"> • Introduction to Isometric • Axonometric Projection • Isometric Projection 	Week-6

Task No.	Task	Description	Week
		<ul style="list-style-type: none"> • Isometric View • Isometric Scale • Construction of Isometric Scale • Methods of Making an Isometric Projection or View • Some Important Terms • Isometric Projection of a Circle • Isometric Projection of the Sphere 	
20	3D Basics interface	<ul style="list-style-type: none"> • Introduce 3D Basic Ribbons including Create, Edit, Draw, Modify, Selection, Coordinates, Layers, and Views. • Execute steps involved in executing Pull-down menus that include Home, Render, Insert, Manage, Output, Plugins, online, and Express Tools. • Explain 3D Cartesian coordinates against the 3DPOLY command by specifying start and endpoints. • Describe the process to track in the Z direction by “O Snap” tracking or F11 key and “Polar” tracking or F10 key. 	
21	Setup to create 3D Objects	<ul style="list-style-type: none"> • Apply 3D Modeling panels including Modeling, Mesh, Solid, Editing, Draw, Modify, Section, Coordinates, View, Selection, Layers, and Groups. • Explain steps of applying 3D Modeling Pull down menus that are Home, Solid, Surfaces, Mesh, Render, Parametric, Insert, Annotate, View, Manage, Output, Plugins, Online, and Express Tools. • Viewports (VPORTS command), preset 3D Viewports, and Named Views. • Apply the technique to track the cursor (Steering Wheel) over wedge as full navigation wheel, view object wheel, orbit, walk up/down, rewind, and it's 	Week-7

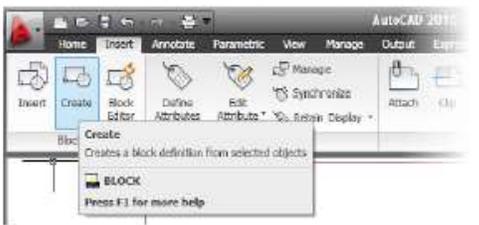
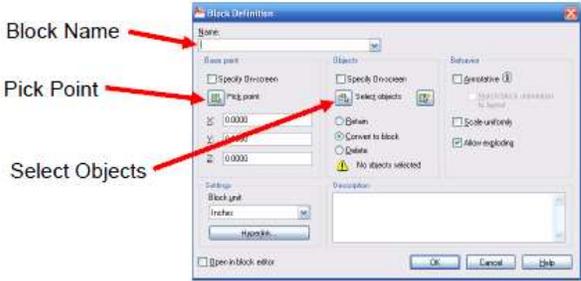
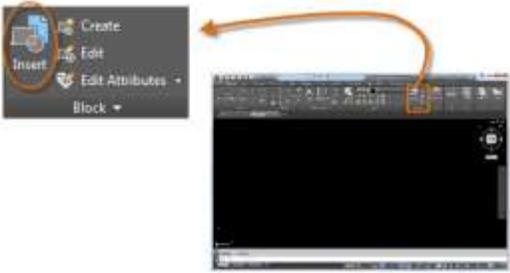
Task No.	Task	Description	Week
		<p>setting.</p> <ul style="list-style-type: none"> Execute the “Thickness” command at the command prompt with different values or modify the general properties of an object. Execute the “Elev” command at the command prompt with different values. 	
22	<p>Create 3D Object (Box)</p>  <p>Fig. 1</p> <p>Fig. 2</p>	<p>Create Box: Trainee can use the box command to create a solid rectangular box or cube. Start a new file by the acad3D.dwt template file. In 3D drawing templates, dynamically preview the operations that are performing.</p> <p>(ii) By two corner options [Fig. 1]</p> <ul style="list-style-type: none"> Specify first corner or [centre] <0, 0, 0> : 2, 2, 0 Specify other corner or [Cube/Length] : @ 5, 4, 0 Specify height or [2 point] : 3 <p>(ii) Centre length option [Fig. 2]</p> <ul style="list-style-type: none"> Specify first corner or [centre] <0, 0, 0> : C Specify other centre <0, 0, 0> : 4, 4 Specify corner or [cube/length] : L Specify length : 7 Specify width : 5 Specify height : 3 	
23	<p>Create 3D Object (Cone)</p>  <p>Fig. 3</p>	<p>Create a Cone: CONE command creates a solid cone with an elliptical or circular base. This command provides, the option of defining the cone height or the location of the cone apex. Defining the location of the apex will also define the height of the cone and the orientation of the cone base from the XY plane as shown in [Fig. 3].</p> <ul style="list-style-type: none"> Specify centre point for base or [3P/2P/Ttr/Elliptical] <0, 0, 0> : specify the centre of the base. Specify base radius or [Diameter] < default > : specify the radius or Enter D to specify the diameter of the cone specify height or [2 Point/Axis/end point/Top radius] <default>: Specify the height of the cone or enter an option or press the ENTER KEY to accept the default value. 	

Task No.	Task	Description	Week
24	<p>Create 3D Object (Cylinder)</p>  <p>Fig. 4</p>	<p>Create Cylinder: The CYLINDER command is used to create a solid cylinder. Similar to the CONE command, this command provides two options for creating the cylinder. Circular cylinder and elliptical cylinder. This command also allows defining the height of the cylinder or choosing from the 2 point or Axis endpoint options. <i>Circular cylinder</i> [Fig. 4]</p> <ul style="list-style-type: none"> • <i>Specify center point of base or [3P/2P/Ttr/Elliptical]<0, 0, 0>: Specify the location of the center point or choose one of the options.</i> • <i>Specify base radius or [Diameter] <default> : Specify the radius or choose the option for specifying the diameter.</i> • <i>Specify the height of the cylinder or [2 Point/Axis/end point]< default >: specify the height of the cylinder or choose an option.</i> 	
25	<p>Define Edit 3D objects</p>	<ul style="list-style-type: none"> • Explore different methods to convert the object/drawing to Solid or Surface. • Operate the Solid using 3D Move, Rotate, Align, Mirror, and Array. • Apply different edge effects or extract edges. 	
26	<p>Edit 3D objects</p>	<ul style="list-style-type: none"> • Convert polylines and circles with thickness to 3D solids using the “convtosolid” command. • Convert polylines and circles with thickness to surfaces using the “convtosurface” command. • Edit the existing solids through <ul style="list-style-type: none"> ○ 3D Move ○ 3D Rotate ○ 3D Align ○ 3D Mirror ○ 3D Rectangular Array ○ 3D Polar Array ○ command. 	<p>Week-8</p>

Task No.	Task	Description	Week
27	Manipulate 3D Objects	<ul style="list-style-type: none"> • Adjust the smoothness of shaded and rendered objects using “FACETRES” command with a valid values range. • Apply “ISOLINES” and “REGEN” command to regenerate the 3D drawing in 3D view. 	
28	Demonstrate Ethics and Professional Conduct	<ul style="list-style-type: none"> • Motivational Lecture <i>(For further detail please see Page No: 4 and Annex-II)</i> 	
29	Execute Rendering	<ul style="list-style-type: none"> • Create a photorealistic or realistically shaded image of a three-dimensional wireframe or solid model using the “Render” command. • Determine the output site that the renderer uses to display the rendered image using the “RPERF” command and selecting “Destination”. • Determine the output quality that the renderer uses to display the rendered image using the “RPERF” command and selecting “Quality level” 	Week-9
30	The setting of Render 3D Model	<ul style="list-style-type: none"> • Control the parts of the model that gets processed during rendering for the following three settings: i.e. <ul style="list-style-type: none"> ○ View ○ Crop ○ Selected • Render cropped window using “RPERF” command and selecting “Procedure” • Execute the process to render to File and Turn off Render to File. • Use environmental features to set up atmospheric effects or background images using the “RENDER 	

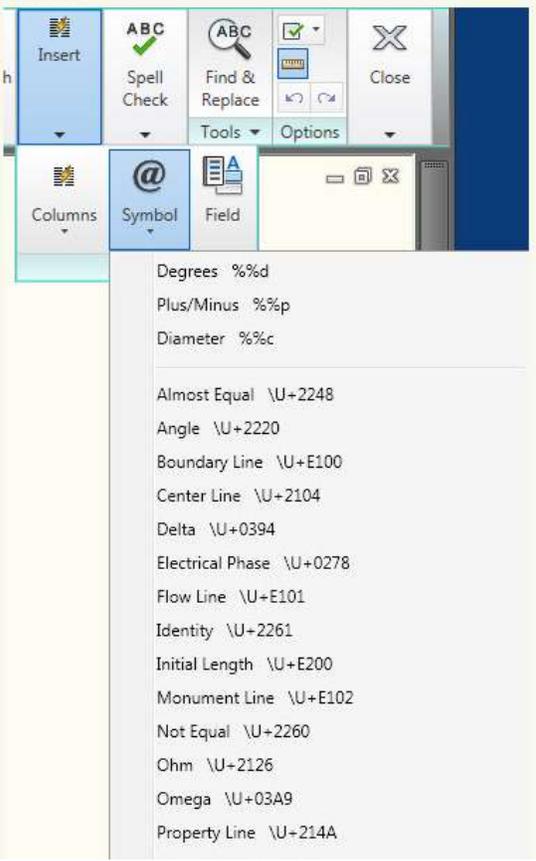
Task No.	Task	Description	Week
		ENVIRONMENT” command.	
31	Apply background on object	<ul style="list-style-type: none"> • Apply the following Backgrounds: i.e. <ul style="list-style-type: none"> ○ Single color ○ Multicolor gradient ○ Bitmap image Using the “View” command and later selecting “New”. • Define settings that affect how materials are handled by the renderer as : <ul style="list-style-type: none"> ○ Apply Materials ○ Texture Filtering ○ Force 2 – Sided • Execute how renderer controls sampling by allocating values to; <ul style="list-style-type: none"> ○ Min Samples ○ Max Samples ○ Filter Type ○ Filter Width and Filter Height ○ Contrast color ○ Contrast Alpha 	Week-10
32	Render and print the 3D model	<ul style="list-style-type: none"> • Apply settings that affect how shadows appear in the rendered image in Simple, Sort, or Segment modes. • Apply settings that affect the shading of a rendered image (Ray tracing) with the following options; i.e. <ul style="list-style-type: none"> ○ Enable ○ Max Depth ○ Max Reflection ○ Max Refraction • Show how the scene is illuminated with the following 	

Task No.	Task	Description	Week
		options: i.e. <ul style="list-style-type: none">○ Enable○ Radius○ Max Depth○ Max Reflection○ Max Refraction	

Task No.	Task	Description	Week
33	Create Block	<ul style="list-style-type: none"> • Introduction to block in AutoCAD • Using the Block Command.   <ul style="list-style-type: none"> • Insert a Block  <ul style="list-style-type: none"> • Create a Block Definition 	Week-11
34	Insert Symbols	<ul style="list-style-type: none"> • In the In-Place Text Editor, right-click and click Symbol. • On the expanded Text Formatting toolbar, click Symbol. 	

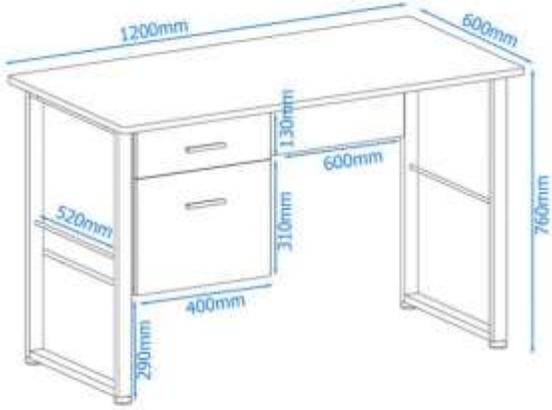
Task No.	Task	Description	Week
		<ul style="list-style-type: none"> • Copy and paste from the Character Map. • Enter the control code or Unicode string. <p>Note: Precede the Unicode string with a backslash (\).</p>	
35	Design Library	<ul style="list-style-type: none"> • Click View tab > Palettes panel > DesignCenter > find  • Load a Symbol Library into DesignCenter • Load Hatch Patterns into DesignCenter 	
36	Practice to insert Text & Symbols	<ul style="list-style-type: none"> • In the In-Place Text Editor, right-click and click Symbol. • On the expanded Text Formatting toolbar, click Symbol. • Copy and paste from the Character Map. • Enter the control code or Unicode string. Note: Precede the Unicode string with a backslash (\). 	
37	AutoCAD Control Codes and Special Text Characters	<ul style="list-style-type: none"> • It used to be pretty tough to get special characters into your text in AutoCAD. You had to use %% or other tricks to get it done. Some may still use these “inline” tricks or you could use the menus. • May use Unicode • When entering text, you can create special characters, including the degree symbol, plus/minus tolerance symbol, and the diameter symbol, by entering the following Unicode character strings: <ul style="list-style-type: none"> • \U+00B0 = Degrees symbol (°) • \U+00B1 = Tolerance symbol (±) • \U+2205 = Diameter symbol • Better yet – Use %% – this is a more standard way to enter special characters 	Week-12

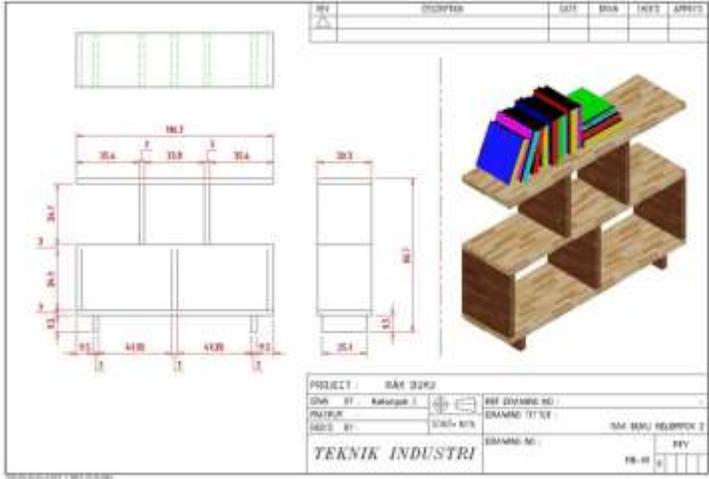
Task No.	Task	Description	Week
		<ul style="list-style-type: none"> • In addition to using Unicode characters for entering special characters, you can also overscore text, underscore text, or insert a special character by including control information in the text string. Use a pair of percent signs to introduce each control sequence. • You can use this control code with standard AutoCAD text fonts and Adobe PostScript fonts: • %%nnn – Draws character number nnn. • NOTE: You can use these control codes with standard AutoCAD text fonts only: • %%o – Toggles overscoring on and off. • %%u – Toggles underscoring on and off. • %%d – Draws degrees symbol (°). • %%p – Draws plus/minus tolerance symbol (±). • %%c – Draws circle diameter dimensioning symbol. • What if I want the % sign??? • %%% – Draws a single percent sign (%). This is valid for the TEXT command only. • Overscoring and underscoring can be in effect at the same time. Both turn off automatically at the end of the text string. • You can use the %%nnn control sequence to display special characters using the PostScript fonts. • You can also get most of these off the MTEXT menu now. 	

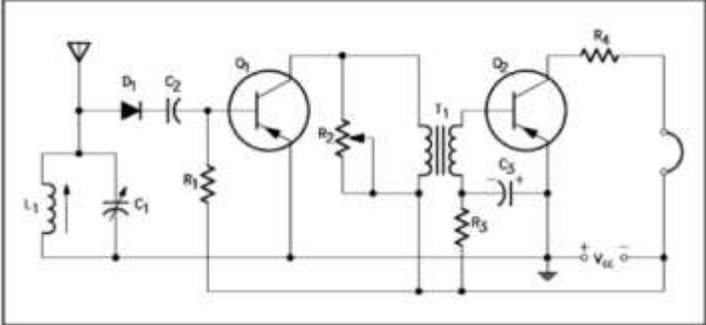
Task No.	Task	Description	Week
			
38	Demonstrate Ethics and Professional Conduct	<ul style="list-style-type: none"> • Motivational Lecture (<i>For further detail please see <u>Page No: 4 and Annex-II</u></i>) 	
39	Set Camera	<ul style="list-style-type: none"> • Change Camera Lens Length <ul style="list-style-type: none"> ○ Click the camera glyph. ○ Click and drag a Lens Length/FOV grip. ○ Move the cursor and click where you want to position the lens and press Enter. • Set Camera Clipping Panes <ul style="list-style-type: none"> ○ Double-click the camera whose clipping planes you want to set. ○ In the Properties palette, Clipping section, Clipping option, select Front On, Back On, or 	Week-13

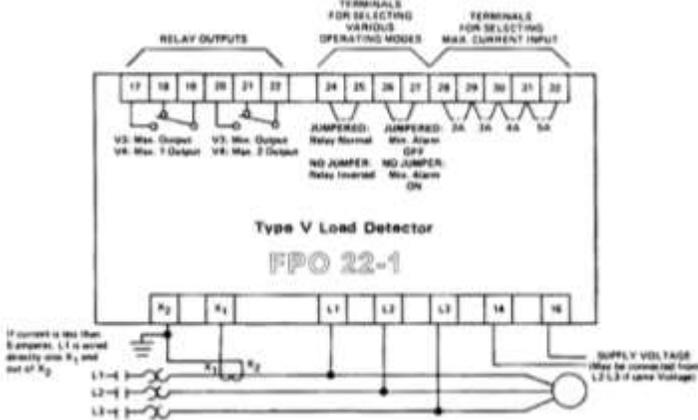
Task No.	Task	Description	Week
		<p>Front and Back On.</p> <ul style="list-style-type: none"> ○ In the Front Plane or Back Plane option, enter numeric values and press Enter ● Rename a Camera <ul style="list-style-type: none"> ○ Double-click a camera glyph. ○ In the Properties palette, under Camera, enter a new name and press Enter ● Change Camera Location <ul style="list-style-type: none"> ○ Click and drag a camera glyph, click again to place the camera, and press Enter. ● Change Camera Target <ul style="list-style-type: none"> ○ Click the camera glyph whose target you want to change. ○ Click the Target Distance grip tool (the blue grip in the center), drag it to the new location, click to place the target, and press Enter. ● Specify Whether Camera Glyphs Plot <ul style="list-style-type: none"> ○ Double-click a camera. ○ In the Properties palette, Camera sections, Plot option, click Yes or No. 	
40	Customize Rendering, Shadows, and Lights	<ul style="list-style-type: none"> ● Create a photorealistic or realistically shaded image of a three-dimensional wireframe or solid model using the “Render” command. ● Determine the output site that the renderer uses to display the rendered image using the “RPERF” command and selecting “Destination”. ● Determine the output quality that the renderer uses to display the rendered image using the “RPERF” 	Week-13

Task No.	Task	Description	Week
		command and selecting “Quality level”.	
41	Apply Lights	<ul style="list-style-type: none"> • Turn On/Off the default Lighting using the “DEFAULTLIGHTING” command. • Execute command “POINTLIGHT” that radiates light in all directions from its location. • Execute command “SPOTLIGHT” that emits a directional cone of light. • Modify Lights in a drawing using the “LIGHTLIST” command. • Customize Photometric (light energy” light for lighting units, Luminaries, Weblight, Halogen effect, Candela intensity, etc. • Apply the available functionality of the Lights tool palette by pressing CTRL+3. • Display uniform parallels light rays in one direction only using the “DISTANTLIGHT” command and mentioning from and to points. • Incorporate natural light based on climate into the drawing by specifying the latitude and longitude of a location for the sunlight using the “GEOGRAPHICLOCATION” command. • Adjust the Sun properties using the “SUNPROPERTIES’ command. 	
41A	Build your CV	<p>Download professional CV template from any good site (https://www.coolfreecv.com or relevant)</p> <ul style="list-style-type: none"> • Add Personal Information • Add Educational details • Add Experience/Portfolio • Add contact details/profile links 	Week 13 onwards

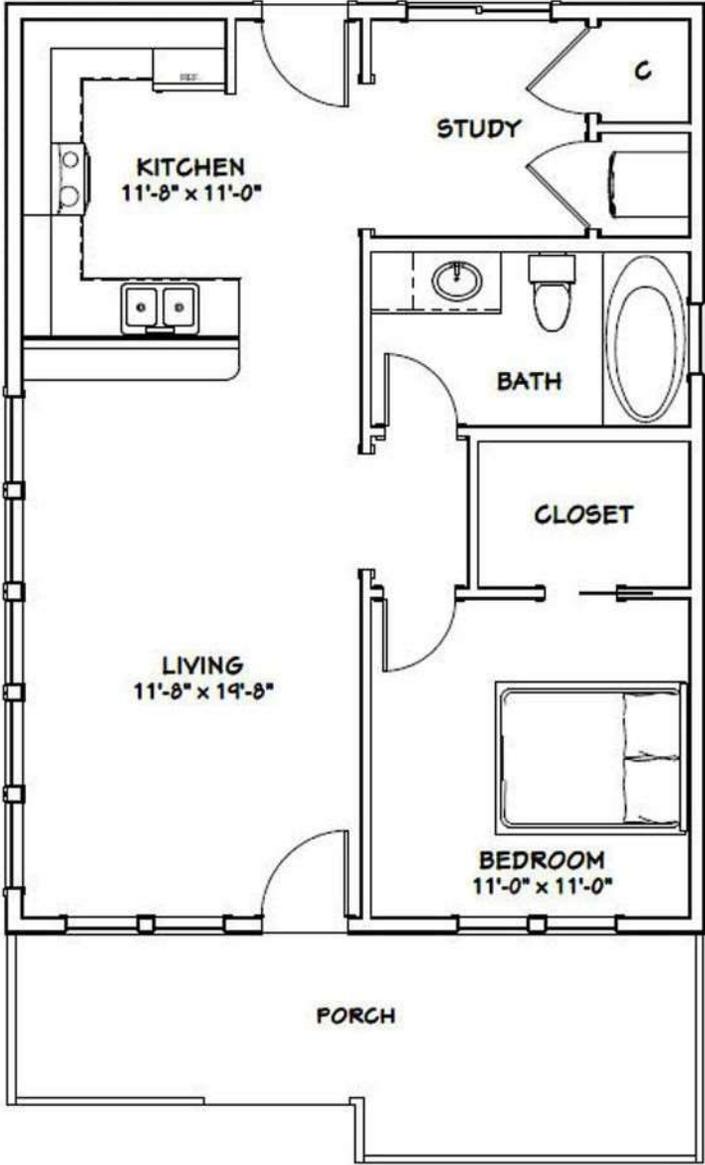
Task No.	Task	Description	Week
42	Draw a 3D chair model	<ul style="list-style-type: none"> Draw 3D rendered view of Office chair as per given dimension. 	Week-14
43	Draw a 3D Office table model	<ul style="list-style-type: none"> Draw 3D rendered view of Office table as per given dimension. 	Week-14
44	Draw a 3D Rostrum / Podium model	<ul style="list-style-type: none"> Draw 3D rendered view of Rostrum as per given dimension. 	

Task No.	Task	Description	Week
			
45	Draw a 3D Book rack model	<ul style="list-style-type: none"> Draw 3D rendered view of Book rack as per given dimension. 	Week-14
46	Draw a 3D Sofa model	<ul style="list-style-type: none"> Draw 3D rendered view of Sofa as per given dimension. 	

Task No.	Task	Description	Week
47	Mid-Term Assignment/Exam	<ul style="list-style-type: none"> The instructor gives trainees some Mid-Term Assignment to assess the competency Take Mid Term Exam 	Week-15
48	Electrical Schematic Drawing	<ul style="list-style-type: none"> Draw a schematic diagram of an electrical circuit shows the complete electrical connections between components using their symbols and lines. Start with a collection of electrical symbols appropriate for your diagram Draw circuits represented by lines Drag and drop symbols to the circuits and connect them Use line hops if any lines need to cross 	Week-16
48A	Create an account profile on Fiverr (at least two gigs) and Upwork	<p>Create an account by following these steps:</p> <p>Step 1: Personal Info</p> <p>Step 2: Professional Info</p> <p>Step 3: Linked Accounts</p> <p>Step 4: Account Security</p>	Week-16 onwards
49	Demonstrate Ethics and Professional Conduct	<ul style="list-style-type: none"> Motivational Lecture (<i>For further detail please see Page No: 4 and Annex-II</i>) 	Week-17
50	Working with PLC symbols	<ul style="list-style-type: none"> Draw Circuit Lines Change Line Style 	

Task No.	Task	Description	Week
		<ul style="list-style-type: none"> • Drag a symbol from the docked library • Insert PLC (Parametric) • Insert PLC(full units) • Insert Individual PLC I/O points 	
51	<p>Creating Custom Symbols</p>	<ul style="list-style-type: none"> • Create a parent schematic symbol • If AEGS is not the active project, in the Project Manager, right-click AEGS and select Activate. • In the Project Manager, double-click AEGS to expand the drawing list. • Open AEGS03.dwg. • Click the Schematic tab > Other Tools panel > Symbol Builder drop-down > Symbol Builder. • In the Select Symbol/Objects dialog box, Attribute template section, browse to the Library path C:\Users\Public\Documents\Autodesk\Acade {version}\Libs\jic125. 	<p>Week-18</p>
52	<p>Produce the drawing for a simple</p>	<ul style="list-style-type: none"> • Produce the drawings for a simple residential house 	<p>Week-19</p>

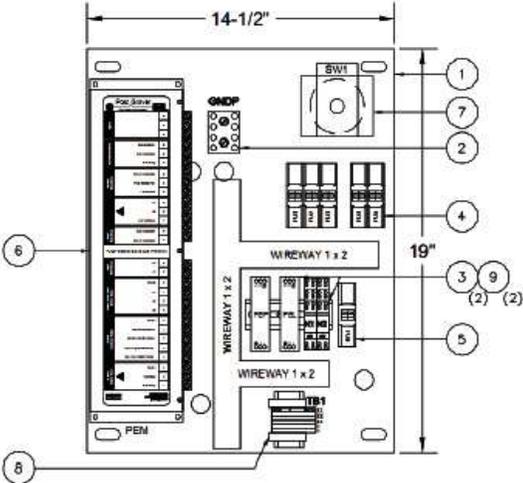
Task No.	Task	Description	Week
	residential house	<p>(single story) as per the given dimension and layout.</p> <ul style="list-style-type: none"> • Add notation that complies with common standards and drawing protocols to the drawings as required • Add dimensions, using appropriate scales in accordance with common standards and drawing protocols as required • Drawing files are saved and backed up correctly to specified drives or directories 	

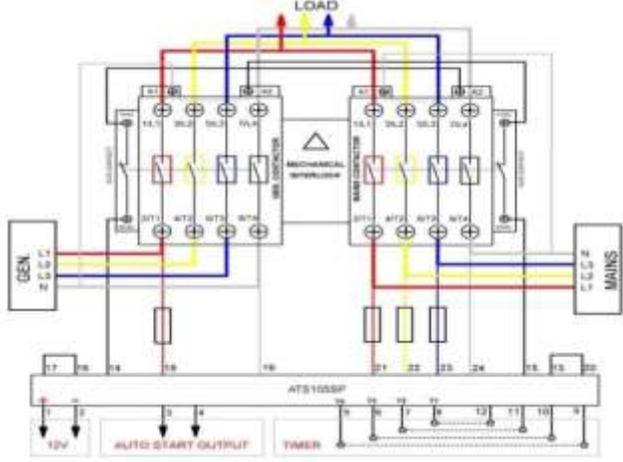
Task No.	Task	Description	Week
		 <p>The floor plan shows a rectangular building layout. At the top left is the Kitchen (11'-8" x 11'-0") with a sink and stove. To its right is a Study area. Below the kitchen is a large Living area (11'-8" x 14'-8"). To the right of the living area is a Bathroom containing a toilet, sink, and bathtub. Below the bathroom is a Closet. At the bottom right is a Bedroom (11'-0" x 11'-0") with a bed. A Porch is located at the bottom of the building. A small room labeled 'C' is located at the top right, adjacent to the study.</p>	
53	Produce the drawing for residential building (multi-story)	<ul style="list-style-type: none"> • Produce the drawings for a simple residential building (multi-story) as per the given dimension and layout. • Add notation that complies with common standards and drawing protocols to the drawings as required • Add dimensions, using appropriate scales in 	Week-20

Task No.	Task	Description	Week
		<p>accordance with common standards and drawing protocols as required</p> <ul style="list-style-type: none"> Drawing files are saved and backed up correctly to specified drives or directories 	
54	Demonstrate Ethics and Professional Conduct	<ul style="list-style-type: none"> Motivational Lecture (<i>For further detail please see <u>Page No: 4 and Annex-II</u></i>) 	
55	Project and Assignment	<ul style="list-style-type: none"> Guidelines to the Trainees for selection of students employable project like final year project (FYP) Assign Independent project to each Trainee A project-based on trainee's aptitude and acquired skills. Designed by keeping in view the emerging trends in 	Week-21

Task No.	Task	Description	Week
		<p>the local market as well as across the globe.</p> <ul style="list-style-type: none"> • The project idea may be based on entrepreneurs. • Leading to successful employment. • Ideas may be generated via different sites such as: <ul style="list-style-type: none"> ○ https://1000projects.org/ ○ https://nevonprojects.com/ ○ https://www.freestudentprojects.com/ ○ https://technofizi.net/best-computer-science-and-engineering-cse-project-topics-ideas-for-students/ 	
55A	<p>How to search and apply for jobs in at least two labor marketplace countries (KSA, UAE, etc.)</p>	<ul style="list-style-type: none"> • Browse the following website and create an account on each website <ul style="list-style-type: none"> ▪ Bayt.com – The Middle East Leading Job Site ▪ Monster Gulf – The International Job Portal ▪ Gulf Talent – Jobs in Dubai and the Middle East • Find the handy ‘search’ option at the top of your homepage to search for the jobs that best suit your skills. • Select the job type from the first ‘Job Type’ drop-down menu, next, select the location from the second drop-down menu. • Enter any keywords you want to use to find suitable job vacancies. • On the results page you can search for part-time jobs only, full-time jobs only, employers only, or agencies only. Tick the boxes as appropriate to your search. • Search for jobs by: <ul style="list-style-type: none"> ▪ Company ▪ Category ▪ Location ▪ All jobs ▪ Agency ▪ Industry 	<p>Week 21 onwards</p>

Task No.	Task	Description	Week
56	Construct terminal plan drawing	<ul style="list-style-type: none"> • Using DIN Rail command • Navigate AutoCAD Electrical interface • Inserting, editing, and numbering wires • Using 3-phase ladders and components • Using the circuit clipboard and circuit builder • Editing, moving, copying, and deleting components • Copying installation and location code values • Inserting terminals and jumpers • Using PLC symbols • Inserting connectors for point-to-point wiring • Creating custom symbols 	Week-22

Task No.	Task	Description	Week
57	Draw Panel layout	<ul style="list-style-type: none"> • Draw Circuit Lines • Change Line Style • Drag a symbol from the docked library • Insert PLC (Parametric) • Insert PLC(full units) • Insert Individual PLC I/O points 	Week-23
58	Draw Electrical circuits & control	<ul style="list-style-type: none"> • Draw a schematic diagram of an electrical circuit shows the complete electrical connections between components using their symbols and lines. • Start with a collection of electrical symbols appropriate for your diagram • Draw circuits represented by lines • Drag and drop symbols to the circuits and connect them • Use line hops if any lines need to cross 	

Task No.	Task	Description	Week
			
59	<p>Prepare Presentation</p> <p>Drawing of Electrical Circuit</p>	<ul style="list-style-type: none"> • Prepare presentation Drawing of an Electrical circuit • Guide to the Trainees for preparation of presentation drawing of an electrical circuit. • Assign Independent presentation drawing of an electrical circuit to each Trainee • A presentation drawing of an electrical circuit based on trainee's aptitude and acquired skills. • Presentation drawing of the electrical circuit by keeping in view the emerging trends in the local market as well as across the globe. 	Week-24
60	<p>Demonstrate Ethics and Professional Conduct</p>	<ul style="list-style-type: none"> • Motivational Lecture <i>(For further detail please see <u>Page No: 4 and Annex-II</u>)</i> 	
61	<p>Submission Drawing Electrical</p>	<ul style="list-style-type: none"> • Define types of drawings. i.e. <ul style="list-style-type: none"> ○ Submission Drawings ○ Working Drawings ○ Structural Drawing ○ Shop Drawings ○ As-Built Drawings 	Week-25

Task No.	Task	Description	Week
		<ul style="list-style-type: none"> • Introduction & components of Submission Drawing • Brief Electrical Design Submission • Why submission drawing is mandatory • When must a submission drawing be made • Features of submission drawing • Components of submission drawing 	
62	Plan Business Process activities	<ul style="list-style-type: none"> • Fundamentals of Business Development • Provide due assistance to in-line manager e.g. coordinating recurring meetings, intimate resource availability, create and keep documentation, validate applicable company-defined standards. • Define activities, e.g. Apply specific life cycle methodologies – (Requirement gathering, design solution, prototype, testing, documentation) • Estimate time, e.g. hour calculation for an activity; consider calendar year official leaves, company working timings. • Achieve work breakdown, divide module into smaller and more manageable components e.g. testing a drawing may have components like interface, coordinates, and render cases. • Level resource due to workload, e.g. calculation of leisure hours of a worker. 	Week-26
63	Freelancing	<ul style="list-style-type: none"> • Define freelancing • Explain opportunities in freelancing • Guide trainees on what resources are available for freelancing in the market. i.e. freelancing below 	

Task No.	Task	Description	Week
		websites. <ul style="list-style-type: none"> ○ Fiverr ○ Upwork ○ Toptal ○ Simply Hired ○ PeoplePerHour ○ Aquent ○ Crowded ○ The Creative Group ○ 99Designs ○ Nexxt ○ Writer Access ○ TaskRabbit ○ Skyword ○ Designhill ○ Freelancer ○ Guru ○ Hireable ○ FlexJobs 	
64	Entrepreneurship	<ul style="list-style-type: none"> ● Define Entrepreneurship ● Types of Entrepreneurship ● Characteristics of Entrepreneurship ● Concept of Entrepreneurship 	
65	Sales and Marketing Strategies	<ul style="list-style-type: none"> ● Define Sales and Marketing Strategies ● Types of Sales and Marketing Strategies ● Characteristics of Sales and Marketing Strategies ● Concept of Sales and Marketing Strategies 	
66	SWOT Analysis	<ul style="list-style-type: none"> ● Define SWOT Analysis ● Benefits of SWOT Analysis ● Concept of SWOT Analysis 	
67	PEST Analysis	<ul style="list-style-type: none"> ● Define PEST Analysis ● Benefits of PEST Analysis 	

Task No.	Task	Description	Week
		<ul style="list-style-type: none"> • Concept of PEST Analysis 	
68	SMART Objectives	<ul style="list-style-type: none"> • Define SMART Objectives • Benefits of SMART Objectives • Concept of SMART Objectives 	
69	Cost Management (OPEX, CAPEX, ROCE, etc.)	<ul style="list-style-type: none"> • Understanding the Differences between Operating and Capital Expenses • Define OPEX • Define CAPEX • Define ROCE 	

Annexure-II

SUGGESTIVE FORMAT AND SEQUENCE ORDER OF MOTIVATIONAL LECTURE.

Mentor

Mentors are provided an observation checklist form to evaluate and share their observational feedback on how students within each team engage and collaborate in a learning environment. The checklist is provided at two different points: Once towards the end of the course. The checklists are an opportunity for mentors to share their unique perspective on group dynamics based on various team activities, gameplay sessions, pitch preparation, and other sessions, giving insights on the nature of communication and teamwork taking place and how both learning outcomes and the student experience can be improved in the future.

Session- 1 (Communication):

Please find below an overview of the activities taking place Session plan that will support your delivery and an overview of this session's activity.

Session- 1 OVERVIEW
Aims and Objectives:
<ul style="list-style-type: none"> • To introduce the communication skills and how it will work • Get to know mentor and team - build rapport and develop a strong sense of a team • Provide an introduction to communication skills • Team to collaborate on an activity sheet developing their communication, teamwork, and problem-solving • Gain an understanding of participants' own communication skills rating at the start of the program

Activity:	Participant Time	Teacher Time	Mentor Time
Intro Attend and contribute to the scheduled.			
Understand good communication skills and how it works.			
Understand what good communication skills mean			
Understand what			

skills are important for good communication skills		
Key learning outcomes:	Resources:	Enterprise skills developed:
<ul style="list-style-type: none"> • Understand the communication skills and how it works. • Understand what communication skills mean • Understand what skills are important for communication skills 	<ul style="list-style-type: none"> • Podium • Projector • Computer • Flip Chart • Marker 	<ul style="list-style-type: none"> • Communication • Self Confidence • Teamwork

Schedule	Mentor Should do
Welcome: 5 min	Short welcome and ask the Mentor to introduce him/herself. Provide a brief welcome to the qualification for the class. Note for Instructor: Throughout this session, please monitor the session to ensure nothing inappropriate is being happened.
Icebreaker: 10 min	Start your session by delivering an icebreaker, this will enable you and your team to start to build rapport and create a team presentation for the tasks ahead. The icebreaker below should work well at introductions and encouraging communication, but feel free to use others if you think they are more appropriate. It is important to encourage young people to get to know each other and build strong team links during the first hour; this will help to increase their motivation and communication throughout the sessions.
Introduction & Onboarding: 20mins	Provide a brief introduction of the qualification to the class and play the “Onboarding Video or Presentation”. In your introduction cover the following: 1. Explanation of the program and structure. (Kamyab jawan Program) 2. How you will use your communication skills in your professional life. 3. Key contacts and key information – e.g. role of teacher, mentor, and SEED. Policies and procedures

	<p>(user agreements and “contact us” section). Everyone to go to the Group Rules tab at the top of their screen, read out the rules, and ask everyone to verbally agree. Ensure that the consequences are clear for using the platform outside of hours. (9am-8pm)</p> <p>4. What is up next for the next 2 weeks ahead so young people know what to expect (see pages 5-7 for an overview of the challenge). Allow young people to ask any questions about the session topic.</p>
<p>Team Activity Planning: 30 minutes</p>	<p>MENTOR: Explain to the whole team that you will now be planning how to collaborate for the first and second collaborative Team Activities that will take place outside of the session. There will not be another session until the next session so this step is required because communicating and making decisions outside of a session requires a different strategy that must be agreed upon so that everyone knows what they are doing for this activity and how.</p> <ul style="list-style-type: none"> • “IDENTIFY ENTREPRENEURS” TEAM ACTIVITY • “BRAINSTORMING SOCIAL PROBLEMS” TEAM ACTIVITY” <p><i>As a team, collaborate on a creative brainstorm on social problems in your community. Vote on the areas you feel most passionate about as a team, then write down what change you would like to see happen.</i></p> <p>Make sure the teams have the opportunity to talk about how they want to work as a team through the activities e.g. when they want to complete the activities, how to communicate, the role of the project manager, etc. Make sure you allocate each young person a specific week that they are the project manager for the weekly activities and make a note of this.</p> <p>Type up notes for their strategy if this is helpful - it can be included underneath the Team Contract.</p>
<p>Session Close: 5 minutes</p>	<p>MENTOR: Close the session with the opportunity for anyone to ask any remaining questions.</p> <p>Instructor: Facilitate the wrap-up of the session. A quick reminder of what is coming up next and when the next session will be.</p>

MOTIVATIONAL LECTURES LINKS.

<u>TOPIC</u>	<u>SPEAKER</u>	<u>LINK</u>
How to Face Problems In Life	Qasim Ali Shah	https://www.youtube.com/watch?v=OrQte08MI90
Just Control Your Emotions	Qasim Ali Shah	https://www.youtube.com/watch?v=JzFs_yJt-w
How to Communicate Effectively	Qasim Ali Shah	https://www.youtube.com/watch?v=PhHAQEGehKc
Your ATTITUDE is Everything	Tony Robbins Les Brown David Goggins Jocko Willink Wayne Dyer Eckart Tolle	https://www.youtube.com/watch?v=5fS3rj6eIFg
Control Your EMOTIONS	Jim Rohn Les Brown TD Jakes Tony Robbins	https://www.youtube.com/watch?v=chn86sH0O5U
Defeat Fear, Build Confidence	Shaykh Atif Ahmed	https://www.youtube.com/watch?v=s10dzfbozd4
Wisdom of the Eagle	Learn Kurooji	https://www.youtube.com/watch?v=bEU7V5rJTtw
The Power of ATTITUDE	Titan Man	https://www.youtube.com/watch?v=r8LJ5X2eijU
STOP WASTING TIME	Arnold Schwarzenegger	https://www.youtube.com/watch?v=kzSBrJmXqdg
Risk of Success	Denzel Washington	https://www.youtube.com/watch?v=tbnzAVRZ9Xc

Annexure-III

SUGGESTIVE FORMAT AND SEQUENCE ORDER OF SUCCESS **STORY-1**

S. No	Key Information	Detail/Description
1.	Self & Family background	<ul style="list-style-type: none"> • Asim Qamar • Middle-class Family & live in a rented house, with 3 children & parents. • B.Tech. Mechanical, freelance designing & consultant. • Financial hardships etc
2.	How he came on board NAVTTC Training/ or got trained through any other source	<ul style="list-style-type: none"> • Information about course, apply and selection • Course duration, trade selection • Attendance, active participation, monthly tests, interest in lab work.
3.	Post-training activities	<ul style="list-style-type: none"> • After graduation, I am searching in any specialized field of my trade. So I am keeping on a search where I give my full potential & get success. Then I realize I have a passion for designing. • Through freelancing where zero investment is required, I have generated reasonable capital to start my own Design house. • As a freelance designer you can see my work at (https://grabcad.com/aq-2) in design house I have 14 nos. of designers in the area Mechanical, Manufacturing, Civil & Fabrication. • The clients are local & international & last year company generate 107,000 USD remittances. • After a long journey of strive, life is going well and has its own house and sufficient capital.
4.	Message to others (under training)	<ul style="list-style-type: none"> • Take the training opportunity seriously • Impose self-discipline and ensure regularity • Make Hard work pays in the end so be always ready for the same.

Note: Success story is a source of motivation for the trainees and can be presented in several ways/forms in a NAVTTC skill development course as under: -

- 1. To call a passed out successful trainee of the institute. He will narrate his success story to the trainees in his own words and meet trainees as well.**
- 2. To see and listen to a recorded video/clip (5 to 7 minutes) showing a successful trainee Audio-video recording that has to cover the above-mentioned points.**
- 3. The teacher displays the picture of a successful trainee (name, trade, institute, organization, job, earning, etc.) and narrates his/her story in the teacher's own motivational words.**

SUGGESTIVE FORMAT AND SEQUENCE ORDER OF SUCCESS STORY-2

S. No	Key Information	Detail/Description
1.	Self & Family background	<ul style="list-style-type: none"> • Efthakhar Alam • Belong to Middle-class Family. • Intermediate & Different CAD courses. • It was 2010 and I had passed the hardest time in my life. I will never forget those days. My father faced a huge loss in his business. For this reason, our family was unable to pass the days. We were nearly hand to mouth.
2.	How he came on board NAVTTC Training/ or got trained through any other source	<ul style="list-style-type: none"> • Information about course, apply and selection • Course duration, trade selection • Attendance, active participation, monthly tests, interest in lab work.
3.	Post-training activities	<ul style="list-style-type: none"> • After the Intermediate, I have purchased a computer from my pocket money, I am keeping on finding where I give my full efforts & get success. Then I realize Job is not the only solution & then I become an Entrepreneur. • Through my Business, I have generated USD 5000 per month. • My clients are generally the Automotive industry. • At that time I am in a comfortable position & my Business has flourished.
4.	Message to others (under training)	<ul style="list-style-type: none"> • Take the training opportunity seriously • Impose self-discipline and become regular. • Make Hard work & convert into smart work pays in the end so be always ready for the same.

Note: Success story is a source of motivation for the trainees and can be presented in several ways/forms in a NAVTTC skill development course as under: -

1. To call a passed out successful trainee of the institute. He will narrate his success story to the trainees in his own words and meet trainees as well.

- 2. To see and listen to a recorded video/clip (5 to 7 minutes) showing a successful trainee Audio-video recording that has to cover the above-mentioned points.**
- 3. The teacher displays the picture of a successful trainee (name, trade, institute, organization, job, earning, etc.) and narrates his/her story in the teacher's own motivational words.**

SUGGESTIVE FORMAT AND SEQUENCE ORDER OF SUCCESS STORY-3

S. No	Key Information	Detail/Description
1.	Self & Family background	<ul style="list-style-type: none"> • James Ran • Belong to Poor Family. • BS. Mechanical & expertise in AUTO-CAD. • During my teenage, I have faced the hardest time in my life.& this time give me a lot of learning.
2.	How he came on board NAVTTC Training/ or got trained through any other source	<ul style="list-style-type: none"> • Information about course, apply and selection • Course duration, trade selection • Attendance, active participation, monthly tests, interest in lab work.
3.	Post-training activities	<ul style="list-style-type: none"> • After completing his Engineering. He started a job in a small organization & with time he improves his skills. • Now he becomes a Product Design Engineer. In a well-known company & take a salary of USD 4000 per month.
4.	Message to others (under training)	<ul style="list-style-type: none"> • Take the training opportunity seriously • Impose self-discipline and become regular. • Make Hard work & pays in the end so be always ready for the same.

Note: Success story is a source of motivation for the trainees and can be presented in several ways/forms in a NAVTTC skill development course as under: -

1. To call a passed out successful trainee of the institute. He will narrate his success story to the trainees in his own words and meet trainees as well.
2. To see and listen to a recorded video/clip (5 to 7 minutes) showing a successful trainee Audio-video recording that has to cover the above-mentioned points.
3. The teacher displays the picture of a successful trainee (name, trade, institute, organization, job, earning, etc.) and narrates his/her story in the teacher's own motivational words.

Annex-IV

BASIC AUTOCAD TERMINOLOGY

There are some basic terms that the user will want to review before using AutoCAD. Some terms have links to give the user more information.

Absolute co-ordinates	A way of inputting points based on AutoCAD's origin.
Acad.dwt	This is the default template that automatically loads whenever the user starts a drawing session. It can be customized to suit your needs.
Associated Dimensioning	Dimensions that are associated with specific points will update as that point is moved.
Backup file	AutoCAD can be set to automatically backup your drawing and save it. This is a safeguard in case your file gets corrupted. It is saved with a .BAK extension
Block	A pre-drawn image user can insert in your drawing to save time and make your file size smaller.
Crosshairs	This is your cursor when it is in the drawing space.
Cursor	Your cursor will change depending on where it is in the program.
Database	An AutoCAD drawing file is one large database containing all the information needed to reproduce the objects when the file is opened. Info for layers and line types etc. is stored in this manner.
Dialog box	AutoCAD uses a large number of dialog boxes to get information from the user. Users must know how to input the information that it asks for.
Drawing template file	This is a file that contains preset values for the frequently used setting. AKA a prototype drawing. The file extension in DWT.
Extents	The outer boundaries of the objects user have drawn.
Grid	This is a pattern of dots displayed on the screen to guide the user. It can be toggled on and off by pressing the F7 key.
Layer	All objects are drawn on a layer. Users can group objects (such as electrical) on a single layer and organize your drawing.
Layout Tabs	A space used for plotting your drawings (formerly called Paper Space).
Limits (Grid)	A setting to impose an 'artificial' boundary on your drawing that sets the area of the grid, and when turned on, limits the user to draw in the grid area.
Linetype	All objects are drawn with a particular line type. Examples would be solid, center, dashed, etc.
Model space	The drawing space where the user 'model' the objects.
Modify	A generic term used for changing your objects.

Object	Any item that is in the AutoCAD database. Also known as an entity.
Origin	The (0, 0) point of your current coordinate system.
Orthomode	This is a drawing mode that allows the user to draw only perpendicular lines. It is toggled on and off by pressing the F8 key.
Osnap-Object Snap	This is a method of 'snapping' to certain, precise points on an object.
Pan	To move around drawing by dragging the drawing area around your screen.
Path	The specific folder where AutoCAD looks for or saves files.
Pick	To select an object by 'left-clicking' on it.
Plot	Also known as a print. To make a hard copy of your drawing.
Polar coordinates	A way of inputting points based on distance and angle.
Property	Any specific characteristic of an object such as a layer, scale, line type, start point, etc.
Relative coordinates	A way of inputting points is based on a starting point.
Selection set	The current group of objects selected for modifying.
Snap	This is a drawing mode that allows users to snap your cursor to precise points laid out in a grid pattern. Toggle with the F9 key.
Styles	Formatting that defines the look of the text, dimensions, etc.
Units	The basic drawing unit is set for your drawing. For example, a user can use inches or millimeters depending on your needs. User can also set the precision you want to be displayed, such nearest 1/4", 1/ 2" 1/64", etc.
User co-ordinate	Modifications made to the World Co-ordinate System system (WCS) results in a User Coordinate System (UCS)
View	A particular area of your drawing.
Viewport	A separate 'window' on your drawing. Users may have more than one viewport visible to see different areas of your drawing at the same time.
Wizard	An easy step-by-step instruction set to help users set-up certain aspects of your drawing.
World Co-ordinate	This is the common X-Y co-ordinate system that is System (WCS) the default. If it is modified, it becomes a User coordinate System (UCS)
Zoom	To view either a smaller section of your drawing (zoom in) or a larger section (zoom out).

3D CAD TERMINOLOGY

2D	A concept of displaying real-world objects on a flat surface showing only height and width. This system uses only the <i>X</i> and <i>Y</i> axes.
3D	A way of displaying a real-world object in a more natural way adding depth to the height and width. This system uses the <i>X</i> , <i>Y</i> , and <i>Z</i> axes.
Boolean Operations	Commands that allow the user to add, subtract or intersect solid objects in AutoCAD.
Complex surface	Generally a curved surface. Examples: car fender, landscape contour.
Elevation	The difference between an object being at zero on the <i>Z</i> -axis and the height that it is above zero.
Extrude	The extrude command raises the shape of a 2D outline into a 3D solid. For example, a circle would be extruded into a cylinder.
Face	The simplest true 3D surface.
Facet	A three or four-sided polygon that represents a piece (or section) of a 3D surface.
Hidden line removal	A way of hiding lines that would not be visible if the user were viewing the actual object user has drawn in AutoCAD. (Command: HIDE)
Isometric Drawing	A simple way of achieving a 3D appearance using 2D drawing methods.
Plan View	Also known as the top view, a plan view looks directly down the WCS <i>Z</i> -axis to the <i>X</i> - <i>Y</i> axis.
Primitive	A basic solid building block. Examples: boxes, cones, cylinders.
Region	A 2D area consisting of lines, arcs, etc.
Rendering	A complex way of adding photo-realistic qualities to a 3D model user has created.
Shading	Quick ways of adding color to a 3D object user have drawn. (Command: SHADE)
Solid Model	A 3D model creating using solid 'building blocks'. This is the most accurate way of representing real-world objects in CAD.
Surface Model	A 3D model is defined by surfaces. The surface consists of polygons.
Thickness	A property of lines and other objects that gives them a 3D like an appearance.
UCS	The user coordinates the system. This is defined by the person drawing to have easier access to portions of a 3D model.
View	A particular view of the object user has created.
Viewport	A window into your drawing showing a particular view. Users can have several viewports on your screen. Different from the viewports used in plotting.

Wireframe Model	A 3D shape that is defined by lines and curves. A skeletal representation. Hidden line removal is not possible with this model.
Z-Axis	The third axis defines the depth.

List of Machinery / Equipment

Sr. No	Name of the item as per curriculum	Quantity physically available at the training location
1	Desktop Computers	25
2	CAD-CAM software	01
3	Measuring Tools	25
4	Laser Printer	01

1. Software List

Sr. No	Software Name
1.	<p>Dassault Catia</p> <ul style="list-style-type: none"> Complete PLM software (CAD, CAM, CAE, Motion, and simulation)
2.	<p>Swan Soft Computer Numeric Control (SSCNC)</p> <ul style="list-style-type: none"> Simulator for most CNC Control Panels with material removal (Fanuc, Fagor, Heidenhain, etc)
3.	<p>Cimco Edit</p> <ul style="list-style-type: none"> Numeric control NC file back plot to tool path Basic simulation Communication with CNC
4.	<p>Siemens NX</p> <ul style="list-style-type: none"> Complete PLM software (CAD, CAM, CAE, Motion, and simulation)

5.	AutoCAD <ul style="list-style-type: none"> • Advanced CAD software for mechanical drafting
6.	Power Mill <ul style="list-style-type: none"> • Usage is for CAM computer-aided manufacturing
7.	Master CAM <ul style="list-style-type: none"> • Usage is for CAM computer-aided manufacturing

2. Minimum Qualification of Teachers / Instructor

The qualification of teachers/instructor of this course should be:

B.Sc./BE Mechanical/Industrial & Manufacturing Engineering with a minimum of 1-Years related Experience

OR

B. Tech / Honors Mechanical with 2 Years related Experience

OR

D.A.E. in Mechanical, Civil / CAD-CAM Designers / Operators with 3to 5 Years related experiences

3. Supportive Notes

Teaching Learning Material

Books Name	Author
CAD-CAM Notes	James H Earl
AutoCAD	Dassault
AutoCAD CBT Based Curriculum	TSSP website
Applied CNC Machining	Josh Mitchell
CAD-CAM II Handbook	Hassan Jawad, Training Department Gujranwala Tools Dies and Moulds Center
CNC Programming Handbook	Mujahid Gillani, Training Department Gujranwala Tools Dies and Moulds Center
CAD-CAM II Handbook	Training Department Gujranwala Tools Dies and Moulds Center