Government of Pakistan

National Vocational and Technical Training Commission

Prime Minister Hunarmand Pakistan Program

"Skills for All"

Course Contents/ Lesson Plan

Course Title: CONVENTIONAL MACHINIST

Duration: 6 Months

Plot no. 38, Kirthar Road, H-9 Islamabad
051-9044250

Trainer Name	Prof. Arif Ali Nadeem
Course Title	CONVENTIONAL MACHINIST
Objectives of Course	This course is meant to produce a workforce that is capable of conducting preliminary machine cutting operations mostly related to the conventional processes. This course will impart skills and competency to the trainees to use measuring instruments such as steel rule, inside/outside caliper, vernire caliper, micrometer, dial indicator and bevel protector. The pass outs would also be equally competent to perform cutting operations on lathe machine, milling machine, shaper, and grinder to produce industrial products. They will work in industry as machinist, craftsman, and quality assurance supervisor.

Learning Outcome of the Course	At the end of the course the trainees must attained the following competencies • Apply work health and safety practices. • Implement workplace policies and procedures. • Perform lathe operations. • Perform screw cutting operations. • Perform tool grinding operations. • Perform milling operations. • Perform drilling operations. • Perform shaper operations
Course Execution Plan	Total Duration of Course: **06 Months (26 Weeks)**
	Class Hours: **4 Hours per day (06 days / week)**
	Theory: 20%, Practical: 80%
	Weekly Hours: **24 Hours per week**
	Total Contact Hours: **600 Hours**
Companies offering Jobs in the respective trade	All engineering industries and manufacturing industries.

Job Opportunities	Machinists are employed in the light engineering plants, manufacturing plants and production industry specially in Automobile industry, agriculture industry, car plants, sugar industry, cement industry, paper industry, and textile industry. Machinist may advance to the higher positions with same employer or with other employers. They can become: • Machine Operator • Turner • Mill Wright • Foreman • Workshop Supervisor Some competent machinists may achieve highly salaries. They can find employment opportunity within Pakistan and abroad. The employment in this occupation will be emphasized by a wide variety of factors including: • Trends and events effecting overall employment. • Location in Pakistan • Employment turnover (work opportunity generated by people leaving existing positions) • Occupational growth (new positions created in existing industry) • Size of the industry
Number of Students	25
Learning Place	Classroom/workshop
Instructional Resources	• Board Marker • White Board • Multimedia

WEEKLY SCHEDULE OF TRAINING

Scheduled Week	Module Title	Learning Units	Remarks
Week 1	**Introduction**	• Course Introduction • Motivational Lecture • Application Course • Job Market Overview • Health and Safety	• **TASK:** • 1 Detail may be seen at Annexure- 1
Week 2	**Measuring** **&** **Motivational Lecture**	• Measuring • Basic Unit, Measuring System, Testing Instruments, Measuring Methods, Testing • Vernier Calliper (Kinds) and use of Vernier Calliper	• **TASK:** • 2 • 3 • 4 Detail may be seen at Annexure- 1
Week 3	**Measuring** **&** **Success Stories**	• Use of inside, outside calliper and bevel protector • Gauges (Kinds) and use of gauges • Use of different types of internal and external gauges	• **TASK:** • 5 • 6 Detail may be seen at Annexure- 1
Week 4 & Week 5	**Fitting (Benchwork)** **&** **Motivational Lecture**	• Basic mathematics • Basic Units • Basic Drawings • Safety Precautions	• **TASK:** • 7 • 8 • 9

		• Hand Tools • Concept of Filing, Drilling, Polishing, Chipping, Layout, Tapping, Threading, Sawing, and Reaming	Detail may be seen at Annexure- 1
Week 6	**Filing and Sawing** **&** **Success Stories**	• Filing and Sawing exercise • Tri Square, Fitting • Drilling, Tapping, Reaming • Inside & Outside Calliper • Center Gauge	• **TASK:** • 10 • 11 Detail may be seen at Annexure- 1
Week 7 & Week 8	**Tool Grinding** **&** **Motivational Lecture**	• Introduction of Tool Grinding Machines • Personal, Machine and Work Safety • Kinds of grinding wheels and uses • Testing and mounting of grinding wheels • Cutting Tools and their Angles • Cutting Tool Material • Angles of Chisels, Scribers, and Center Punch • Grinding of Scriber and Center Punch	• **TASK:** • 12 • 13 • 14 • 15 • 16 • 17 Detail may be seen at Annexure- 1

		• Grinding of flat chisels and cross cut chisel	
Week 9 & Week 10	**Tool Grinding & Success Stories**	• Grinding of right hand roughing tool • Grinding of right hand turning tool • Grinding of parting off tool • Grinding of round nose polishing tool • Grinding of twist drill • Balancing/mounting of grinding wheel • Re-adjustment of tool rest with minimum space • Dressing of grinding wheel	• **TASK:** • 18 • 19 • 20 • 21 • 22 • 23 • 24 Detail may be seen at Annexure- 1
Week 11 & Week 12	**Turning & Motivational Lecture**	• Introduction of Lathe tools and their uses • Basic material • Safety precautions • Specification of lathe • Types of lathe • Parts of lathe and their functions	• **TASK:** • 25 • 26 Detail may be seen at Annexure- 1

Week 13 & Week 14	**Turning & Success Stories**	• Maintenance of Lathe Machines • Clamping of tools in tool post • Facing & turning • Step turning • Gear blank (Spur) • Gear blank (Helical) • Step boring	• **TASK:** • 27 • 28 • 29 Detail may be seen at Annexure- 1
Week 15 & Week 16	**Lathe Operations & Success Stories**	• Reaming • Knurling • Threading “V” Shape External • Threading “V” Shape Internal • Threading Acme Shape External • Threading Acme Shape Internal • Threading Square Shape External • Threading Square Shape Internal • Acme Gauge	• **TASK:** • 30 • 31 • 32 • 33 • 34 • 35 • 36 • 37 Detail may be seen at Annexure- 1
Week 17	**Milling &**	• Safety Precautions about Milling Machine	• **TASK:** • 38 • 39

	Motivational Lecture	• Specifications of Milling Machine • Types of Milling Machine • Parts of Milling Machines and their Functions	Detail may be seen at Annexure- 1
Week 18 & Week 19	**Milling Operations & Success Stories**	• Milling Cutters • Accessories of Milling Machines • Plane Milling (Square Piece 16x16x160mm) • Step Milling	• **TASK:** • 40 • 41 Detail may be seen at Annexure- 1
Week 20-22	**Milling Operations & Success Stories**	• Straight Edge • Spur Gear • Helical Gear • Rack Cutting • Twist Drill (2 Flute) • End Mill Cutter (4 Flute)	• **TASK:** • 42 • 43 • 44 • 45 • 46 • 47 Detail may be seen at Annexure- 1
Week 23	**Shaping & Motivational Lecture**	• Safety Precautions about Shaper Machine • Specification of Shaper • Parts of Shaper and their Functions	• **TASK:** • 48 Detail may be seen at Annexure- 1

Week 24 & Week 25	**Shaping & Success Stories**	• Nomenclature of Cutting Tools • Difference between shaper and planner • Squaring Slotting Work • Angular Slotting Work • "V" Block • Tapping Block	• **TASK:** • 49 • 50 • 51 • 52 Detail may be seen at Annexure- 1
Week 26	**Workshop Project / Maintenance**	• Maintenance & Allotment of Projects • Depth Gauge • Circular Die Holder	• **TASK:** • 53 • 54 Detail may be seen at Annexure- 1

List of Machinery and Equipment

Sr.No	Name of Item as per curriculam	Quantity available at training location
1	Drawing board	25
2	Work benches	25
3	Lathe machine	8
4	Milling machine	5
5	Tool grinder	3
6	Shaper	2
7	Power hacksaw	1
8	Drill machines	4
9	Univeral milling	1

Minimum qualification of Instructor:

I. Bsc Mechanical Engineering Technology with 02 years of relevant experience.
II. DAE Mechanical Engineering with 05 years of relevant experience.

Teaching Learning Material:

Books Name	Author
Shop Theory	Anderson
Machine Tool Operation I & II	N.D.Burghardt
All about Machine tools	T.T.P series-1 Translated by Aftab Ahmad
Trade Training-II Machinist	T.T.P series-25
Workshop Practice – I	Prof. Arif Ali Nadeem

Annexure-I:

Week	Task No.	Description
Week 1	Task - 1	Explore health and safety
Week 2	Task -2 Task -3 Task-4	Explore Measuring Define basic unit, measuring system Explore types of Vernier caliper and its use
Week 3	Task-5 Task-6	Explore inside, outside caliper and bevel protector Perform measurement with internal and external gauges
Week 4-5	Task-7 Task-8 Task-9	Make basic drawings Explore hand tools Explore filing, drilling, polishing, chipping, tapping, threading, sawing, and reaming
Week-6	Task-10 Task-11	Perform exercise of filing, sawing, drilling, tapping, and reaming Perform measurement with inside and outside caliper, center gauge, and acme gauge
Week 7-8	Task-12 Task-13 Task-14 Task-15 Task-16 Task-17	Explore kinds of grinding wheels and its uses Perform mounting of grinding wheels Explore cutting tool material Explore angles of chisels, scriber, and center punch Perform grinding of scriber and center punch Perform grinding of flat chisel and cross cut chisel
Week 9-10	Task-18 Task-19 Task-20 Task-21 Task-22 Task-23 Task-24	Perform grinding of right hand turning tool Grind parting off tool Grind round nose polishing tool Grind twist drill Make balancing of grinding wheel

		Re-adjust tool rest with minimum space Perform dressing of grinding wheel
Week 11-12	Task-25 Task-26	Explore safety precautions of lathe machine Explore the parts of lathe and their functions
Week 13-14	Task-27 Task-28 Task-29	Perform clamping of tools in tool post Perform facing, turning, step turning Make gear blank (spur), gear blank (Helical), step boring
Week 15-16	Task-30 Task-31 Task-32 Task-33 Task-34 Task-35 Task-36 Task-37	Perform reaming Perform knurling Perform threading “V” shape external Perform threading “V” shape internal Perform threading Acme shape external Perform threading Acme shape internal Perform threading Square shape external Perform threading Square shape internal
Week 17	Task-38 Task-39	Explore specification of Milling machine Explore types of Milling machines, parts of Milling machine and their functions
Week 18-19	Task-40 Task-41	Perform plain Milling “Square piece 16x16x160mm) Perform step Milling
Week 20-22	Task-42 Task-43 Task-44 Task-45 Task-46 Task-47	Make straight edge Make Spur gear Make Helical gear Make Rack Make twist drill (2 Flute) Make End Mill (4 Flute)
Week 23	Task-48	Explore specification of shaper, parts of shaper, and their functions
Week 24-25	Task-49 Task-50 Task-51 Task-51	Perform squaring slotting work Perform Angular slotting work Make “V” block

		Make “Tapping” block
Week 26	Task-52 Task-53	Make depth gauge Make Circular die Holder

Annexure-II:

Hisham Serwar Motivational Story | Pakistani Freelancer

https://www.youtube.com/watch?v=CHm_BH7xAXK

21 year old pakistani Fiverr millionaire | 25-35 lakhs a month income | Inerview

https://www.youtube.com/watch?v=9WrmYYhr7s0

success story of 23 year-old SEO expert | How This Business Works | Urdu Hindi Punjabi

https://www.youtube.com/watch?v=tlQ0CWgszI0

Failure to Millionaire- How to Make Money Online | Fiverr Superhero Aaliyaan Success Story

https://www.youtube.com/watch?v=d1hocXWSpus

Annexure-III:

SUGGESTIVE FORMAT AND SEQUENCE ORDER OF MOTIVATIONAL LECTURE

Mentor

Observation checklist are provided to mentor to evaluate and share their observations that how students within each team engaged and collaborate in learning environment. The checklists are an opportunity for mentors to share their experience on group dynamics based on team activities such as game play session, pitch preparation, and other sessions giving understanding on the nature of communication and team work. This practice will demonstrate that how learning outcomes and student experience can be developed in the future.

Session -1 (Communication):

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

Session-1 OVERVIEW
Aims and Objectives:
• To introduce communication skills. • Mentor and team must know to build working relationships and develop a strong sense of a team. • Team to collaborate on activity sheet developing their communication, teamwork, and problem-solving. • Develop an understanding of participants to develop 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.			

Key learning outcomes:	**Resources:**	**Enterprise skills developed:**
• Understand what communication skills mean. • Understand the communication skills and how it works. • Understand what skills are required for communication	• Podium • Projector • Computer • Flip Chart • Marker	• 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 to ensure nothing inappropriate is being happened.
Preliminary Coordination: **10 min**	Start your session by delivering preliminary motivation, this will enable you and your team to start to build relationship and create a team for the tasks ahead. The preliminary coordination 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 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: **20 mins**	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. 2. How you will use your communication skills in your professional life. 3. Key contracts and key information – e.g. role of teacher, mentor. Policies and procedures. Everyone to go to the group rules tab at the top of their screen, read out rules and ask everyone to agree.

	4. Allow young people to ask any questions about the session topic so that their understanding can be developed.
Team Activity Planning: **30 min**	MENTOR: explain to whole team that you will know the planning how to collaborate team activities that will take place after the session. There will not be another session until the next session so this step is required because communicating and making decisions outside of session requires a different strategy that must be agreed upon by everyone to know what they are doing for this activity and how. • "IDENTIFY ENTERPRENEURS" TEAM ACTIVITY • "BRAINSTORMING SOCIAL PROBLEMS" TEAM ACTIVITY" As a team, collaborate on 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 suggest. Make sure the teams have the opportunity to talk about how they want to work 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 he is the project manager for the weekly activities and make a note of this. Write notes for their strategy if this is helpful.
Session Close: **5 min**	**MENTOR:** Close the session with the opportunity for anyone to ask any remaining questions. **Instructor:** Facilitate the wrap-up of the session. A quick reminder of what is coming up in the next session.

Motivational Lectures and Success Stories (Course Outlines)

Sr #	Topic Title	Contents	Theme
1	Success Stories	1. Story of Skill worker who get good job. 2. Entrepreneur/ self-business 3. Freelancer	1. Family Background 2. How to get Training 3. How to get job 4. Success trait 5. Few word of advice for youth
2	Motivational Lectures	1. Soft skills 2. Work Ethics 3. Personality Grooming	Good Habits • Punctuality • Honesty • Positive attitude Interpersonal skills • Determinant • Consistent • Welling worker • Teamwork • Initiative • Hardworking • Creative • Enthusiastic • Goal oriented • Self-motivated • Communication • Loyalty

MOTIVATIONAL LECTURE LINKS.

TOPIC	SPEAKER	LINK
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=PhHAQEehkc
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=r8LJ5X2ejqU
STOP WASTING TIME	Arnold Schwarzenegger	https://www.youtube.com/watch?v=kzSBrJmXqdg
Risk of Success	Denzel Washington	https://www.youtube.com/watch?v=tbnzAVRZ9Xc

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Annexure-IV:

Success Story

Sr.No	Key Information	Detail/Description
1	**Self & Family background**	Abdullah Zafar, a resident of an underprivileged area of Khyber Pakhtunkhwa, is an ideal example to be followed by many people. He belongs to a middle-class family and hardly managed to bear his school and college expenses. In 2014, Abdullah successfully completed his college and decided to enroll in a skilled based professional course "CAD/CAM". He did hard work and managed to learn the software. Later on, in 2018, he started his journey as freelancer and started earning through online working. His client mostly belongs to USA and Canada. They were satisfied with his quality of work and commitments. Now Abdullah is earning Rs. 1 million in a year. **If at first, you don't succeed, try again**
2	**How he came on board NAVTTC Training/ or got trained through any other source**	Certification in CAD/CAM from PITAC HQ Lahore (NAVTTC partner institute)
3	**Post-training activities**	Abdullah's area of expertise is in Computer Aided Designing & Computer Aided Manufacturing. In start of his career as freelancer, he successfully managed to create profile on Fiverr and Upwork. He applied mostly for projects focused on Computer Aided Designing. In start it wasn't so easy for him to grab clients. In the first few weeks, he didn't hear back from even a single client, despite bidding for dozens of projects. "I needed to understand what worked, so I read blogs, participated in forums, and analyzed profiles of successful freelancers. It was an uphill struggle, but I didn't want to give up," he explains. Abdullah says he understands why clients would be apprehensive giving projects to untested freelancers. They have hundreds of options to choose from, he explains, and to give a project to someone with no

		experience requires a strong leap of faith. A slow stream of projects started to come Abdullah's way. He soon realized that increased use of precise, versatile and easy-to-machine CAD designs has fundamentally revolutionized the areas of engineering, architecture and the manufacturing industry. But he's had to face his fair share of challenges too. The shoddy state of internet infrastructure in his city, Karak, threatened to derail his freelancing career. "Sometimes I haven't had connectivity for two days straight," he explains. "That's unthinkable for someone who makes his livelihood on the internet.
4	**Message to others (Under training)**	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.

* The online success stories of renowned professionals can also be obtained from Annex-III

Annexure-V:

Workplace/Institute Ethics Guide

Work ethic is a standard of conduct and values for job performance. The modern definition of what constitutes good work ethics often varies. Different businesses have different expectations. Work ethic is a belief that hard work and diligence have a moral benefit and an inherent ability, virtue, or value to strengthen character and individual abilities. It is a set of values-centered on the importance of work and manifested by determination or desire to work hard.

The following ten work ethics are defined as essential for student success:

1. **Attendance:** Be at work every day possible, plan your absences don't abuse leave time. Be punctual every day.
2. **Character:** Honesty is the single most important factor having a direct bearing on the final success of an individual, corporation, or product. Complete assigned tasks correctly and promptly. Look to improve your skills.
3. **Team Work:** The ability to get along with others including those you don't necessarily like. The ability to carry your weight and help others who are struggling. Recognize when to speak up with an idea and when to compromise by blend ideas together.
4. **Appearance:** Dress for success set your best foot forward, personal hygiene, good manner, remember that the first impression of who you are can last a lifetime
5. **Attitude:** Listen to suggestions and be positive, accept responsibility. If you make a mistake, admit it. Values workplace safety rules and precautions for personal and co-worker safety. Avoids unnecessary risks. Willing to learn new processes, systems, and procedures in light of changing responsibilities.
6. **Productivity:** Do the work correctly, quality and timelines are prized. Get along with fellows, cooperation is the key to productivity. Help out whenever asked, do extra without being asked. Take pride in your work, do things the best you know-how. Eagerly focuses energy on accomplishing tasks, also referred to as demonstrating ownership. Takes pride in work.
7. **Organizational Skills:** Make an effort to improve, learn ways to better yourself. Time management; utilize time and resources to get the most out of both. Take an appropriate approach to social interactions at work. Maintains focus on work responsibilities.

8. **Communication:** Written communication, being able to correctly write reports and memos. Verbal communications, being able to communicate one on one or to a group.
9. **Cooperation:** Follow institute rules and regulations, learn and follow expectations. Get along with fellows, cooperation is the key to productivity. Able to welcome and adapt to changing work situations and the application of new or different skills.
10. **Respect:** Work hard, work to the best of your ability. Carry out orders, do what's asked the first time. Show respect, accept, and acknowledge an individual's talents and knowledge. Respects diversity in the workplace, including showing due respect for different perspectives, opinions, and suggestions.