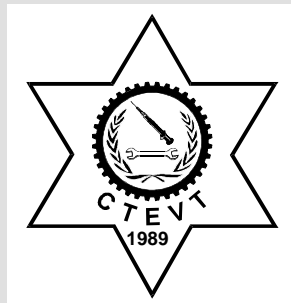


Lathe Setter-Operator

Short-term Curriculum

(A Competency Based)



council for Technical Education and Vocational Training

Curriculum Development Division

Sanothimi, Bhaktapur

2008

Revised in 2015

Table of Contents

Introduction.....	3
Aim	3
Objective.....	3
Course Description.....	3
Duration.....	4
Target Group.....	4
Target location.....	4
Group Size.....	4
Medium of Instruction	4
Pattern of Attendance.....	4
Focus of Curriculum	4
Entry Criteria.....	4
Instructional Media and Materials	4
Teaching Learning Methodologies	4
Follow up Provision.....	5
Grading System	5
Trainees Evaluation Details	5
Trainers' Qualification (Minimum)	5
Trainer-Trainees Ratio.....	5
Suggestions for Instruction	5
Certificate Requirements	7
Provision of Skill Testing.....	7
Physical Facilities.....	7
Course Structure	8
Workshop Safety and Bench Work.....	9
Workshop Safety.....	10
Bench work.....	16
Machine Setting.....	25
Machine Operation	39
Thread Cutting.....	55
Off hand Grinding.....	59
Items Manufacturing (Project Work).....	66
Applied Mathematics	76
Occupational Health, Safety and First Aid	79
Communication.....	83
Entrepreneurship Development	88
Suggested Reference Books:	89
व्यवसायमा आवश्यक तालीम गुणस्तर सूचक	89
सामान्य गुणस्तर सूचक.....	89
प्रक्रियागत तह	89
परिणाम/उपलब्धि तह.....	89
Tools, equipments	89

Introduction

The competency based market oriented curriculum for Lathe Setter-Operator is designed to produce employable workforce equipped with knowledge, skills, and attitudes related to occupation. In this curriculum, the trainees will practice skills of lathe operation in the mechanical workshops. Once the trainees acquired the competencies they will have ample opportunity for wage employment and self-employment through which they will contribute in the national streamline of poverty reduction in the country. The skills and knowledge included in this curriculum improve their knowledge and skills and make them competent Lathe Setter-Operator needed for the occupation.

Aim:

The main aim of this program is to produce employable Lathe Setter-Operators who will provide mechanical services at the mechanical workshops in the country as well as could create self employment opportunity in the country.

Objective

After completion of training the trainees will be able:

1. To apply /follow safety measures in order to minimize lost of lives and properties;
2. To identify, enumerate and handle and/or operate tools, instruments, devices and equipment;
3. To perform bench work related to mechanical setting;
4. To set up machine and work pieces;
5. To operate machines for drilling, turning, boring, facing, chamfering and grooving;
6. To perform thread cutting;
7. To perform off hand grinding;
8. To apply simple mathematical technique related occupation;
9. To be familiar with First Aid .
10. To be familiar with occupational health and apply safe working technique; and
11. To apply Communication and Small Enterprise Development skills.

Course Description

This curricular programme is based on the job required to be performed by a Lathe Operator. Therefore, this curriculum is designed in module system which provides knowledge and skills about lathe operation focusing on latest practiced technology. It intends to provide the knowledge and skills on Workshop safety, Bench work, Machine operation, Threads cutting, Off hand grinding other various project works for manufacturing various items as a project work. It also includes Applied mathematics, Occupational health and safety, First aid, Communication and Small Enterprise Development.

The duration of particular modules will be as mentioned in the course structure. There will be demonstration by instructors/trainers and the opportunity to practice skills/tasks necessary for this level of technicians. Trainees will practice & learn skills using typical tools, equipment, machines, and materials necessary for the program.

Duration

The total duration of this training program will be of 390 hours without OJT.

Target Group

The target group for this training program will be school leavers having minimum of class seven educations. Preference will be given to the individuals of rural, poor, female, Dalit, Janjati, Disadvantaged Groups (DAGs), and conflict affected people.

Target location

The target location for this training program will be all over Nepal.

Group Size

The group size for this training program will be maximum 20, provided all necessary resources to practice the tasks/ competencies as specified in this curriculum.

Medium of Instruction

The medium of instruction for this program will be Nepali or English or both

Pattern of Attendance

The trainees should have 80% attendance in theory classes and 90% in practical/ performance to be eligible for internal assessments and final examinations.

Focus of Curriculum

This is a competency-based curriculum. This curriculum emphasizes on competency performance. 80% time is allotted for performance and remaining 20% time is for related technical knowledge. So, the main focus will be on performance of the specified competencies in this curriculum.

Entry Criteria

Individuals who meet the following criteria will be allowed to enter into this program:

- Minimum of seven class pass
- Physically and mentally fit
- Minimum of 15 years of age
- Should pass entrance examination

Instructional Media and Materials

The following instructional media and materials are suggested for the effective instruction and demonstration.

- **Printed Media Materials** (Assignment sheets, Case studies, Handouts, Information sheets, Individual training packets, Procedure sheets, Performance Check lists, Textbooks etc.).
- **Non-projected Media Materials** (Display, Models, Flip chart, Poster, Writing board etc.).
- **Projected Media Materials** (Opaque projections, Overhead transparencies, Slides etc.).
- **Audio-Visual Materials** (Audiotapes, Films, Slide-tape programs, Videodiscs, Videotapes etc.).
- **Computer-Based Instructional Materials** (Computer-based training, Interactive video etc.).

Teaching Learning Methodologies

The methods of teachings for this curricular program will be a combination of several approaches. Such as Illustrated Lecture, Group Discussion, Demonstration, Simulation, Guided practice, Practical experiences, Fieldwork and Other Independent learning.

- Theory: Mini talk, Discussion, Assignment, Group work.
- Practical: Demonstration, Observation, Guided practice and Self-practice.

Follow up Provision

- First follow up: Six months after the completion of the program
- Second follow up: Six months after the completion of the first follow up
- Follow up cycle: In a cycle of one year after the completion of the second follow up for five years

Grading System

The trainees will be graded as follows based on the marks in percentage secured by them in tests/ evaluations.

- Distinction: Passed with 80% or above
- First Division: passed with 75% or above
- Second Division: passed with 65% or above
- Third Division: passed with 60% or above

Trainees Evaluation Details

- Continuous evaluation of the trainees' performance is to be done by the related instructor/ trainer to ensure the proficiency over each competency under each area of the whole course.
- Related technical knowledge learnt by trainees will be evaluated through written or oral tests as per the nature in the institutional phase of training.
- Trainees must secure minimum marks of 40% and 60% in theory and practical evaluations respectively.
- There will be three internal evaluations and one final evaluation of the whole course.
- The ratio between internal and final examination of knowledge test will be 20:80 but for the performance test it will just reverse.
- The entrance test will be administered by the concerned training institute.

Trainers' Qualification (Minimum)

- Diploma in Mechanical Engineering or equivalent in related
- Good communicative and instructional skills
- Minimum 3 years experience in related field

Trainer-Trainees Ratio

- In theory classes 1(trainer): 20 (trainees)
- In practical classes (in workshop and laboratory) 1(trainer): 10 (trainees)

Suggestions for Instruction:

1. Select Objective

- Write Objective of cognitive domain.
- Write Objective of psychomotor domain.
- Write Objective of affective domain

2. Select Subject matter

- Study subject matter in detail.
- Select content related to cognitive domain.
- Select content related to psychomotor domain.
- Select content related to affective domain.

3. Select Instructional Methods

- Teacher centered methods: like lecture, demonstration, question answers inquiry, induction and deduction methods.
 - Student initiated methods like experimental, field trip/excursion, discovery, exploration, problem solving, and survey methods.
 - Interaction methods like discussion, group/team teaching, microteaching and exhibition.
 - Dramatic methods like role play and dramatization
4. Select Instructional method (s) on the basis of Objective of lesson plans and KAS domains.
 5. Select appropriate educational materials and apply at right time and place.
 6. Evaluate the trainees applying various tools to correspond the KAS domains.
 7. Make plans for classroom / field work / workshop organization and management.
 8. Coordinate among Objective, subject matter and instructional methods.
 9. Prepare lesson plan for theory and practical classes.
 10. Deliver /conduct instruction / program.
 11. Evaluate instruction/ program.

Special suggestion for the performance evaluation of the trainees

1. Perform task analysis.
2. Develop a detail task performance checklist.
3. Perform continuous evaluation of the trainees by applying the performance checklist.

Suggestion for skill training

1. Demonstrate task performance in normal speed.
2. Demonstrate slowly with verbal description of each and every step in the sequence of activity of the task performance using question and answer techniques.
3. Repeat 2 for the clarification on trainees demand if necessary.
4. Perform fast demonstration of the task.

Provide trainees the opportunities to practice the task performance demonstration

1. Provide opportunity to trainees to have guided practice.
2. Create environment for practicing the demonstrated task performance.
3. Guide the trainees in each and every step of task performance.
4. Provide trainees to repeat and re-repeat as per the need to be proficient on the given task performance.
5. Switch to another task demonstration if and only trainees developed proficiency in the task performance.

Other suggestions

1. Apply principles of skill training.
2. Allocate 20% time for theory classes and 80% time for task performance while delivering instructions.
3. Apply principles of learning relevant to the learner's age group.
4. Apply principles of intrinsic motivation.
5. Facilitate maximum trainees' involvement in learning and task performance activities.
6. Instruct the trainees on the basis of their existing level of knowledge, skills and attitude.

Certificate Requirements

The related training institute will provide the training certificate of "**Lathe Setter- Operator**" to those trainees who successfully complete all the requirements as prescribed by the curriculum.

Provision of Skill Testing

The graduates who have completion certificate of "**Lathe Setter-Operator**" may sit in the skill testing examination of **Level one (Level- 1)** as provisioned and administered by the National Skill Testing Board.

Physical Facilities

The theory class rooms at least should have area of 10 square feet per trainee and in the workshop it should be at least of 30 square feet per trainees. All the rooms and laboratory should be well illuminated and ventilated.

Well equipped workshop with adequate space	1 (No.)
Well furnished class room with adequate space	1 (No.)
Office room equipped with modern facilities	1 (No.)
Principle room equipped with modern facilities	1 (No.)
Reception room equipped with modern facilities	1 (No.)

Course Structure of Lathe Operator

Part A. Specialized modules

S.N.	Modules and sub-modules	Nature	Time (hours)	Total (hours)
1	Workshop Safety and Bench Work <ul style="list-style-type: none"> • Workshop Safety • Bench Work 	T+P	10 30	40
2	Machine/ Job/Tools Setting	T+P	35	35
3	Machine Operation	T+P	100	100
4	Thread Cutting	T+P	25	25
5	Offhand Grinding	T+P	25	25
6	Manufacturing Items (project work)	P	80	80
7	Applied Mathematics	P	20	20
8	Occupational Health Safety and First Aid	T+P	15	15
9	Communication	T+P	10	10
10	Entrepreneurship Development	T+P	40	40
	Total			395

Module 1

Workshop Safety and Bench Work

Description:

This module consists of two sub modules viz; workshop safety and bench work. The first sub module intends to provide knowledge on workshop safety whereas the second module intends provide knowledge and skills about bench work related to the occupation.

Objectives:

After completion of the module the trainees will be able:

1. To acquaint knowledge about workshop safety that must be followed in order to minimize lost of lives and properties
2. To perform various bench work activities as fundamental skills

Module Structure (M1)

S.N	Sub modules	Nature	Time (hours)
1	SM1: Workshop Safety	T+P	10
2	SM2: Bench work	T+P	30
		Total	40

Module 1

Sub module 1.1

Workshop Safety

Description:

This sub module intends to provide the knowledge and skills on Safety measures which must to be applied while providing the services safely minimizing lost of lives and properties. This course also provides knowledge and skills about personal safety and hygiene, Safety measures, Work place safety and Tools and equipment safety.

Objectives:

After completion of this sub module the trainees will be able:

1. To orient with personal safety and hygiene
2. To apply personal safety measures
3. To apply tools, equipment and materials safety measures
4. To apply work place safety measures

Duration: 10 hours (Theory 6.5 hours + Practical 3.5 hours)

Tasks:

1. Maintain occupational hygiene
2. Orient with personal safety
3. Follow safety measures/instructions
4. Fix safety notices/ signs
5. Prevent workshop hazard
6. Maintain first aid box
7. Apply first aid
8. Use fire extinguisher
9. Follow good safety practices (personal safety and proper machine operation).

Task Analysis

Task No: 1 Maintain occupational hygiene.

Time : 1 hr
Theory: 1 hr
Practical: 0 hr

Performance steps	Terminal Performance Objective	Related Technical Knowledge
1. Receive instruction. 2. Define occupational hygiene. 3. Enlist occupational hygiene. 4. Enlist importance related occupational hygiene 5. Informative tool ,machine and materials stick or hang on the proper place.	<p><u>Condition(Given):</u> Safety brochure, manuals, notice, posture, written instructions</p> <p><u>Task (What):</u> Follow the occupational hygiene.</p> <p><u>Standard (How Well):</u> Necessary materials needed for maintaining occupational hygiene.</p>	<ul style="list-style-type: none"> ☒ Importance of health and Safety signs colours ☒ Occupational hygiene related physical chemical biological environmental nuclear radiation psychological related to jobs (Accident hazards, Physical hazards, Chemical hazards, Biological hazards and Ergonomic, psychosocial and organizational factors) ☒ Preventive measures (refer to task no. 8 of this sub module)

Tools, equipment and materials: Toolbox, Gloves, Helmet, Apron, Goggles, Safety shoes, Handrill Machine, Drill bits, Ladder, safety belt, Informative posters, colors.

Safety: • Hammering safely • Drilling safely

Task Analysis

Task No: 2 Orient with personal safety

Time : 1 hr
Theory: 1 hr
Practical: 0 hr

Performance steps	Terminal Performance Objective	Related Technical Knowledge
1. Receive instruction. 2. Define safety precaution/ personal hygiene. 3. Enlist importance of safety precaution/personal hygiene. 4. Enlist the things that should be considered while acquiring personal safety/hygiene 5. Collect information on hazards that may occur in their working condition.	<p><u>Condition(Given):</u> Safety brochure, manuals, notice, posture, written instructions</p> <p><u>Task (What):</u> Orient with personal safety precaution/ hygiene.</p> <p><u>Standard (How Well):</u> Personal safety Precaution and personal hygiene oriented.</p>	<ul style="list-style-type: none"> ☒ Introduction of personal hygiene and safety precaution ☒ Importance of safety precaution and personal hygiene ☒ Hazards related to jobs (Accident hazards, Physical hazards, Chemical hazards, Biological hazards and Ergonomic, psychosocial and organizational factors) ☒ Preventive measures (refer to task no. 8 of this sub module)

Tools, equipment and materials: Toolbox, Gloves, Helmet, Apron, Goggles, Safety shoes, Hand Drill Machine, Drill bits, Ladder, safety belt, Informative posters, colors.

Safety: • Hammering safely • Drilling safely

Task Analysis

Task No: 3 Follow safety measure/instructions.

Time: 1 hr
Theory: 1 hr
Practical: 0 hr

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Receive instruction. 2. Read/interpret safety signs and notice 3. Follow personal safety precautions/instructions 4. Follow tools and equipments safety precautions/instructions 5. Follow work place safety precautions/instructions 6. Ask for the instructions if could not understand 7. Follow the instruction step by step 	<p><u>Condition(Given):</u> Safety brochure, manuals, notice, posture, written instructions</p> <p><u>Task (What):</u> Follow safety precautions/instructions.</p> <p><u>Standard (How Well):</u> Different safety signs and notice collected, read and interpreted. Different safety precautions/ instructions followed in sequential order.</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Concept of safety precaution <input type="checkbox"/> Different safety precautions (Personal, tools and equipment and work place) <input type="checkbox"/> Safety rules and regulation <input type="checkbox"/> Safety notice and signs <input type="checkbox"/> Different safety measures

Tools, equipment and materials: Toolbox, Gloves, Helmet, Apron, Goggles, Safety shoes, Handrill Machine, Drill bits, Ladder, safety belt, Informative posters, colors.

Safety: • Hammering safely • Drilling safely

Task Analysis

Task No: 4 Fix safety notice/ signs.

Time: 1 hr
Theory: 0.5 hr
Practical: 0.5 hr

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Read different safety signs and notice 2. Print safety sign/ notices 3. Educate safety sign and notices to all colleagues 4. Put the notices and sign in all critical places 	<p><u>Condition(Given):</u> Safety notices and signs</p> <p><u>Task (What):</u> Fix safety notice/ signs</p> <p><u>Standard (How Well):</u> Safety sign fixed according to the international rules at the work place.</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Safety sign and its importance <input type="checkbox"/> Different safety notice and signs

Tools, equipment and materials: Toolbox, Gloves, Helmet, Apron, Goggles, Safety shoes, Handrill Machine, Drill bits, Ladder, safety belt, Informative posters, colors.

Safety: • Hammering safely • Drilling safely

Task Analysis

Task No: 5 Prevent workshop hazard.

Time: 1 hr
Theory: 1 hr
Practical: 0 hr

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Check the electrical wiring 2. Ensure all wire connections are properly taped 3. Ensure the proper earthing 4. Ensure none of the socket and pin is loosely connected 5. Use rubber shoe while working with electrical lines (dry places) 6. Ensure all fire equipments are properly placed. 7. Stick the fire exit on proper place. 8. Paint the passage for workshop. 9. Ensure the proper ventilation and light. 10. Cover all the moving parts in the working place. 11. Check and drain the lubricant and coolant. 12. Take permission to operate the machine and equipment. 13. Set the gear levers before starting the machine. 	<p><u>Condition(Given):</u> Electrical wiring, instruments and devices</p> <p><u>Task (What):</u> Prevent electrical hazard</p> <p><u>Standard (How Well):</u> Electrical connections, devices and instruments checked before working.</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Principle of electricity generation <input type="checkbox"/> Concept of current, voltage & resistant <input type="checkbox"/> Parallel and series connection <input type="checkbox"/> Concept of earthing <input type="checkbox"/> Electrical devices, instrument & appliances <input type="checkbox"/> Loose connection and naked eye <input type="checkbox"/> Introduction of machines and equipments <input type="checkbox"/> Workshop safety <input type="checkbox"/> Personal safety <input type="checkbox"/> Tools & equipments safety <input type="checkbox"/> Machine safety <input type="checkbox"/> Possible hazards

Tools, equipment and materials: Fully equipped workshop.

Safety:

- Do not touch any electrical connection and appliance with wet hand
- Do not change gears while the machines are in running condition.

Task Analysis

Task No: 6 Maintain first aid box.

Time: 1 hr
Theory: 0.5 hr
Practical: 0.5 hr

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Take a list of medicine to be kept inside first aid box from medical practitioner. 2. Purchase those medicine from medical shop 3. Put those medicine in a first aid box and make a list of medicine and quantity 4. Put the first aid box in a accessible place 	<p><u>Condition(Given):</u> First aid box and medicine</p> <p><u>Task (What):</u> Maintain first aid box</p> <p><u>Standard (How Well):</u> Necessary medicine and materials needed for first aid maintained.</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Importance of first aid <input type="checkbox"/> First aid kit with necessary medicine and materials <input type="checkbox"/> Usage of different medicine

Tools, equipment and materials: First aid box with necessary medicine

Safety:

- Check the expire date of the medicine.

Task Analysis

Task No: 7 Apply first aid.

Time: 1 hr
Theory: 0.5 hr
Practical: 0.5 hr

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Identify different kinds of hazards in workshop 2. Perform first aid for cut and burn 3. Perform artificial respiration 	<p><u>Condition (Given):</u> First aid box</p> <p><u>Task (What):</u> Perform first aid.</p> <p><u>Standard (How Well):</u> First aid procedures for different cases applied.</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Importance of first aid <input checked="" type="checkbox"/> First aid kit with necessary medicine and materials <input checked="" type="checkbox"/> First aid technique

Tools, equipment and materials: First aid box with necessary medicine

Safety:

- * First aid box need to be maintained
- * First aid technique need to be followed exactly as specified

Task Analysis

Task No: 8 Use fire extinguishers.

Time: 1 hr
Theory: 0.5 hr
Practical: 0.5 hr

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Check the expiry date of fire extinguisher 2. Check the type of fire extinguisher 3. Select the fire extinguisher as per the nature of the fire 4. Spray the fire extinguisher taking it closer to the fire with caution 5. Clean the debris 	<p><u>Condition (Given):</u> Fire extinguisher, fire</p> <p><u>Task (What):</u> Use fire extinguisher.</p> <p><u>Standard (How Well):</u> Fire stopped through applying fire extinguisher.</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Types of fire extinguisher <input checked="" type="checkbox"/> Instructions given <input checked="" type="checkbox"/> Function and its use of fire extinguisher

Tools, equipment and materials: Fire extinguisher, Goggles, helmet, safety shoes, Fire proof apron

Safety:

- * To check expiry date of fire extinguisher
- * Clear distance to be maintained with fire while spraying so that it will not burn your hand
- * Do not keep the fire extinguisher near by burning.

Task Analysis

Task No: 9 Follow good safety practices (personal safety and proper machine operation).

Time: 2 hrs
Theory: 0.5 hr
Practical: 1.5 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<p><u>Personal safety wares:</u></p> <ol style="list-style-type: none"> 1. Always wear eye protection - preferably industrial quality safety glasses with side-shields. 2. Wear short sleeve shirts, if possible, or shirts with snugly fitting cuffs if long sleeve. 3. Wear shoes - preferably leather work shoes - to protect your feet from sharp metal chips on the shop floor and from tools and chunks of metal that may get dropped. 4. Remove wrist watches, necklaces, tie, chains and other jewelry 5. Tie back long hair so it can't get caught in the rotating work <p><u>Proper machine operation safety:</u> <u>(applicable while operating lathe machine)</u></p> <ol style="list-style-type: none"> 6. Always double check to make sure your work is securely clamped in the chuck or between centers before starting the lathe 7. Get in the habit of removing the chuck key immediately after use. 8. Keep your fingers clear of the rotating work and cutting tools. 9. Avoid reaching over the spinning chuck. 10. Never use a file with a bare tang - the tang could be forced back into your wrist or palm. 11. Do not the change the gear while machine is in motion. 12. While operating lathe machine operator must be on right hand side. 13. Use chip hook while removing the chips. 14. Switch off the machine before cleaning 15. Lubricate before and after operating the machine 	<p><u>Condition (Given):</u> Safety wares and lathe machine</p> <p><u>Task (What):</u> Follow good safety practices (personal safety and proper machine operation).</p> <p><u>Standard (How Well):</u> Good safety practices followed in view of personal safety and proper machine operation followed in sequential order.</p>	<p>☒ Important of good safety practices.</p> <p>☒ Tips for good safety practices.</p> <p>☒ Different safety wares</p>

Tools, equipment and materials: Toolbox, Gloves, Helmet, Apron, Goggles, Safety shoes, Handrill Machine, Drill bits, Ladder, safety belt, Informative posters, colors.

Safety:

- * Personal and workshop safety need to be maintained.
- * Do not keep long hair, finger ring, wrist watch, tie, necklaces while working in the workshop.

Module 1

Sub module 1.2

Bench work

Description:

This module intends to provide basic knowledge and skill needed to work in mechanical or its related workshops. It deals with filing a solid metal pieces to desire shape or maintain the surfaces as its fitting position when the parts have been repaired by welding; sawing the excessive areas of metals or preparing the structure components; marking and punching the mechanical parts as and when necessary and drilling and boring the holes in fastening the mechanical parts or structural components.

Objectives:

After completion of this sub module the trainees will be able:

1. To interpret Mechanical Drawing
2. To Orient with safety rules and workshop procedure
3. To identify/enumerate/handle basic tools and hand tools used in bench work in order to build confident in material preparation for welding the structures
4. To carryout bench works activities

Duration: 30 hours

Tasks:

1. Identify tools/equipments/materials
2. Handle tools/**equipment**.
3. Interpret mechanical drawing
4. Clean rusted parts
5. Measure/mark the given W/P
6. Perform Punching (letter/center)
7. Perform filing
8. Perform sawing
9. Perform grinding
10. Perform drilling
11. Perform chiseling

Task Analysis

Task No: 1 Identify/ tools/equipment/materials.

Time: 2 hrs
Theory: 1 hr
Practical: 1 hr

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Receive instructions 2. Visit tools/equipment/materials display room. 3. Identify different tools. 4. Enlist the function of identified and different enumerated tools. 5. Identify different equipment. 6. Identify different materials and tools needed for rust cleaning, lathe operation and items manufacturing. 7. Enlist the application of identified and enumerated materials. 8. Keep records. 	<p><u>Condition (Given):</u> Tools, equipment and materials displaying</p> <p><u>Task (What):</u> Identify/enumerate tools/equipment/materials</p> <p><u>Standard (How Well):</u> Different tools, equipment and materials identified and enumerated as well as their functions enlisted.</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Identification of different tools, equipment and materials <input checked="" type="checkbox"/> Basics of steel <input checked="" type="checkbox"/> Function of different tools and equipment <input checked="" type="checkbox"/> Application of materials <input checked="" type="checkbox"/> Identification and enumerating procedure <input checked="" type="checkbox"/> Safety precautions

Tools, equipment and materials: Different tools, equipment and materials

Safety: • Filling Safely • Use masks

Task Analysis

Task No: 2 Handle tools/equipment.

Time: 2 hrs
Theory: 1 hr
Practical: 1 hr

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Receive instructions 2. Visit tools/equipment/materials display room. 3. Handle measuring, marking and checking tools/equipment related to bench work. 4. Handle metal sawing with hand hacksaw. 5. Handle grinding off hand grinder and tools/equipment 6. Handle drilling tools/equipment 7. Handle files. 8. Handle rust cleaning tools. 9. Keep records. 	<p><u>Condition (Given):</u> Tools, equipment and materials displaying</p> <p><u>Task (What):</u> Handle tools/equipment.</p> <p><u>Standard (How Well):</u> Different tools and equipment handled and identified and handled.</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Identification of different tools, equipment and materials <input checked="" type="checkbox"/> Function of different tools and equipment <input checked="" type="checkbox"/> Handling procedure <input checked="" type="checkbox"/> Safety precautions

Tools, equipment and materials: Different tools, equipment and materials

Safety: • Drilling safety • Use goggles

Task Analysis

Task No: 3 Interpret mechanical drawing.

Total : 5 hrs
Theory : 2 hrs
Practical: 3 hrs

Performance Steps	Terminal Performance Objective	Related Technical Knowledge
1. Collect the mechanical designs and drawing. 2. Interpret the different representative lines. 3. Interpret the symbols given in the drawings. 4. Interpret the views as shown in the drawings 5. Interpret the scale. 6. Interpret the dimensions. 7. Draw or copy the individual components free hand on extra sheet. 8. Practice the same free hand exercise until you draw a clear view.	<p><u>Condition (Given):</u> Fully equipped workshop with mechanical designs and drawings.</p> <p><u>Tasks (What):</u> Interpret mechanical drawing.</p> <p><u>Standards (How well):</u> The working mechanical drawing interpreted and prepared the materials as well. Free hand sketch of components drawn.</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Representative lines <ul style="list-style-type: none"> • Constructional • Center • Dimensional • Hidden • Hatching <input checked="" type="checkbox"/> Representative symbols <ul style="list-style-type: none"> • Thread • Welding • Tolerance • Surface <input checked="" type="checkbox"/> Different views <ul style="list-style-type: none"> • Pictorial view • Isometric view • Orthographic view • Work shop drawing <input checked="" type="checkbox"/> Drawing scale. <ul style="list-style-type: none"> • Increased ratio • Decreased ratio <input checked="" type="checkbox"/> Dimensions <ul style="list-style-type: none"> • Linear • Circular • arc <input checked="" type="checkbox"/> Free hand sketch.

Tools, equipment and materials: Drawing board, Compass, Set square set, templates of holes and hexagon, Pencil 'B', Eraser, Ruler, Drawing tape, Clipper, Pencil sharpener, Dusting cloth.

Safety:

- * Keep the workplace dry.
- * Keep away the inflammable material.
- * Do not carry pointed tools in your pocket. Avoid working on damp floor

Task Analysis

Task No: 4 Clean rusted parts.

Total: 3 hrs
Theory : 1 hr
Practical: 2 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Obtain work piece material 2. Obtain emery paper or cloth of operation as required no. 3. Place or hold the w/p securely. 4. Scrub dirt and rusted area from metal parts with scriper 5. Take a piece of emery, fold it thrice or forth. 6. Hold between fore and middle fingers. 7. Rub the surfaces until the surface free from rusted layer. 8. Wipe the parts after rubbing. 	<p><u>Condition (Given):-</u> Fully equipped mechanical workshop</p> <p><u>Task (What):-</u> Clean rusted parts.</p> <p><u>Standard (How Well):-</u> Surface area rusted parts absolutely freed from rust and dirt.</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Rusted parts cleaning procedures <input checked="" type="checkbox"/> Safety precautions

Tools, equipment and materials: Scraper, emery paper etc.

Safety: • Use gloves while rubbing parts. • Follow workshop safety rules.

Task Analysis

Task No: 5 Measure /mark the given W/P.

Total: 3 hrs
Theory : 1 hr
Practical: 2 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Obtain required drawings. 2. Study drawing carefully. 3. Obtain required tools. 4. Obtain required (material) work piece. 5. Measure work piece. 6. De-burr the edges of the w/p 7. Clean the rusted surfaces. 8. Mark the layout according to dimension of given drawing. 9. Clean the working place. 	<p><u>Condition (Given):-</u> Workshop, work piece, measuring & marking instruments.</p> <p><u>Task (What):-</u> Measure/mark the given W/P.</p> <p><u>Standard (How Well):-</u> Work piece measured and marks well.</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Identification of measuring and marking tools <input checked="" type="checkbox"/> Measuring and marking procedure <input checked="" type="checkbox"/> Safety precautions

Tools, equipment and materials: Scriper, emery paper, file, steel Ruler, base Back Square, Marking scriber etc.

Safety:

- * Handle the tools carefully.
- * Follow workshop safety rules.
- * Don't put the measuring tools mix with cutting or other tools.

Task Analysis

Task No: 6 Perform sawing

Total: 3 hrs
Theory : 1 hr
Practical: 2 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Obtain work piece. 2. Obtain drawing and instructions. 3. Obtain required tools. 4. Mark the symmetrical lines. 5. Punch dotted on marked line. 6. Clamp the work piece on the vice (the marked line must be out side from the vice) 7. Check the blade & set up the blade on the hack saw frame. 8. Mark a small "V" notch at starting point using small triangular file if necessary only. 9. Hold hack saw frame & start cutting slowly moving the blade forward. 10. Apply pressure with only during forward motion (no pressure when backwards). 11. Check the cutting ways for straightness. 12. Move slowly down while finishing a cut. 13. Check the sawed part. 14. Clean all the tools & equipment then put it back. 15. Clean the working place & vice. 	<p><u>Condition (Given):-</u> Fully equipped mechanical Workshop, drawing, bench vice, hack saw & blade, & work piece material.</p> <p><u>Task (What):-</u> Saw the metal by hand.</p> <p><u>Standard (How Well):-</u> Vee notch before cutting marked. Straight cutting carried out.</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Use of hacksaw blade for different metal <input checked="" type="checkbox"/> Holding of work piece for sawing <input checked="" type="checkbox"/> Procedure of sawing metal by hand <input checked="" type="checkbox"/> Safety precautions

Tools, equipment and materials: Bench vice, Hacksaw Frame with blade, Triangular file, Scriper, emery paper, file, steel Ruler, base back square, marking scriber, centre punch and steel hammer etc.

Safety:

- * The work piece clamped tightly..
- * The teeth of the hack saw blade kept forward direction.
- * Don't move the blade left right during sawing.
- * Incline the blade is 150 during sawing.
- * Follow general safety rules.

Task Analysis

Task No: 7 Perform Grinding

Total: 2 hrs
Theory : 0 hr
Practical: 2 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Obtain drawing and instruction. 2. Obtain work piece. 3. Obtain hand grinder. 4. Obtain safety equipments 5. Clamp the work piece on the vice/secure on other fixture devices as per work piece 6. Hold the grinder with one hand position the switch button on thumb & another hand in handle of the machine. 7. Position the feet to safe stance during grinding. 8. Switch on the machine and rub the wheel on work surfaces forth and back or left and right movement as required. 9. Repeat the same motion until producing even surface. 10. Clean all the tools & put it back to proper place. 11. Clean the vice & working place. 	<p><u>Condition (Given):-</u> Fully equipped mechanical workshop with working bench & bench vice, hand grinder, safety equipments and work piece material.</p> <p><u>Task (What):-</u> Grind metal surface.</p> <p><u>Standard (How Well):-</u> Clear grounded work piece produced. the surface edges of De burred / chamfered</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Grinding procedure <input checked="" type="checkbox"/> Safety precautions

Tools, equipment and materials: Scribe, emery paper, file, steel Ruler, base back square, marking scribe, bench vice or fixture to secure the workpiece hand grinder, safety equipments etc.

Safety:

- * Stet up the height of bench vice before start grinding.
- * Wear safety goggles, hand gloves, and safety shoes.
- * Clamp the work piece tightly.
- * Use cleaning brush for cleaning the working surroundings.
- * Follow workshop safety rules.

Task Analysis

Task No: 8 Perform Filing

Total: 3 hrs
Theory : 1 hr
Practical: 2 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Obtain drawing and instructions. 2. Obtain work piece. 3. Obtain required tools & equipments. 4. Clamp the work piece on the vice (the flat surface should be up ward) 5. Hold the file's handle with one hand & put another hand's palm on the file's head. 6. Take Position for filing. 7. Put the file on top of the work piece & push forwards with pressure slowly touching the surface of materials equally. 8. Return the file without pressure. 9. Apply the same motion to produce even removal of filing surface. 10. Check the flatness diagonally & cross, using steel rule. 11. Repeat the same motion of filing until producing even surface. 12. Clean all the tools & put it back to proper place. 13. Clean the vice & working place. 	<p><u>Condition (Given):-</u> Fully equipped mechanical workshop with Flat files, working bench & bench vice & work piece material.</p> <p><u>Task (What):-</u> File flat surface.</p> <p><u>Standard (How Well):-</u> The even surface in metals and work piece materials produced.</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Function of vice <input checked="" type="checkbox"/> Function of files & its type <input checked="" type="checkbox"/> Filing procedure <input checked="" type="checkbox"/> Safety precautions

Tools, equipment and materials: Flat file, steel ruler, base Back Square, marking scribe, bench vice or fixture to secure the workpiece, safety equipments etc.

Safety:

- * Stet up the height of bench vice before start filling.
- * Use the whole length of the file.
- * Don't use the file with damage or broken handle.
- * Use wires brush for clean the file teeth.
- * Follow workshop safety rules.

Task Analysis

Task No: 9 Perform Punching(letter/center)

Total: 2 hrs
Theory : 0 hr
Practical: 2 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Obtain drawing and instruction. 2. Obtain prepared size of work piece. 3. Obtain required tools and equipment. 4. Mark the symmetrical lines as per drawing. 5. Place the work piece on the anvil. 6. Hold the punch by three fingers of one hand & hammer it by another hand. 7. Place the point of center punch at 90⁰. 8. Apply trail stroke. 9. Check the punch for accuracy. 10. Align if required. 11. Take cross line & punch. 12. Move the center as required side Vertical downward Horizontal right hand side 13. Repeat the same step until completing. 14. Clean tools & working place. 	<p><u>Condition (Given):-</u> Fully equipped mechanical workshop, drawing, anvil, steel rule, hammer, center/ dot punch, safety goggles, work piece materials.</p> <p><u>Task (What):-</u> Perform Punching (letter/center)</p> <p><u>Standard (How Well):-</u> The dotted marks on layouts punched for drilling and sawing.</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Punching procedure <input checked="" type="checkbox"/> Safety precautions

Tools, equipment and materials: Steel ruler, base back square, marking scribe, bench anvil, Center / Dot punch, safety equipments

Safety:

- * Don't wear bangles & wristwatch during punching.
- * Never use mushroom formatted head of punches.
- * Look at the punching point during punching, not at the head of punch during punching.
- * Follow the general safety rules of workshop.

Task Analysis

Task No: 10 Perform Drilling.

Total: 2 hrs
Theory : 1 hr
Practical: 1 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Obtain drawing and instruction. 2. Obtain required tools and equipment. 3. Obtain layout marked work piece. 4. Punch the center. 5. Clamp the work piece on the machine vice. 6. Mount the required drill bit on drill chuck. 7. Set up R.P.M. as per drill bit size. 8. Set coolant-housing pipe. 9. Set the machine & give hand feed first. 10. Switch on the machine and start drilling to the required depth. 11. Stop the machine. 12. Remove the work piece & clean it. 13. Measure the center & the hole size according to the drawing. 14. Remove the drill bit & clean all belongings and surroundings. 	<p><u>Condition (Given):-</u> Fully equipped mechanical workshop with drill m/c, drill bit set, refinished work piece with drill layout, safety goggles.</p> <p><u>Task (What):-</u> Drill a hole.</p> <p><u>Standard (How Well):-</u> A hole drilled.</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Introduction of drill m/c <input checked="" type="checkbox"/> Drill bits & its types <input checked="" type="checkbox"/> Drilling procedure <input checked="" type="checkbox"/> Safety precautions

Tools, equipment and materials:

Safety:

- * Tighten the work piece perfectly.
- * Check drill bit cutting edge before drilling
- * Use safety goggles.
- * Never use very loose cloth, tie, chain etc.
- * Use clan brush to clean the chips.
- * Follow general safety rules.

Task Analysis

Task No: 11 Perform Chiseling.

Total: 3 hrs
Theory : 1 hr
Practical: 2 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Obtain drawing and instruction. 2. Obtain required tools and equipment. 3. Obtain layout marked work piece. 4. Clamp the work piece on the vice. 5. Hold the chisel by left hand and hammer by right hand. 6. Put the chisel in the work piece 7. Make some angle (15° -30°) and strike by hammer on chisel for guide chip. 8. Make the chisel around 40° -60° and start to strike hammer on the chisel continuously up to the end of the work piece. 9. Make sure that end of the work piece will not cut down. 10. To finish (cut) the end of the work piece and turn the work piece strike from the other end. 11. Check the chiseled work. 12. Clean all tool and equipment. 13. Clean work piece and work place. 	<p><u>Condition (Given):-</u> Fully equipped mechanical workshop</p> <p><u>Task (What):-</u> Perform chiseling.</p> <p><u>Standard (How Well):-</u> Straight chiseling. Alternate chiseling.</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Introduction and use of different types of chisel <input checked="" type="checkbox"/> Holding of work piece for chiseling <input checked="" type="checkbox"/> Procedure of chiseling <input checked="" type="checkbox"/> Safety precautions

Tools, equipment and materials:

Bench vice, Cold Chisel, Marking scribe, steel scale, steel hammer, goggle, impact shield, protective shield

Safety:

- * Wear workshop appraise.
- * Clean the heads of hammer and chisel.
- * Put the impact shield on chisel.
- * Put the protective shield against chip flying off.
- * Check the wedge of the hammer.
- * Straight strike by hammer on the chisel.
- * Never used mushroom head chisel.
- * Never try to cut more than 1-2mm.

Module 2

Machine/Job/Tools Setting

Description:

This module is designed to provide knowledge and skills on setting up lathe machine in order to keep machine ready to operation. Machine setting includes the activities such as Setting up round machine on three jaw chuck, Setting turning tool on tool post, setting up machine control, Setting up round square work piece, Setting up machined work piece, setting up irregular work piece and setting up work piece along a steady rest.

Objectives:

After completion of this module the trainees will be able:

1. To be familiar with lathe machine and its accessories along with parts identification.
2. To set up turning tools and machine control
3. To set up various shapes of work pieces on machine

Module Structure (M2)

S.N	Module	Nature	Time (hours)
1	M2: Machine Setting	T+P	35

Tasks:

1. Set up Round Work piece on self centering Chuck
2. Set up Turning Tool on Tool Post
3. Set Up Machine Control
4. Set up Round/Square Work piece on independent Chuck
5. Set up Machined Work piece on Collet Chuck
6. Set up Irregular Work piece on Face Plate
7. Set up Workpiece Center to Center with Lathe Dog and Dog Clamp
8. Set up Work piece along a Steady Rest
9. Set up Work piece along a Follower Rest
10. Set up drill chuck
11. Set up tail stock
12. Set up top slide

Task Analysis

Task No. 1: Set up Round Work piece on self centering Chuck

Time: 3 hrs.
Theory: 1 hr
Practical: 2 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Obtain round workpiece 2. Obtain chuck key 3. Set the speed change gear lever into neutral position 4. Clean the jaws with cotton waste 5. Bring the jaws slightly bigger than workpiece diameter with the help of chuck key 6. De-burrs the workpiece if necessary 7. Insert the workpiece on three jaw leaving the required working length outside the chucks 8. Tighten the jaws slightly 9. Obtain height gauge (use dial test indicator for machined work piece and precision work piece) 10. Set the pointer of height gauge to workpiece diameter 11. Turn the chuck freely by hand 12. Observe concentricity 13. Hammer on the side as necessary 14. Check the concentricity again and align same process till the workpiece turn truly 15. Tighten the chuck 	<p><u>Condition (Given):</u></p> <p>Fully equipped workshop with Center lathe machine and Three jaw chuck.</p> <p><u>Task (What):</u></p> <p style="text-align: center;">Set up Round Work piece on self centering Chuck</p> <p><u>Standards (How well):</u></p> <p>Construction of 3 jaw chuck explained</p> <p>Concentricity in clamping aligned.</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Introduction of Lathe machine. <input checked="" type="checkbox"/> Construction of Three jaw chuck. <input checked="" type="checkbox"/> Procedure of clamping & truing the work piece <input checked="" type="checkbox"/> Safety precautions

Tools, equipment and materials:

Safety:

- * Avoid leaving Chuck key on the three jaw chuck.
- * Always remove burrs before clamping the workpiece.
- * Keep the carriers away from the Head stock.
- * Switch off the main electrical line while setting up the workpiece.
- * Pre-set enough lighting in machine area.
- * Always keep the machine and its surroundings neat and clean.

Task Analysis

Task No. 2: Set up Turning Tool on Tool Post

Time: 2 hrs
Theory: 1 hr
Practical: 1 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Identify the required shape and size of the tool to be clamp 2. Obtain tool post key 3. Check the cutting edge of the tool stone it if necessary (oil stone) 4. Collect and set the packages if necessary 5. Open up all bolts as required size of tool 6. Mount center (Revolving or dead) on Tailstock spindle 7. Bring center near to the tool post 8. Hold tool on Tool post projecting 15mm out 9. Tighten slightly all the bolts respecting with the tool 10. Set the center of cutting edge with center tip of center 11. Tighten all bolts 12. Open the bolts and place the packages until the center of cutting edge shows parallel to the Dead center tip 13. Adjust the screw to set the center for cutting edge if the tool post is Quick change tool post 	<p><u>Condition (Given):</u></p> <p>Fully equipped workshop with Center lathe machine, Tool holder, Tool tightening key and cutting tools.</p> <p><u>Task (What):</u></p> <p>Set up turning tool on tool post.</p> <p><u>Standards (How well):</u></p> <p>Cutting edge aligned with the center of the dead center.</p> <p>The projection of tool length determined.</p> <p>The cutting tool determined according to the lathe operation.</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Types of available Tool posts <input checked="" type="checkbox"/> Lathe tool settings procedure <input checked="" type="checkbox"/> Safety precautions

Tools, equipment and materials:

Safety:

- * Always use same size of wrench or keys when tightening the tool.
- * Avoid projecting over length of the tool.
- * Always set up the cutting edge with the spindle center.
- * Use Quick fixed Tool post as far as possible.
- * Always keep the machine and its surroundings neat and clean.
- * Pay attention when aligning anything in front of the tighten tool.

Task Analysis

Task No. 3: Set Up Machine Control

Time: 2 hrs.
Theory: 1 hr
Practical: 1 hr

Performance steps	Terminal Performance Objective	Related Technical Knowledge
1. Identify the material to be machine 2. Identify the diameter to be turn 3. Identify the operation to be perform 4. Calculate the RPM to be set 5. Calculate the feed to be set 6. Recognize the levers to set the RPM as per calculated 7. Recognize the levers to set the feed as per calculated 8. Calculate and set the levers of RPM and feed every time before starting to any machining operation	<p><u>Condition (Given):</u> Fully equipped workshop with Center lathe machine.</p> <p><u>Task (What):</u> Set up machine control.</p> <p><u>Standards (How well):</u> Gear lever set as calculated RPM according to work piece and cutting tools. Machine parts controlled as per its functions. Norton gear box set as per work piece, cutting tool material and depth of cut.</p>	<input checked="" type="checkbox"/> Main parts and their functions of the lathe machine <input checked="" type="checkbox"/> RPM and feed calculation <input checked="" type="checkbox"/> Setting procedure <input checked="" type="checkbox"/> Safety precautions

Tools, equipment and materials:

Safety:

- * Always set the RPM as per the workpiece material, cutting tool material and operation to be performed.
- * Always shift the gear lever after stopping the machine completely.
- * Set the lever in neutral position when not in use.

Task Analysis

Task No. 4: Set up Round/Square Work piece on independent Chuck

Time: 3 hrs
Theory: 1 hr
Practical: 2 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Obtain round/square work piece 2. Obtain chuck key 3. Set the speed change gear lever into neutral position 4. Clean the jaws with cotton waste 5. Bring the jaws slightly bigger than workpiece size in the center of spindle with the help of chuck key individually 6. De-burrs the work piece if necessary 7. Insert the work piece inside the jaws leaving the required working length outside 8. Tighten the jaws slightly one by one 9. Obtain height gauge 10. Obtain dial test indicator for machined work piece 11. Set the pointer of height gauge to the periphery of work piece 12. Turn the chuck freely by hand 13. Observe concentricity 14. Open the jaw where the pointer is far from the work piece 15. Tighten the opposite jaw where the pointer is beyond 16. Align the work piece opening and tightening the opposite jaws checking concentricity with height gauge pointer 17. Tighten all the jaws equally 	<p><u>Condition (Given):</u></p> <p>Fully equipped workshop with Center lathe machine, Four jaw chuck and Height gauge.</p> <p><u>Task (What):</u></p> <p>Set up Round/Square Work piece on independent Chuck</p> <p><u>Standards (How well):</u></p> <p>The construction of 4 jaw chuck explained.</p> <p>The concentricity setup in clamping with Dial test indicator.</p> <p>All 4 jaw chuck clamped with equal force.</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Uses of four jaw independent chuck <input checked="" type="checkbox"/> Construction of four jaw chuck <input checked="" type="checkbox"/> Uses of dial test indicator <input checked="" type="checkbox"/> Procedure of clamping and truing a workpiece on 4 jaw independent chuck <input checked="" type="checkbox"/> Safety precautions

Tools, equipment and materials:

Safety:

- * Avoid opening the adjacent jaws together.
- * Avoid projecting the part of jaws beyond the chuck periphery.
- * Use a wooden block on lathe bed when installing / removing the chuck.
- * Follow the same safety precautions of the task setting up round work piece on three jaw chuck.

Task Analysis

Task No. 5: Set up Machined Work piece on Collect Chuck

Time: 4 hrs
Theory: 1 hr
Practical: 3 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Obtain machined work piece 2. Identify the diameter as per size of the collect chuck 3. Obtain collect chuck with draw bar 4. Set the speed change gear lever into low speed position 5. Remove the lathe chuck 6. Clean the spindle nose with cotton waste 7. Insert draw bar from behind the head stock. 8. Insert collect chuck on spindle nose holding draw bar wheel from left hand 9. Turn draw bar wheel few round to hold the collect chuck 10. Insert the work piece on collect chuck leaving the required working length outside 11. Turn draw bar wheel in same direction as it hold until completely clamped the work piece 12. Set the rpm lever in neutral position 13. Turn the draw bar wheel freely by hand to check the concentricity. 14. Re-clamp if necessary 	<p><u>Condition (Given):</u></p> <p>Fully equipped workshop with Center lathe machine Sets of Collets, Collect chucks and Draw bar</p> <p><u>Task (What):</u></p> <p>Set up machined work piece on collect chuck.</p> <p><u>Standards (How well):</u></p> <p>The function of Collect chuck identified.</p> <p>The limitation of Collect chuck determined.</p> <p>The collect chucks set up and tightened on machine spindle.</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Introduction of collect chuck, Adapter and Draw in bar <input checked="" type="checkbox"/> Importance of using collect chucks <input checked="" type="checkbox"/> Procedure of clamping work on collect chuck <input checked="" type="checkbox"/> Safety precautions

Tools, equipment and materials:

Safety:

- * Refer the same safety precautions of the task: set up round work piece on three jaw chuck.
- * Use a wooden block on lathe bed when installing / removing the chuck.

Task Analysis

Task No. 6: Set up Irregular Work piece on Face Plate

Time: 4 hrs
Theory: 1 hr
Practical: 3 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Obtain a work piece 2. Obtain Face plate 3. Obtain clamps, T bolts and nuts with washer 4. Identify the position to clamp the workpiece 5. Place the work piece in required position and clamp with the T bolts and nuts 6. Clamp the counter piece if necessary 7. Set the speed change gear lever for low speed 8. Remove the chuck if necessary 9. Clean up threads on the spindle nose 10. Mount the face plate (along with the work piece) 11. Reset the rpm lever in neutral position 12. Check trueness of workpiece clamping 13. Realign if necessary 14. Tighten all the nuts bolts equally 	<p><u>Condition (Given):</u></p> <p>Fully equipped workshop with Center lathe machine, Face plate and clamping set.</p> <p><u>Task (What):</u></p> <p>Set up irregular workpiece on face plate.</p> <p><u>Standards (How well):</u></p> <p>The chucks removed and setup as fitted on machine spindle.</p> <p>Procedure of clamping followed on regular and irregular workpiece.</p> <p>Counter weight or supports used.</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Introduction of Face plate and its application <input type="checkbox"/> Importance of using counter weight on face plate <input type="checkbox"/> Procedure of clamping irregular different shaped work piece on Face plate <input type="checkbox"/> Safety precautions

Tools, equipment and materials:

Safety:

- * Always keep the counter piece of same weight.
- * Always use same size of spanners.
- * Keep the carriers away from the Head stock.
- * Switch off the main electrical line while setting up the workpiece.
- * Pre-set enough lighting in machine area.
- * Always keep the machine and its surroundings neat and clean.
- * Use a wooden block on lathe bed when installing / removing the chuck.
- * Setting or removing of a chuck or faceplate shall be made with due care, not to drop them down.

Task Analysis

Task No. 7: Set up Workpiece Center to Center with Lathe Dog and Dog Clamp

Time: 2 hrs
Theory: 1 hr
Practical: 1 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Obtain .work piece 2. Obtain facing tool, centre drill and drill chuck with key 3. Clamp the work piece on three jaw chuck 4. Set up the cutting tool on tool post 5. Perform facing operation 6. Perform center drilling operation 7. Reclamp the work piece for facing next side of the work piece 8. Carryout facing and central drilling operation 9. Hold the lathe dog on one side of work piece 10. Remove three jaw chuck 11. Set up face plate with dog stopper 12. Set up live center on spindle nose 13. Set the tail stock 14. Fix the work center of both side on live and dead or revolving center 15. Tighten the work piece from tail stock 16. Turn the work piece by hand until it stops on stopper in anti clock wise direction 	<p><u>Condition (Given):</u></p> <p>Fully equipped workshop with Center lathe machine, Live and Revolving center, Faceplate, Lathe dog and clamps.</p> <p><u>Task (What):</u></p> <p>Set up work piece center to center with lathe dog and dog clamp</p> <p><u>Standards (How well):</u></p> <p>The chucks removed and setup as fitted on machine spindle.</p> <p>Procedure of clamping between centre work piece with a lathe dog driving</p> <p>A work piece supported with a Tailstock.</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Introduction of Lathe dog and Dog clamp <input checked="" type="checkbox"/> Center drilling for Dog clamp <input checked="" type="checkbox"/> Procedure of clamping work pieces on center to center <input checked="" type="checkbox"/> Safety precautions

Tools, equipment and materials:

Safety:

- * Use small piece of Vee block when tightening the dog on machined surface.
- * Clean the spindle noses of Head and Tail-stock before setting the center.
- * Keep the carriers away from the Head stock.
- * Switch off the main electrical line while setting up the work piece.
- * Follow the same safety precautions of center drilling and facing operation.
- * Always keep the machine and its surroundings neat and clean.

Task Analysis

Task No. 8: Set up Work piece along a Steady Rest

Time: 3 hrs
Theory: 1 hr
Practical: 2 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Obtain work piece 2. Obtain steady rest 3. Set up the turning tool on the tool post 4. Set up work piece on the chuck to turn at the rest surface 5. Mount the Steady rest on lathe bed in the position according to the length of the work piece 6. Open the rest from its clamp 7. Set up work piece positioning the rest surface exactly on the rest 8. Close the rest and tighten the nuts 9. Align concentricity with the help of height gauge 10. Tighten fully chuck and nuts of Steady rest 11. Start the operation as needed. 	<p><u>Condition (Given):</u> Fully equipped workshop with Center lathe machine and Steady rest.</p> <p><u>Task (What):</u> Set up work piece along a steady rest.</p> <p><u>Standards (How well):</u> The surface area of work piece determined and positioned on machine bed to set steady rest. Procedure of clamping a work piece followed in sequence.</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Introduction of Steady rest <input checked="" type="checkbox"/> Importance of using rests <input checked="" type="checkbox"/> Procedure of using Steady rests <input checked="" type="checkbox"/> Safety precautions

Tools, equipment and materials:

Safety:

- * Use sufficient oil on the rest surface while rotating the work.
- * Keep the carriers away from the Headstock while setting the Steady rest.
- * Switch off the main electrical line while setting up the work piece.
- * Pre-set enough lighting in machine area.
- * Always keep the machine and its surroundings neat and clean.

Task Analysis

Task No. 9: Set up Work piece along a Follower Rest

Time: 3 hrs
Theory: 1 hr
Practical: 2 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Refer the step no. 1 to 6 of set up workpiece center to center with lathe dog and dog clamp. 2. Set up the Follower rest on the carrier 3. Reclamp workpiece projecting all machine length 4. Support at the end from tail stock with revolving center 5. Adjust the jaws of rest along with workpiece diameter 6. Set the tool according to the rest adjusted 7. Tighten all the jaws equally. 8. Try a cut to ensure the jaws of the rest follows to the cutting tool & its surface 	<p><u>Condition (Given):</u></p> <p>Fully equipped workshop with Center lathe machine and Follower rest.</p> <p><u>Task (What):</u></p> <p>Set up work piece along with follower rest.</p> <p><u>Standards (How well):</u></p> <p>The surface area of workpiece determined and positioned on machine carrier to set Follower rest.</p> <p>Procedure of clamping a work piece followed in sequence.</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Introduction of follower rest <input checked="" type="checkbox"/> Importance of using rests <input checked="" type="checkbox"/> Procedure of using Follower rests <input checked="" type="checkbox"/> Safety precautions

Tools, equipment and materials:

Safety:

- * Use sufficient oil on the rest surface while rotating the work.
- * Keep the carriers away from the Headstock while setting the Steady rest.
- * Switch off the main electrical line while setting up the work piece.
- * Pre-set enough lighting in machine area.
- * Always keep the machine and its surroundings neat and clean.

The spindle of tailstock shall not project out for. Whenever the tailstock is not in use it is safer to apply a stopper at the end of the bed or to completely removed it.

Task Analysis

Task No. 10: Set Up Drill chuck

Time: 3 hrs
Theory: 1 hr
Practical: 2 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
1 Obtain a Tail Stock. 2 Obtain a drill chuck 3 Identify the material to be Drilled 4. Identify the diameter to be drill 5. Identify the MT Size of the Drill chuck 6. Identify the Mt size of the Tail stock 7. Clean the Morse taper portion by wooden taper sleeve.	<p><u>Condition (Given):</u></p> <p>Fully equipped workshop with Center lathe machine.</p> <p><u>Task (What):</u></p> <p>Set up machine control.</p> <p><u>Standards (How well):</u></p> <p>Set up any Mourse taper. Set up Reamer ,Drills with taper shank</p>	<p>☒ Related parts and their functions of the lathe machine and tail stock</p> <p>☒ Setting procedure</p> <p>☒ Safety precautions</p>

Tools, equipment and materials:

Tail stock, Drill chuck, Wooden taper sleeve

Safety:

- * Always set the RPM as per the workpiece material, cutting tool material and operation to be performed.
- * Always shift the gear lever after stopping the machine completely.
 - * Set the lever in neutral position when not in use.

Task Analysis

Task No. 11: Set Up Tail stock

Time: 3 hrs
Theory: 1 hr
Practical: 2 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Obtain a Tail stock. 2. Obtain a Mandril 3. Obtain a Live centre 4. Obtain a Dial test indicator 5. Obtain a Revolving centre 6. Remove the chuck and fix the Live centre. 7. Fix the Revolving centre on Tail stock. 8. Place the mandrill between centre to centre . 9. Fix the Dial test indicator with stand on Carriage. 10. Bring and touch the point of the indicator near on one end of the Mandrill. 12. Touch the mandrill by the indicator point and fix the dial in zero 13. slide the carriage by touching the mandrill. 14. Slide one end to another end of the mandrill and show zero to zero on dial by sliding tailstock itself. 	<p><u>Condition (Given):</u></p> <p>Fully equipped workshop with Center lathe machine.</p> <p><u>Task (What):</u></p> <p>Set up Tail stock.</p> <p><u>Standards (How well):</u></p> <p>Set Tailstock zero to zero from one end to another end of the Mandrill. Perform turning operation, same diameter from both end of the lengthy shaft.</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Related parts and their functions of the lathe machine <input checked="" type="checkbox"/> Setting procedure <input checked="" type="checkbox"/> Safety precautions

Tools, equipment :Tail stock ,Mandrill.Live centre, Revolving centre,Dial test indicator with stand

Safety:

- * Always set the RPM as per the workpiece material, cutting tool material and operation to be performed.
- * Always shift the gear lever after stopping the machine completely.
- * Set the lever in neutral position when not in use.

Task Analysis

Task No. 12: Set Up Top slide

Time: 3 hrs
Theory: 1 hr
Practical: 2 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
1. Obtain a Tail stock. 2. Obtain a Mandril 3. Obtain a Live centre 4. Obtain a Dial test indicator 5. Obtain a Revolving centre 6. Remove the chuck and fix the Live centre. 7. Fix the Revolving centre on Tail stock. 8. Place the mandrill between centre to centre . 9. Fix the Dial test indicator with stand on Top slide. 10. Bring and touch the point of the indicator near on one end of the Mandrill. 15. Touch the mandrill by the indicator point and fix the dial in zero 16. Let the top slide sliding by touching the mandrill. 17. Slide one end to another end of the mandrill and have zero to zero on dial by tilting or adjusting top slide.	<p><u>Condition (Given):</u></p> <p>Fully equipped workshop with Center lathe machine.</p> <p><u>Task (What):</u></p> <p>Set up Top slide.</p> <p><u>Standards (How well):</u></p> <p>Set Top slide zero to zero from one end to another end of the Mandrill. Perform turning operation, and have same diameter from both end of the lengthy shaft.</p>	<p>☒ Main parts and their functions of the lathe machine</p> <p>☒ RPM and feed calculation</p> <p>☒ Setting procedure</p> <p>☒ Safety precautions</p>

Tools, equipment :Tail stock , Main drill, Live centre, Revolving centre, Dial test indicator with stand

Safety:

- * Always set the RPM as per the workpiece material, cutting tool material and operation to be performed.
- * Always shift the gear lever after stopping the machine completely.
- * Set the lever in neutral position when not in use.

Module 3

Machine Operation

Description:

This module is designed to provide knowledge and skills in producing cylindrical work piece, performing various lathe operation such as Facing, Plain turning, Step turning, Centre drilling, Chamfering, Grooving, Knurling, Internal groove cutting, Plain boring, External taper turning, Internal taper turning and Parting off machined parts operating lathe machine. It also deals with the procedures of manufacturing eccentric shaft.

Objectives:

After completion of this module the trainees will be able:

1. To carefully identify different machine operations know and understand
2. To carefully perform different **basic** lathe operations

Module Structure (M3)

S.N	Module	Nature	Time (hours)
1	M3: Machine Operation	T+P	100

Tasks:

1. Perform Facing
2. Perform Plain turning
3. Perform Step turning
4. Perform Center drilling/**drilling/reaming**
5. Perform Chamfering
6. Perform External Grooving
7. Perform Knurling
8. Perform plain boring/**counter boring**
9. Perform Internal groove cutting/turning
10. Perform External taper turning
11. Perform Internal taper turning
12. Perform Parting off
13. **Perform Eccentric Turning**

Task Analysis

Task No. 1: Perform Facing

Time: 5 hrs
Theory: 1 hr
Practical: 4 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Obtain drawing & work-piece material. 2. Wear safety gears related to operation 3. Clamp work piece firmly in chuck protruding minimum length. 4. Set facing tool in tool post. 5. Swivel tool post if required 6. Set machine controls (RPM, Feed, Coolant) 7. Run the machine. 8. Bring the tool towards the center of the rotating work piece by using top slide. 9. Lock the carriage tightly. 10. Give depth of cut from cross slide. 11. Draw back the tool slowly observing the surface being cut / faced. 12. Move the tool towards the centre, give depth of cut and feed the tools away from centre. 13. Repeat the process in different passes until required length is obtained. 14. Stop the machine, Measure all the dimensions and Make sure the dimensions are within tolerance before taking out the work-piece and tool from M/C. 15. Clean and set machine in safe position before leaving. 16. Collect and store all tools after neatly cleaning ready to re-use. 	<p><u>Condition (Given):</u></p> <p>Fully equipped workshop with Center lathe machine and Facing tool.</p> <p><u>Task (What):</u></p> <p>Perform Facing.</p> <p><u>Standards (How well):</u></p> <p>Procedure of facing operation followed in sequence.</p> <p>Surface finish checked.</p> <p>W/p produced within specified tolerances</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Interpretation of drawing <input checked="" type="checkbox"/> Handling m/c tools <input checked="" type="checkbox"/> Importance of facing <input checked="" type="checkbox"/> Procedure of facing operation <input checked="" type="checkbox"/> Facing tool <input checked="" type="checkbox"/> Vernier Caliper reading <input checked="" type="checkbox"/> RPM calculation <input checked="" type="checkbox"/> Safety precautions

Tools, equipment and materials: Center Lathe Machine, Three Jaw universal Chuck, Chuck keys, Soft hammer, Pedestal grinding machine, Grinding wheel dresser, HSS tool bit, Tool post key, Vernier caliper, Safety goggles, flat file, Cleaning brush, Safety gears. Material; MS Rod

Safety:

- * Refer the same safety precautions of the Module 2 task: Machine setting
- * Don't leave the chuck key on the chuck ,**keep at suitable proper place immediately after clamping the work piece**
- * Always wear safety gears.
- * Apply sufficient coolant.
- * **Avoid Accumulation of chips at job and tool**
- * Swivel the tool post slightly in opposite direction to the facing surface.

Task Analysis

Task No. 2: Perform Plain Turning

Time: 5 hrs

Theory: 1 hr

Practical: 4 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Obtain workshop drawing 2. Obtain work-piece material 3. Wear safety gears related to operation 4. Set up machine control (Feed, RPM, Coolant 5. Clamp work piece firmly in chuck protruding minimum length 6. Set up turning tool 7. Perform center drilling in case of job is long and support needed, (If necessary) 8. Determine the length & diameter to be machined 9. Run the machine 10. Bring the cutting tool at the edge of the work-piece 11. Apply first cut giving initial depth of cut 12. Bring back the turning tool initial position (step 7) 13. Set second depth of cut for roughing 14. Feed the tool towards the Head stock by slowly moving hand wheel of carriage 15. Apply auto feed as per requirements 16. Repeat cutting / turning until the required size is obtained 17. Stop the machine, Measure all the dimensions and Make sure the dimensions are within tolerance before taking out the work-piece and tool from M/C 18. Clean and set machine in safe position before leave. 19. Collect and store all tools after neatly cleaning ready to re-use. 	<p><u>Condition (Given):</u></p> <p>Fully equipped workshop with Center lathe machine and cutting tools.</p> <p><u>Task (What):</u></p> <p>Perform plain turning.</p> <p><u>Standards (How well):</u></p> <p>Plain cylindrical job turned in lathe machine. Surface finish checked. W/p produced within specified tolerances.</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Interpretation of drawing <input checked="" type="checkbox"/> Handling m/c tools <input checked="" type="checkbox"/> Concept of plain turning <input checked="" type="checkbox"/> Procedure of plain turning operation <input checked="" type="checkbox"/> RPM Calculation <input checked="" type="checkbox"/> Plain turning tool <input checked="" type="checkbox"/> Vernier Caliper reading <input checked="" type="checkbox"/> Safety precautions

Tools, equipment and materials: Tools, equipment and materials: Center Lathe Machine, Three Jaw universal Chuck, Chuck keys, Soft hammer, Pedestal grinding machine, Grinding wheel dresser, HSS tool bit, Tool post key, Vernier caliper, Safety goggles, flat file, Cleaning brush, Safety gears, Drill chuck & Key, Sleeve, Drift, Centre drill, Revolving center Material; MS Rod

Safety:

- * Refer the same safety precautions of the Module 2 task: Machine setting & Module 3 task: perform facing.
- * Machine setting tasks as of: Perform facing.
- * Do not apply over cut and over feed.

Task Analysis

Task No. 3: Perform Step turning

Time: 10 hrs
Theory: 1 hr
Practical: 9 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Refer and follow all the steps 1 to 16 of task to perform Plain turning. 2. Determine the length to be step turn. 3. Determine the diameter to be machined. 4. Mark the step length by tool and rotating the chuck manually. 5. Perform plain turning applying rough cut. 6. Repeat rough cut turning leaving 1 mm excess material in size. 7. Reset the tool if necessary. 8. Measure the length and diameter. 9. Perform further turning till the diameter, shoulder and step length is obtained. 10. Apply auto feed if necessary. 11. Stop the machine, Measure all the dimensions and Make sure the dimensions are within tolerance before take out the work-piece and tool from M/C 12. Clean and set machine in safe position before leave. 13. Collect and store all tools after neatly cleaning ready to re-use. 	<p><u>Condition (Given):</u></p> <p>Fully equipped workshop with Center lathe machine and cutting tools.</p> <p><u>Task (What):</u></p> <p>Perform step turning.</p> <p><u>Standards (How well):</u></p> <p>Different shoulders identified. Stepped cylindrical Φ/P turned. Measurements of machined surface (Diameter & Length) checked. Good surface quality</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Interpretation of drawing <input checked="" type="checkbox"/> Handling m/c tools <input checked="" type="checkbox"/> Concept of step turning <input checked="" type="checkbox"/> Types of shoulders and their use <input checked="" type="checkbox"/> Procedure of turning steps <input checked="" type="checkbox"/> RPM Calculation <input checked="" type="checkbox"/> Step turning tool <input checked="" type="checkbox"/> Vernier Caliper reading <input checked="" type="checkbox"/> Safety precautions

Tools, equipment and materials: Tools, equipment and materials: Center Lathe Machine, Three Jaw universal Chuck, Chuck keys, Soft hammer, Pedestal grinding machine, Grinding wheel dresser, HSS tool bit, Tool post key, Vernier caliper, Safety goggles, flat file, Cleaning brush, Safety gears, Drill chuck & Key, Sleeve, Drift, Centre drill, Revolving center, Material; MS Rod

Safety:

- * Refer the same safety precautions of Module 2 task: Machine setting & Module 3 task: perform facing, plain turning.
- * Pay attention when machining the shoulder.

Task Analysis

Task No. 4: Perform Center drilling/**drilling/reaming**

Time: 5 hrs

Theory: 1 hr

Practical: 4 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Refer and follow all the tasks and steps 1 to 13 to perform facing operation. 2. Obtain center drill, drill chuck & key, and sleeve suitable to the Tailstock spindle taper size. 3. Obtain drill, and reamer according to specified in drawing. 4. Mount drill chuck on Tailstock spindle 5. Hold Center drill in drill chuck and tighten with the key 6. Bring the center drill point near to the face of the work piece and clamp the tail stock . 7. Set up the RPM as center drilling 8. Run the machine 9. Apply sufficient coolant flow 10. Apply feed gently to depth using tailstock hand wheel 11. Finish the centre drilling and check for required length. 12. Remove centre drill and replace drill bit in drill chuck. Change bits gradually up to reaming size. 13. Repeat procedure steps 6 to 11 12. Remove drill bit and place reamer on drill chuck. 13. Repeat procedure steps 6 to 11 14. Stop the machine, Measure all the dimensions and Make sure the dimensions are within tolerance before take out the work-piece and tool from M/C 15. Clean and set machine in safe position before leave. 16. Collect and store all tools after neatly cleaning ready to re-use. 	<p><u>Condition (Given):</u> Fully equipped workshop with Center lathe machine, Facing tool, Drill chuck and Center drill.</p> <p><u>Task (What):</u> Perform center drilling/ drilling/ reaming</p> <p><u>Standards (How well):</u> Center drill on drill chuck and drill chuck on Tailstock clamped. RPM set up for center drilling. The depth of center drilling determined. RPM set up for drilling. RPM set up for reamer. Procedure of drilling followed in sequence.</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Interpretation of drawing <input checked="" type="checkbox"/> Handling m/c tools <input checked="" type="checkbox"/> Center drill <input checked="" type="checkbox"/> Drill bit <input checked="" type="checkbox"/> Reamer <input checked="" type="checkbox"/> Sleeve <input checked="" type="checkbox"/> Procedure of center drilling, drilling, reaming <input checked="" type="checkbox"/> RPM Calculation <input checked="" type="checkbox"/> Vernier Caliper reading <input checked="" type="checkbox"/> Safety precautions

Tools, equipment and materials: : Center Lathe Machine, Three Jaw universal Chuck, Chuck keys, Soft hammer, Pedestal grinding machine, Grinding wheel dresser, HSS tool bit, Tool post key, Vernier caliper, Safety goggles, flat file, Cleaning brush, Safety gears, Drill chuck & Key, Sleeve, Drift, Centre drill, Revolving center, Drill bits, Reamer, Material; MS Rod

Safety:

- * Refer the same safety precautions of Module 2 task: Machine setting & Module 3 task: perform facing, plain turning.
- * Keep away the tool post from the **Job**.
- * Apply coolant sufficiently.
- * Avoid protruding the center drill and tailstock spindle unnecessary.
- * **Do not apply over pressure (cut/feed) on tailstock spindle.**
- * **Avoid chips jamming in drill hole**

Task Analysis

Task No. 5: Perform Chamfering.

Time: 5.0 hrs
Theory: 1.0 hr
Practical: 4.0 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Refer and follow all the steps 1 to 16 of task to perform Plain turning 2. Reset the chamfering tool on tool post 3. Determine the size of chamfer 4. Bring gently the mid of face of cutting tip to the edge of the work piece 5. Set the dial scale '0' of both the top and cross slide 6. Run the machine 7. Give feed as in plain turning 8. Repeat the process and the chamfer at all corners and edges of the work piece 9. Stop the machine, Measure all the dimensions and Make sure the dimensions are within tolerance before taking out the work-piece and tool from M/C 10. Clean and set machine in safe position before leave. 11. Collect and store all tools after neatly cleaning ready to re-use. 	<p><u>Condition (Given):</u></p> <p>Fully equipped workshop with Center lathe machine and cutting tools.</p> <p><u>Task (What):</u></p> <p>Perform Chamfering.</p> <p><u>Standards (How well):</u></p> <p>Feeds applied for chamfering. No Chatter marks on surface</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Interpretation of drawing <input checked="" type="checkbox"/> Handling m/c tools <input checked="" type="checkbox"/> Concept of chamfering <input checked="" type="checkbox"/> Importance of chamfers <input checked="" type="checkbox"/> Procedure of turning chamfers <input checked="" type="checkbox"/> Chamfering tool bit <input checked="" type="checkbox"/> RPM Calculation <input checked="" type="checkbox"/> Vernier Caliper reading <input checked="" type="checkbox"/> Safety precautions

Tools, equipment and materials: Center Lathe Machine, Three Jaw universal Chuck, Chuck keys, Soft hammer, Pedestal grinding machine, Grinding wheel dresser, HSS tool bit, Tool post key, Vernier caliper, Safety goggles, flat file, Cleaning brush, Safety gears, Drill chuck & Key, Sleeve, Drift, Centre drill, Revolving center Material; MS Rod

Safety:

- * Refer the same safety precautions of Module 2 task: Machine setting & Module 3 task: perform facing, plain turning step turning.

Task Analysis

Task No. 6: Perform External Grooving.

Time: 11.0 hrs

Theory: 1.0 hr

Practical: 10.0 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Refer and follow all the steps 1 to 16 of task to perform Plain turning 2. Refer and follow all the steps 1 to 10 of task perform Step turning 3. Make the corner shoulder 4. Obtain grooving tool according to the size and shape of the groove 5. Reset the grooving tool on tool post face so that the cutting tool is parallel to the work-piece 6. Identify and mark off groove to be cut 7. Set appropriate RPM for grooving 8. Run the machine 9. Bring the tool near to the groove to be cut 10. Set the dial scale '0', of both the top and cross slide 11. Perform feeding cross slide towards the machine center reading dial scale 12. Stop feeding, turn back, Set the same '0' again 13. Slide Top slide according to wide to be cut reading dial scale 14. Repeat step no.11. until required depth is obtained 15. Verify the width and depth of the groove with vernier caliper 16. Move back and forward to acquire required depth and width 17. Slide the cutting tools back & forth 18. Stop the machine, Measure all the dimensions and Make sure the dimensions are within tolerance before take out the work-piece and tool from M/C 19. Clean and set machine in safe position before leave. 20. Collect and store all tools after neatly cleaning ready to re-use. 	<p><u>Condition (Given):</u> Fully equipped workshop with Center lathe machine & grooving tool.</p> <p><u>Task (What):</u> Perform Grooving.</p> <p><u>Standards (How well):</u> The cutting tool selected for grooving. Grooving tool set up on tool post and work position. Grooving operation performed. Measurements of grooves taken.</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Interpretation of drawing <input checked="" type="checkbox"/> Handling m/c tools <input checked="" type="checkbox"/> Concept of grooving <input checked="" type="checkbox"/> Types of grooves and uses <input checked="" type="checkbox"/> Procedure of turning grooves <input checked="" type="checkbox"/> Grooving tool bit <input checked="" type="checkbox"/> RPM Calculation <input checked="" type="checkbox"/> Vernier Caliper reading <input checked="" type="checkbox"/> Safety precautions

Tools, equipment and materials: Center Lathe Machine, Three Jaw universal Chuck, Chuck keys, Soft hammer, Pedestal grinding machine, Grinding wheel dresser, HSS tool bit, Tool post key, Vernier caliper, Safety goggles, flat file, Cleaning brush, Safety gears, Drill chuck & Key, Sleeve, Drift, Centre drill, Revolving center Material; MS Rod

Safety:

- * Refer the same safety precautions of Module 2 task: Machine setting & Module 3 task: perform facing, plain turning step turning.
- * Avoid overhanging **and vibration** of tool.

Task Analysis

Task No. 7: Perform Knurling.

Time: 6 hrs
Theory: 1 hr
Practical: 5 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Refer and follow all the steps 1 to 16 of task to perform Plain turning 2. Perform further operations if necessary 3. Determine the distance/and length to be knurled 4. Obtain knurling tool (machine knurling) 5. Calculate the rate of feed and set on the m/c 6. Calculate the RPM and set on the m/c 7. Set the knurling tool on tool post 8. Bring gently the tool roll on the work-piece 9. Run the machine 10. Give depth of cut 11. Set the lead screw and start feeding 12. Check the mark on the surface 13. Stop auto feeding and return to starting position 14. Clean with the brush 15. Repeat the process from step no 10 until fine knurled surface is obtained 16. Stop the machine, Measure all the dimensions and Make sure the dimensions are within tolerance before take out the work-piece and tool from M/C 17. Clean and set machine in safe position before leave. 18. Collect and store all tools after neatly cleaning ready to re-use. 	<p><u>Condition (Given):</u></p> <p>Fully equipped workshop with Center lathe machine and Knurling tools.</p> <p><u>Task (What):</u></p> <p>Perform knurling.</p> <p><u>Standards (How well):</u></p> <p>Surface area of work-piece determined.</p> <p>Knurling tools clamped.</p> <p>Procedures of knurling followed in sequence.</p> <p>Knurling Quality checked</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Interpretation of drawing <input checked="" type="checkbox"/> Handling m/c tools <input checked="" type="checkbox"/> Introduction to Knurling <input checked="" type="checkbox"/> Types of knurling <input checked="" type="checkbox"/> Procedure of knurling operation <input checked="" type="checkbox"/> RPM Calculation <input checked="" type="checkbox"/> Vernier Caliper reading <input checked="" type="checkbox"/> Safety precautions

Tools, equipment and materials Center Lathe Machine, Three Jaw universal Chuck, Chuck keys, Soft hammer, Pedestal grinding machine, Grinding wheel dresser, HSS tool bit, Tool post key, Vernier caliper, Safety goggles, flat file, Cleaning brush, Safety gears, Drill chuck & Key, Sleeve, Drift, Centre drill, Revolving center, Material; MS Rod

Safety:

- * Refer the same safety precautions of Module 2 task: Machine setting & Module 3 task: perform facing, plain turning step turning.
- * Avoid giving excessive depth.
- * Avoid knurling overlapped.
- * Apply light oil with brush when knurling, and take care that the brush does not roll over

Task Analysis

Time: 5 hrs
Theory: 1 hr
Practical: 4 hrs

Task No. 8: Perform Plain boring/counter boring

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Refer and follow all the steps 1 to 6 of task to perform Plain turning 2. Perform facing operation 3. Perform center drilling 4. Perform plain turning if necessary 5. Drill pilot hole up to 2mm small then the exact hole size 6. Reset the boring tool in the centre line with the center located on the tailstock 7. Bring the tool tip gently on the drilled hole surface 8. Set the dial scale '0' of cross slide feed 9. Apply depth of cut 10. Run the machine and give feed manually 11. Ensure the cut is performed smoothly 12. Check the size of diameter 13. Give remaining depth of cut leaving allowance for finishing cut 14. Apply auto feed if necessary and complete the cut 15. Stop the machine, Measure all the dimensions and make sure the dimensions are within tolerance before take out the work-piece and tool from M/C 16. Clean and set machine in safe position before leave. 17. Collect and store all tools after neatly cleaning ready to re-use. 	<p>Condition (Given): Fully equipped workshop with Center lathe machine Facing tool, turning tool, Center drill, Drill bits for pilot hole plain boring tool</p> <p>Task (What): Perform plain boring/counter boring.</p> <p>Standards (How well): Pilot hole drilled. Boring tool set up. RPM selected for drilling and boring. Procedures of plain boring followed in sequence. Measurement of internal diameter checked.</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Interpretation of drawing <input checked="" type="checkbox"/> Handling m/c tools <input checked="" type="checkbox"/> Concept of plain boring <input checked="" type="checkbox"/> Boring and drilling on lathe machine <input checked="" type="checkbox"/> Procedure of boring operation <input checked="" type="checkbox"/> Boring tool <input checked="" type="checkbox"/> RPM Calculation <input checked="" type="checkbox"/> Vernier Caliper reading <input checked="" type="checkbox"/> Safety precautions

Tools, equipment and materials: Center Lathe Machine, Three Jaw universal Chuck, Chuck keys, Soft hammer, Pedestal grinding machine, Grinding wheel dresser, HSS tool bit, Tool post key, Vernier caliper, Safety goggles, flat file, Cleaning brush, Safety gears, Drill chuck & Key, Sleeve, Drift, Centre drill, Revolving center Material; MS Rod, Boring tool, "V" block, Material; MS Rod

Safety:

- * Refer the same safety precautions of the tasks as of: Set up turning tool, Perform plain turning and Perform center drilling.
- * Apply sufficient coolant on machining surface.
- * Do not apply over pressure (cut/feed) on tailstock spindle.
- * Avoid chips jamming in drill hole

Task Analysis

Task No. 9: Perform Internal Groove cutting/Undercut turning

Time: 11.0 hrs
Theory: 1.0 hr
Practical: 10.0 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Refer and follow all the steps 1 to 14 of task to perform Plain boring(Task-8) 2. Obtain internal grooving tool according to the size and shape of the groove 3. Set the internal grooving tool to exact centre height of the job 4. Set the dial scale '0' on top slide & cross slide 5. Locate internal groove to be cut 6. Bring the tool tip gently on the surface to be groove 7. Set RPM and Run the machine 8. Move the cross slide observing tool cuts in groove. 9. Give side feed cut if necessary 10. Repeat the process for remaining depth of cut until groove size is obtained 11. Stop the machine, Measure all the dimensions and Make sure the dimensions are within tolerance before take out the work-piece and tool from M/C 12. Clean and set machine in safe position before leave. 13. Collect and store all tools after neatly cleaning ready to re-use. 	<p><u>Condition (Given):</u> Fully equipped workshop with Center lathe machine. Facing tool, turning tool, Center drill, Drill bits for pilot hole, plain boring tool internal grooving tool.</p> <p><u>Task (What):</u> Perform internal groove cutting/Undercut turning.</p> <p><u>Standards (How well):</u> The cutting tool selected for grooving. Grooving tool set in tool post. Grooving operation performed. Measurements of grooves checked.</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Interpretation of drawing <input checked="" type="checkbox"/> Handling m/c tools <input checked="" type="checkbox"/> Concept of internal grooving <input checked="" type="checkbox"/> Procedure of turning internal grooves <input checked="" type="checkbox"/> Internal grooving tool <input checked="" type="checkbox"/> RPM Calculation <input checked="" type="checkbox"/> Vernier Caliper reading <input checked="" type="checkbox"/> Safety precautions

Tools, equipment and materials: Center Lathe Machine, Three Jaw universal Chuck, Chuck keys, Soft hammer, Pedestal grinding machine, Grinding wheel dresser, HSS tool bit, Tool post key, Vernier caliper, Safety goggles, flat file, Cleaning brush, Safety gears, Drill chuck & Key, Sleeve, Drift, Centre drill, Revolving center Material; MS Rod, Boring tool, "V" block, Internal Grooving tool.
 Material; MS Rod

Safety:

- * Refer the same safety precautions of the task as of: Perform external grooving.

Task Analysis

Task No. 10: Perform External Taper turning.

Time: 10.0 hrs
Theory: 1.0 hr
Practical: 9.0 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Refer and follow all the steps 1 to 7 of task to perform Plain turning 2. Perform step turning if necessary 3. Calculate the setting angle to be cut 4. Identify the angle to be cut and set 5. Loosen the nuts of the swivel plate on the cross slide 6. Set the required angle reading swivel plate scale and tighten the nuts. 7. Bring gently the cutting tip of tool on the edge of the work-piece 8. Set the sliding length of top slide as per taper length 9. Run the machine and give depth of cut from cross slide 10. Feed manually from top slide 11. Repeat tapering process until the required dimension is obtained <li style="color: red;">12. Stop the machine, Measure all the dimensions and Make sure the dimensions are within tolerance before taking out the work-piece and tool from M/C <li style="color: red;">13. Clean and set machine in safe position before leave. <li style="color: red;">14. Collect and store all tools after neatly cleaning ready to re-use 	<p><u>Condition (Given):</u> Fully equipped workshop with Center lathe machine and cutting tools.</p> <p><u>Task (What):</u> Perform external taper turning.</p> <p><u>Standards (How well):</u> The setting angle calculated. Compound slide and cutting tool set up. Feeding applied manually. Procedure of tapering followed in sequences turning external diameter. Surface quality maintained. Made taper angle measured.</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Interpretation of drawing <input checked="" type="checkbox"/> Handling m/c tools <input checked="" type="checkbox"/> Methods of taper turning on lathe machine <input checked="" type="checkbox"/> Taper calculation. <input checked="" type="checkbox"/> Procedure of taper turning by top slide method <input checked="" type="checkbox"/> Turning tool bit <input checked="" type="checkbox"/> RPM Calculation <input checked="" type="checkbox"/> Vernier Caliper reading <input checked="" type="checkbox"/> Safety precautions

Tools, equipment and materials: Center Lathe Machine, Three Jaw universal Chuck, Chuck keys, Soft hammer, Pedestal grinding machine, Grinding wheel dresser, HSS tool bit, Tool post key, Vernier caliper, Safety goggles, flat file, Cleaning brush, Safety gears, Drill chuck & Key, Sleeve, Drift, Centre drill, Revolving center, Open end Spanner. Material; MS Rod

Safety:

* Refer the same safety precautions of the tasks as of: Perform plain turning, Perform step turning.

Task Analysis

Task No. 11: Perform Internal Taper turning.

Time: 10.0 hrs

Theory: 1.0 hr

Practical: 9.0 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Refer and follow all the steps 1 to 5 of task to perform Plain boring 2. Obtain required boring tool. 3. Reset the boring tool in the centre line with the center located on the tailstock 4. Calculate the setting angle to be cut 5. Loosen the nuts of the swivel plate on the cross slide 6. Set the required angle reading swivel plate scale and tighten the nuts 7. Set the sliding length of top slide as per taper length 8. Bring gently the cutting tip on the inside edge of the work-piece 9. Set the dial scale '0' on cross slide & top slide 10. Run the machine and give depth of cut using cross slide 11. Feed manually using top slide. 12. Repeat taper turning process until the required dimension is obtained. 15. Stop the machine, Measure all the dimensions and Make sure the dimensions are within tolerance before take out the work-piece and tool from M/C 16. Clean and set machine in safe position before leave. 17. Collect and store all tools after neatly cleaning ready to re-use 	<p><u>Condition (Given):</u> Fully equipped workshop with Center lathe machine. Facing tool, turning tool, Center drill, Drill bits for pilot hole plain boring tool.</p> <p><u>Task (What):</u> Perform internal taper turning</p> <p><u>Standards (How well):</u> The setting angle. Compound slide and cutting tool set up. Manual feeding applied. Procedure of taper turning of internal diameter followed in sequence. Surface finish maintained. Measurement of taper angle checked.</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Interpretation of drawing <input checked="" type="checkbox"/> Handling m/c tools <input checked="" type="checkbox"/> Concept of internal tapering <input checked="" type="checkbox"/> Setting angle for internal taper. <input checked="" type="checkbox"/> Procedure of turning internal taper. <input checked="" type="checkbox"/> Boring tool bit <input checked="" type="checkbox"/> RPM Calculation <input checked="" type="checkbox"/> Vernier Caliper reading <input checked="" type="checkbox"/> Taper calculation <input checked="" type="checkbox"/> Safety precautions

Tools, equipment and materials: ; Center Lathe Machine, Three Jaw universal Chuck, Chuck keys, Soft hammer, Pedestal grinding machine, Grinding wheel dresser, HSS tool bit, Tool post key, Vernier caliper, Safety goggles, flat file, Cleaning brush, Safety gears, Drill chuck & Key, Sleeve, Drift, Centre drill, Revolving center Material; MS Rod, Boring tool, "V" block , Open end Spanner.

Material; MS Rod

Safety:

- * Refer the same safety precautions of the task as of: Perform boring & Perform taper turning

Task Analysis

Task No. 12: Perform Parting off.

Time: 6.0 hrs
Theory: 1.0 hr
Practical: 5.0 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Finish all the operations that has to be perform as directed. 2. Obtain parting off tool. 3. Clamp tool on tool post setting it perpendicular to the machine center. 4. Locate and mark the length to part off. 5. Bring the cutting tip on work-piece 6. Set RPM half of normal RPM. 7. Run the machine and give depth of cut using cross slide, observe tool cuts without tool vibration. 8. Give side clearance cut if necessary 9. Repeat the process of cutting until parting off is obtained. 10. Stop the machine, Measure all the dimensions and Make sure the dimensions are within tolerance before take out the work-piece and tool from M/C 11. Clean and set machine in safe position before leave. 12. Collect and store all tools after neatly cleaning ready to re-use 	<p><u>Condition (Given):</u> Fully equipped workshop with Center lathe machine and Parting off tool.</p> <p><u>Task (What):</u> Perform parting off.</p> <p><u>Standards (How well):</u> Tools camped. RPM set. Feeds /depth applied as per requirements</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Interpretation of drawing <input checked="" type="checkbox"/> Handling m/c tools <input checked="" type="checkbox"/> Concept of parting off <input checked="" type="checkbox"/> Procedure of parting off the pre machined part <input checked="" type="checkbox"/> parting off tool bit <input checked="" type="checkbox"/> RPM Calculation <input checked="" type="checkbox"/> Vernier Caliper reading <input checked="" type="checkbox"/> Safety precautions

Tools, equipment and materials: : Center Lathe Machine, Three Jaw universal Chuck, Chuck keys, Soft hammer, Pedestal grinding machine, Grinding wheel dresser, HSS tool bit, Tool post key, Vernier caliper, Safety goggles, flat file, Cleaning brush, Safety gears, Drill chuck & Key, Sleeve, Drift, Centre drill, Revolving center, Boring tool, "V" block, Material; MS Rod

Safety:

- * Refer the same safety precautions of the task as of : Perform grooving
- * Do not apply over pressure (cut/feed) on parting off tool
- * Set low RPM to avoid chattering.

Task Analysis

Task No. 13: Perform Eccentric turning.

Time: 12.0 hrs

Theory: 1.0 hr

Practical: 11.0 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Refer and follow all the steps 1 to 6 of task to perform Plain turning. 2. Perform facing both side of work-piece 3. Perform center drilling if necessary 4. Remove the work-piece 5. Perform off set marking on both faces of job for centre drilling using surface plate, angle plate, V-block and height gauge. 6. Punch the intersection of mark 7. Perform center drilling at each punched mark on bench drill M/C 8. Set up work-piece between centers using dog and dog carrier 9. Obtain grooving tool according to the size of the groove 10. Set the grooving tool on tool post so that the cutting face is parallel to the work-piece centre 11. Locate and mark groove to be cut. 12. Set lower RPM than turning same diameter 13. Run the machine and give depth of cut using cross slide, observe tool cuts without tool vibration. 14. Give side clearance cut if necessary 15. Repeat the process of cutting until size is obtained. 16. Stop the machine, Measure all the dimensions and Make sure the dimensions are within tolerance before take out the work-piece and tool from M/C 17. Clean and set machine in safe position before leave. 18. Collect and store all tools after neatly cleaning ready to re-use 	<p><u>Condition (Given):</u> Fully equipped workshop with Center lathe machine and turning tools, Dog clamp, Center punch, Hammer, Vernier height gauge, surface plate with "V" block set. Center drill & Grooving tool Drill M/C.</p> <p><u>Task (What):</u> Perform Eccentric turning.</p> <p><u>Standards (How well):</u> Marking and center drilling performed as per off-set dimensions The work-piece clamped between centers. Procedure of eccentric turning followed in sequence. Measurement of eccentric checked. No Chatter marks on surface</p>	<ul style="list-style-type: none"> ☒ Interpretation of drawing ☒ Handling m/c tools ☒ Methods of eccentric turning ☒ Grinding/hand sharpening tool edges. ☒ Process of holding work piece for turning eccentric ☒ Procedure of eccentric. ☒ Grooving tool bit ☒ RPM Calculation ☒ Vernier Caliper reading ☒ Safety precautions

Tools, equipment and materials: Center Lathe Machine, Three Jaw universal Chuck, Chuck keys, Soft hammer, Pedestal grinding machine, Grinding wheel dresser, HSS tool bit, Tool post key, Vernier caliper, Safety goggles, flat file, Cleaning brush, Safety gears, Drill chuck & Key, Sleeve, Drift, Centre drill, Revolving center, Boring tool, Live center, Revolving center, Allen keys, Center punch, Steel Hammer, Vernier height gauge with marking block, "V" Block, Bench drill M/C set. Material; MS Rod

Safety:

- * Refer the same safety precautions of the tasks as of: Perform Plain turning and Perform center drilling.
- * Take care when center drilling in drilling machine.

Module 4

Thread Cutting

Description:

This module is designed to provide knowledge and skills about cutting different kind of threads by operating machine such as Cutting up threads by using dies and taps and Cutting up external and internal V threads.

Objectives:

After completion of this module the trainees will be able:

1. To identify of different types threads and threads cutting methods
2. To cut different types of threads on lathe machine

Module Structure (M4)

S.N	Module	Nature	Time (hours)
1	M4: Thread Cutting	T+P	30

Tasks:

1. Cut Threads on Machine Using Die/Taps
2. Cut External V Thread on Lathe Machine
3. Cut Internal V Thread on Lathe Machine

Task Analysis

Task No. 1: Cut Threads on Machine Using Threading Die/Taps

Time: 8.0 hrs

Theory: 1.0 hr

Practical: 7.0 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Obtain workshop drawing 2. Obtain workpiece material 3. Obtain required tools and equipment 4. Set up workpiece on three jaw chuck 5. Perform facing 6. Perform center drilling if necessary 7. Reset the workpiece elongating enough length to machine 8. Perform plain turning 9. Perform step turning into thread diameter if necessary 10. Perform grooving at the shoulder end 11. Perform chamfering at the end for thread cutting 45 x 2 mm 12. Set the threading die on its holder 13. Hold the die on threading start supporting with tailstock spindle 14. Set the RPM lever in neutral position 15. Insert the chuck key on key point 16. Turn Chuck anti-clockwise by hand pressing continuous support from tailstock 17. Turn ¼ backward to break the chips at every ½ round cutting thread 18. Stop at the end, Turn back the die, Remove from the workpiece 19. Check the thread with Check nut. 20. Make sure the dimensions are as given in workshop drawing 	<p><u>Condition (Given):</u> Fully equipped workshop with Center lathe machine, Turning tool, Center drill, Grooving tool and threading die/taps and handles.</p> <p><u>Task (What):</u> Cut threads on machine using threading die/taps.</p> <p><u>Standards (How well):</u> The taps and dies distinguished according to shape and size of threads to be cut. A dimension machined as per threads to be cut. Thread cutting manual procedure followed in sequence. Measurements of threads taken.</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Concept of threading <input checked="" type="checkbox"/> Nos. of thread required by different sizes <input checked="" type="checkbox"/> Procedure of cutting threads on lathe machine <input checked="" type="checkbox"/> Safety precautions

Tools, equipment and materials:

Safety:

- * Support should be applied continuously from tailstock spindle.
- * Never tries to run machine for cutting thread.
- * Avoid falling the taps and dies on the floors.
- * Apply oil fluently when cutting thread manually.

Task Analysis

Task No. 2: Cut External V Thread on Lathe Machine

Time: 8.0 hrs
Theory: 1.0 hr
Practical: 7.0 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Obtain workshop drawing 2. Obtain workpiece material 3. Obtain required tools and equipment 4. Set up workpiece on three jaw chuck 5. Refer and follow the step no. 5 to 11 of task “Cut threads on machine using threading die/taps” 6. Reset the “V” shaped threading tool on tool post 7. Calculate the pitch and gear to be set 8. Set the gear lever (refer chart on the machine) 9. Calculate and set the RPM for thread cutting 10. Bring and touch gently the cutting tip on edge of the work piece 11. Run the machine, engage the half nut lever on carriage 12. Give light depth of cut and observe the helical mark on periphery of work piece 13. Return the tool back, disengaging the half nut lever then, stop the machine 14. Check the helical mark with pitch gauge 15. Set the dial scale ‘0’ on both top and cross slide 16. Calculate the depth of cut 17. Give depth of cut for rough cut 18. Align the coolant pipe 19. Run the machine and start cutting helical groove (thread) 20. Turn back the tool in front position, give depth of cut and cut ahead 21. Cut the thread until obtain required depth of cut 22. Check the thread with pitch gauge / thread gauge 23. Make sure the dimensions are as given in workshop drawing. 24. Check by ring nut. 	<p><u>Condition (Given):</u> Fully equipped workshop with Center lathe machine, turning tool, Center drill, Grooving tool, Thread cutting tool, Pitch gauge and Check nut.</p> <p><u>Task (What):</u> Cut external v thread on lathe machine.</p> <p><u>Standards (How well):</u> The diameter determined according to thread size. A thread cutting tool clamed. The depth of cut calculated. The lever set up as per pitch and unit of the thread. The procedure of thread cutting followed in sequence. Measurements of external threads taken.</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Concept of external V threading <input checked="" type="checkbox"/> Manufacturing a thread on lathe machine <input checked="" type="checkbox"/> Taking a measuring of thread element <input checked="" type="checkbox"/> Safety precautions

Tools, equipment and materials:

Safety: Pay full concentration when cutting the thread engaging the auto lever of half nut.

- * Refer the same safety precautions of the tasks: Set up turning tool, Plain turning and Center drilling.

Task Analysis

Task No. 3: Cut Internal V Thread on Lathe Machine

Time: 9.0 hrs
Theory: 1.0 hr
Practical: 8.0 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Obtain workshop drawing 2. Obtain workpiece material 3. Obtain required tools and equipment 4. Set up workpiece on three jaw chuck 5. Perform facing 6. Perform center drilling 7. Refer and follow the step no. 8 to 20 of the task perform Plain boring 12. Reset the "V" shaped internal thread cutting tool on tool post 7. Calculate the pitch and gear to be set 8. Set the gear lever (refer chart on the m/c) 9. Calculate & set RPM for thread cutting 10. Bring and touch gently the cutting tip on bore edge of the work piece 11. Run the machine, engage the half nut lever on carriage 12. Give light depth of cut and observe the helical mark on periphery of work piece 13. Return the tool back, disengaging the half nut lever then, stop the machine 14. Check the helical mark with pitch gauge 15. Set the dial scale '0' on both top and cross slide 16. Calculate the depth of cut 17. Give depth of cut for rough cut 18. Align the coolant pipe 19. Run the machine and start cutting helical groove (thread) 20. Turn back the tool in front position, give depth of cut and cut ahead 21. Cut the thread until required depth 22. Check the thread with pitch gauge/thread gauge 23. Make sure the dimensions are as given in workshop drawing. 	<p><u>Condition (Given):</u> Fully equipped workshop with Center lathe machine, turning tool, Center drill, Drill bits for guide hole, Boring tool, Internal thread cutting tool, Thread plug gauge and Pitch gauge.</p> <p><u>Task (What):</u> Cut V Internal thread on lathe machine.</p> <p><u>Standards (How well):</u> The internal diameter determined according to thread size. A thread cutting tool clamped. The depth of cut calculated. The lever set up as per pitch and unit of the thread. The procedure of thread cutting followed in sequence. Measurements of external thread performed.</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Concept of internal V thread <input checked="" type="checkbox"/> Setting of internal thread cutting tool on tool post. <input checked="" type="checkbox"/> Process of cutting internal threads operation <input checked="" type="checkbox"/> Safety precautions

Tools, equipment and materials:

Safety:

- * Refer the same safety precautions of the tasks: Cut V External thread on lathe machine, Perform boring and internal grooving.

Module 5

Offhand Grinding

Description:

This module is designed to provide knowledge and skills on off hand grinding which includes the activities such as Re-sharpening twist drills, Grinding facing/corner HSS tool bit in, Grinding roughing HSS tool bit, Grinding grooving tool, Grinding thread cutting tool and Preparing boring tool.

Objectives:

After completion of this module the trainees will be able:

1. To be familiar with off hand grinding technique
2. To perform various off hand grinding activities

Module Structure (M5)

S.N	Module	Nature	Time (hours)
1	M5: Machine Setting	T+P	25

Tasks:

1. Sharpen Twist Drills
2. Grind Facing/Corner HSS tool bit
3. Grind Roughing HSS tool bit
4. Grind Grooving Tool
5. Grind V Thread Cutting Tool
6. Grind Boring Tool

Task Analysis

Task No. 1: Sharpen Twist Drills

Time: 5.0 hrs
Theory: 1.0 hr
Practical: 4.0 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Obtain Bench or Pedestrian grinding machine 2. Obtain blunt drill bits 3. Obtain Safety goggles, Bevel protractor or Drill grinding gauge 4. Check the grinding wheel abrasive type, trueness of wheel and cracks. 5. Dress the wheel, if necessary 6. Set up tool-rest if necessary 7. Wear safety goggles 8. Run the machine Switch on the M/C 9. Hold twist drills lightly between the thumb and the first finger, pointing the tip towards wheel 10. Hold the drill level and turn it to 59° to the face of the wheel so that the cutting edge is horizontal and parallel to the grinding wheel - face 11. Swing the shank of the drill slightly downward and towards the left. 12. Rotate the drill to the right by turning it between the thumb and the finger. 13. Apply slight forward motions while swinging down, this will help to form the clearance angle 14. Repeat the process from step no. 10 to 13 to re-sharpen the second cutting edge 15. Check both the cutting edges with a drill angle gauge or Bevel protractor, for correctness of the lip angle and equality of the lip length 16. Repeat the grinding until desired angle 59° and sharpened tip obtained 17. Calculate the drill tip height 	<p><u>Condition (Given):</u> Fully equipped workshop with Bench or Pedestrian grinding machines, Safety goggles, Blunt drills bits Bevel protractor or Angle gauge.</p> <p><u>Tasks :</u> Sharpen twist drills</p> <p><u>Standards (How well):</u> Drill angles identified. Grinding wheel dressed. Drill bit held. Procedure of Grinding a drill bits followed in sequence. The cutting edges checked with a drill angle gauge, and equality of the lip angle.</p>	<ol style="list-style-type: none"> <input checked="" type="checkbox"/> Nomenclature of Drills elements <input checked="" type="checkbox"/> Resharpener procedure of drill bit <input checked="" type="checkbox"/> Safety precautions

Tools, equipment and materials:

Safety:

- * All movement made to the drill i.e. angular turning swinging and forward movements, should be well coordinated.
- * Too much depth may colour the tip and may cause short hardness.
- * Any damage to the grinding wheel, if noticed, should be reported to the instructor.
- * When switching on the grinding machine, stand aside until the wheel reaches full speed.

Task Analysis

Task No. 2: Grind Facing/Corner HSS tool bit

Time: 5.0 hrs
Theory: 1.0 hr
Practical: 4.0 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Obtain Bench or Pedestrian grinding machine 2. Obtain HSS tool bits 3. Obtain Safety goggles, Bevel protractor or grinding gauge 4. Dress the wheel, if necessary 5. Set up tool-rest if necessary 6. Identify the shape of tool to be grind 7. Identify the angles of tool to be grind. 8. Wear safety goggles 9. Run the machine 10. Hold HSS tool left hand in between the thumb, fore and the middle finger, so that front clearance and first cut shape of the tool to be produce 11. Rest the left finger & tool on the tool rest 12. Apply a slight forward motion 13. Move the tool across full face of the wheel with the help of right hand 14. Dip frequently on the coolant to cool the tool, after every second interval. 15. Repeat the processes until the required depth obtain 16. Change holding position for side clearance angle 17. Repeat the same step no 12 to 16 for side clearance 18. Change holding rest only the left arm on the tool rest 19. Reposition for the top rake angle. 20. Repeat the same step as for the clearance angle 21. Check the angles with the gauge or bevel protractor 22. Deburr the edges using oilstone. 	<p><u>Condition (Given):</u></p> <p>Fully equipped workshop with Bench or Pedestrian grinding machine, Safety goggles, HSS Tool bits Bevel protractor or Angle gauge.</p> <p><u>Tasks :</u> Grind facing/corner HSS tool bit</p> <p><u>Standards (How well):</u></p> <p>The cutting angles determined as per workpiece material.</p> <p>Hold and movement given to HSS tool bit while grinding.</p> <p>Dress wheel performed.</p> <p>Procedure of grinding followed in sequence.</p> <p>Cutting edges and angles ground checked.</p>	<ul style="list-style-type: none"> ☒ Importance of cutting geometry of lathe tools ☒ Too angle of facing and corner tool ☒ Procedure of re-sharpening the facing and corner tool ☒ Safety precautions

Tools, equipment and materials:

Safety:

- * Too much depth (depth) may coloured the tip and may cause short hardness.
- * Any damage to the grinding wheel, if noticed, should be reported to the instructor.
- * When switching on the grinding machine, stand aside until the wheel reaches full speed.
- * Refer the same safety precautions of the task: grind twist drill.
- * Don't grind up to Blacky tool face go to coolant frequently.

Task Analysis

Task No. 3: Grind Roughing HSS tool bit

Time: 5.0 hrs
Theory: 1.0 hr
Practical: 4.0 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Obtain Bench or Pedestrian grinding machine 2. Obtain HSS tool bits 3. Obtain Safety goggles, Bevel protractor or grinding gauge 4. Dress the wheel, if necessary 5. Set up tool-rest if necessary 6. Identify the shape of tool to be grind. 7. Identify the angles of tool to be grind. 8. Wear safety goggles 9. Refer and follow the steps of the task grind Facing/corner HSS tool bit 10. Hold the tool lightly 11. Check the angles with the gauge or bevel protractor 12. Deburr the edges using oilstone 	<p><u>Condition (Given):</u> Fully equipped workshop with Bench or Pedestrian grinding machine, Safety goggles, HSS Tool bits Bevel protractor or Angle gauge.</p> <p><u>Tasks :</u> Grind roughing HSS tool bit</p> <p><u>Standards (How well):</u> The cutting angles determined as per workpiece material. Hold and movement given to HSS tool bit while grinding. Dress wheel performed. Procedure of grinding followed in sequence. Cutting edges and angles ground checked.</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Different roughing tools <input checked="" type="checkbox"/> Procedure of re-sharpening the roughing tool <input checked="" type="checkbox"/> Safety precautions

Tools, equipment and materials:

Safety:

- * Too much depth may coloured the tip and may cause short hardness.
- * Any damage to the grinding wheel, if noticed, should be reported to the instructor.
- * When switching on the grinding machine, stand aside until the wheel reaches full speed.
- * Refer the same safety precautions of the task: grind twist drill.
- * Don't grind up to Blacky tool face go to coolant frequently.

Task Analysis

Task No. 4: Grind Grooving Tool

Time: 3.0 hrs
Theory: 0.0 hr
Practical: 3.0 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Obtain Bench or Pedestrian grinding machine 2. Obtain HSS tool bits 3. Obtain Safety goggles, Bevel protractor or grinding gauge 4. Dress the wheel, if necessary 5. Set up tool-rest if necessary 6. Identify the shape of tool to be grind. 7. Identify the angles of tool to be grind 8. Wear safety goggles 9. Run the machine 10. Refer and follow the steps of the task grind Facing/corner tool in HSS bit 11. Perform grind up to make square grooving tool as per groove need. 12. Check the angles with the gauge or bevel protractor 13. Deburr the edges using oilstone 	<p><u>Condition (Given):</u> Fully equipped workshop with Bench or Pedestrian grinding machine, Safety goggles, HSS Tool bits Bevel protractor or Angle gauge.</p> <p><u>Tasks :</u> Grind grooving tool.</p> <p><u>Standards (How well):</u> The cutting angles determined as per workpiece material. Hold and movement given to HSS tool while grinding. Dress wheel performed. Procedure of grinding followed in sequence. Cutting edges and angles ground checked.</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Procedure of re-sharpening the grooving tool <input checked="" type="checkbox"/> Safety precautions

Tools, equipment and materials:

Safety:

- * Too much depth may coloured the tip and may cause short hardness.
- * Any damage to the grinding wheel, if noticed, should be reported to the instructor.
- * When switching on the grinding machine, stand aside until the wheel reaches full speed.
- * Refer the same safety precautions of the task: grind twist drill.

Task Analysis

Task No. 5: Grind V Thread Cutting Tool

Time: 3.0 hrs
Theory: 0.0 hr
Practical: 3.0 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Obtain Bench or Pedestrian grinding machine 2. Obtain HSS tool bits 3. Obtain Safety goggles, Bevel protractor or grinding gauge 4. Dress the wheel, if necessary 5. Set up tool-rest if necessary 6. Identify the shape of tool to be grind. 7. Identify the angles of tool to be grind 8. Wear safety goggles 9. Refer and follow the steps of the task grind Facing/corner HSS tool bit 10. Check the angles with the angle gauge or bevel protractor 11. Deburr the edges using oilstone 	<p><u>Condition (Given):</u> Fully equipped workshop with Bench or Pedestrian grinding machine, Safety goggles, HSS Tool bits Bevel protractor or Angle gauge.</p> <p><u>Tasks :</u> Grind thread cutting tool</p> <p><u>Standards (How well):</u> The cutting angles determined as per workpiece material. Hold and movement given to HSS tool while grinding. Dress wheel performed. Procedure of grinding followed in sequence. Cutting edges and angles ground checked.</p>	<p><input checked="" type="checkbox"/> Procedure of re-sharpening the thread cutting tool</p> <p><input checked="" type="checkbox"/> Safety precautions</p>

Tools, equipment and materials:

Safety:

- * Too much depth may coloured the tip and may cause short hardness.
- * Any damage to the grinding wheel, if noticed, should be reported to the instructor.
- * When switching on the grinding machine, stand aside until the wheel reaches full speed.
- * Refer the same safety precautions of the task: grind Twist drill.
- * Total hours-30

Task Analysis

Task No. 6: Grind Boring Tool

Time: 4.0 hrs
Theory: 0.0 hr
Practical: 4.0 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Prepare a cylindrical rod as per required length 2. Drill a hole 5- 8 mm distance from the end of the rod to insert HSS tool bit 3. File a hole into square hole 4. Check the hole inserting the HSS bit 5. Drill a through hole at the face of rod toward square hole as per thread to be tap 6. Tap the hole clamping the rod on the Bench vice 7. Obtain a headless bolt as per thread 8. Insert the bit and tighten the screw 9. Dress the wheel, if necessary 10. Set up tool-rest if necessary 11. Identify the shape of tool to be grind. 12. Identify the angles of tool to be grind. 13. Wear safety goggles 14. Run the machine 15. Amend the tip height 16. Grind out from the cutting edge length 17. Grind out the side cutting edge and the side relief angle 18. Grind the top rake angle 19. Relieve the end clearance angle 20. Round off the nose if necessary 21. Deburr the edges using oilstone 	<p><u>Condition (Given):</u> Fully equipped workshop with Bench or Pedestrian grinding machines, Safety goggles, and HSS Tool bits Bevel protractor or Angle gauge.</p> <p><u>Tasks :</u> Grind boring tool.</p> <p><u>Standards (How well):</u> The cutting angles determined as per workpiece material. Hold and movement given to HSS tool while grinding. Dress wheel performed. Procedure of preparing followed in sequence. Cutting edges and angles ground checked.</p>	<p><input checked="" type="checkbox"/> Procedure of preparing boring HSS tool bit</p> <p><input checked="" type="checkbox"/> Safety precautions</p>

Tools, equipment and materials:

Safety:

- * Make the wall distance of square sufficient to hold the tool when clamping.
- * Use headless bolt as far as possible and have less projection.
- * Be careful when drilling a hole on periphery of the cylindrical rod.
- * Refer the same safety precautions of the task: grind-grooving tool.

Module 6

Manufacturing Items (Project Work)

Description:

This module deals with manufacturing of simple machine components utilizing appropriate techniques based on knowledge and skill acquired during the course. It also includes procedures, tools and equipment employed in the production of various components on Lathe machine.

General objectives:

After completion of this module, trainees will be able to:

1. Understand the importance of Safety in workshop
2. Know about bench work performances
3. Know and understand various lathe operations
4. Know the procedures and techniques in manufacturing processes

Specific objectives:

After completion of the module, trainee will be able to,

1. Observe and follow Safety precaution rules in the workshop
2. Carefully handle Machine tools and cutting agents used in machining
3. Perform various Lathe operations as mentioned in the module
4. Manufacture simple machine components

Module Structure (M6)

S.N	Modules	Nature	Time (hours)
1	Assignments (project work)	T+P	80

Tasks:

1. **Manufacture a Plain Shaft**
2. Manufacture a Stepped Shaft
3. Manufacture a Center punch
4. Manufacture a Bush
5. Manufacture a Knurled head V thread screw
6. Manufacture a Knurled nut V thread Screw Ring
7. Manufacture a Single V belt pulley

Note:

- 1- Assignments must be accompanied by working procedures / operational sequences in writing
- 2- Evaluation criteria includes Viva voce.

Task Analysis

Task No. 1: Manufacture a Plain Shaft

Time: 11.0 hrs
Theory: 1.0 hr
Practical: 10.0 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
1. Obtain drawing 2. Obtain work piece as per drawing 3. Clamp work piece in 3 jaw chuck 4. Set the cutting tool 5. Set machine speeds 6. Face both ends to length 7. Clamp w/p protruding about 60% of w/p length 8. Turn the diameter as per drawing 9. Clamp pre-machined portion of w/p protruding diameter to be turned 10. Turn the diameter to size 11. Chamfer both ends as shown 12. Check w/p for correctness 13. De-burr sharp edges 14. Finish and stamp ref. number	<p><u>Condition (Given):</u> <u>Work shop Area:</u> Spacious perimeter Well ventilated Sufficient lightings Safety arrangements</p> <p><u>Task (What):</u> Manufacture a Plain Shaft (Task 1.)</p> <p><u>Standards (How well):</u> <u>W/p</u> completed in time W/p produced within specified tolerance Sequential procedure followed</p>	<input checked="" type="checkbox"/> Interpretation of drawing <input checked="" type="checkbox"/> Working Procedure <input checked="" type="checkbox"/> Safety precaution rules <input checked="" type="checkbox"/> Machine controls <input checked="" type="checkbox"/> Handling M/c tools

Tools, equipment and materials:

Centre Lathe MT3, Side tool, Chamfering tool, Centre drill, Revolving center, smooth file

Vernier Caliper 0.1mm

Material: Round steel

Safety:

Abide by all 3 Safety precaution rules strictly (Personal Safety, Machine Safety and Work Safety)!

Note: working procedures/operational sequences sheet must be submitted.

Task Analysis

Task No. 2: Manufacture a Stepped Shaft Time: 12.0 hrs.
Theory: 1.0 hr.
Practical: 11.0 hrs.

Performance steps	Terminal Performance Objective	Related Technical Knowledge
1. Follow stages of work (1-13) applied For plain shaft manufacture (Task 1.) 2. Clamp the w/p protruding the length of Stepped diameter(small diameter) 3. Turn the diameter to length as shown. 4. If the length is longer, use tailstock support with the help of revolving center 5. Turn the undercut diameter, if required. 6. Deburr sharp edges 7. Check the w/p for correctness. 8. Finish and stamp the reference number.	<p><u>Condition (Given):</u> Workshop Area Spacious perimeter Well ventilated Sufficient lightings Safety arrangements</p> <p><u>Task (What):</u> Manufacture a Stepped shaft ((Task 2.)</p> <p><u>Standards (How well):</u> W/p completed in time w/p produced within tolerances Sequential procedures followed</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Interpretation of drawing <input checked="" type="checkbox"/> Working Procedure <input checked="" type="checkbox"/> Safety precautions rules <input checked="" type="checkbox"/> Machine controls <input checked="" type="checkbox"/> Handling m/c tools <input checked="" type="checkbox"/> Squaring corner faces

Tools, equipment and materials:

Set of tools and Equipment listed in Task no. 1. Material : Steel Rod
 Additional requirements: none

Safety:

Abide by Safety precaution rules mentioned in Task 1.

Note: Working procedures/operational sequences sheet must be submitted.

Task Analysis

Task No. 3: Manufacture a Centre Punch

Time: 11.0 hrs
Theory: 1.0 hr
Practical: 10.0 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<p>1. Plain turning Follow stages of work (1-13) applied for Plain shaft manufacture. (Task 1.)</p> <p>2. Stepped turning Follow stages of work (1-8) applied for stepped shaft manufacture.(Task 2)</p> <p>3. Taper Turning -Clamp the W/p protruding the length slightly more than the actual taper length to be turned -Swivel compound slide to required degree (half angle) -Ascertain tool position for tapering -Bring the carriage close to the edge of w/p – keep spacing -Lock carriage in stationary position -Operate compound slide to and fro covering taper length. -Perform taper turning -Repeat similar working stages for all degrees of tapers in Centre punch -Check for correctness of size -Finish and stamp ref. number</p>	<p><u>Condition (Given):</u> Workshop Area Spacious perimeter Well ventilated Sufficient lightings Safety arrangements</p> <p><u>Task (What):</u> Manufacture a Center Punch (Task3.)</p> <p><u>Standards (How well):</u> <u>W/p</u> completed in time W/p produced within specified tolerances Sequential procedures followed</p>	<p><input checked="" type="checkbox"/> Interpretation of drawing</p> <p><input checked="" type="checkbox"/> Working procedures</p> <p><input checked="" type="checkbox"/> Safety precautions rules</p> <p><input checked="" type="checkbox"/> Handling m/c tools</p> <p><input checked="" type="checkbox"/> Swiveling compound slide for short tapers</p>

Tools, equipment and materials:

Set of tools and Equipment listed in Task no 2.

Additional requirements: Sizable spanners, bevel protractor

Safety:

- * Abide by Safety precaution rules mentioned in Task 2.

- Note:**
1. pay attention that carriage does not slide while operating compound slide!
 2. Working procedures/operational sequences sheet must be submitted.

Task Analysis

Task No. 4: Manufacture a Bush

Time: 6.0 hrs
Theory: 1.0 hr
Practical: 5.0 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
1. follow steps of work (1-13) applied for plain shaft manufacture. Task 1. 2. clamp w/p in the chuck protruding a fraction of length 3. make sure the w/p is running true 4. center drill and pilot drill (pilot drill slightly bigger than center drill size), drill through hole 5. enlarge the hole using set of drills with increment 3-5 mm 6. drill final hole size making it 1-2 mm smaller than actual size (1-2 mm allowance for boring operation) 7. set up and align boring tool 8. Perform boring operation applying rough and finishing steps 9. complete hole size and chamfer / de-burr hole edges both sides 10. check for correctness of size 11. finish and stamp ref. number	<p><u>Condition (Given):</u> Workshop Area, Spacious perimeter, well ventilated, sufficient lightings, safety arrangements</p> <p><u>Task (What):</u> Manufacture a Bush Task no 4.</p> <p><u>Standards (How well):</u> <u>W/p</u> completed in time W/p produced within specified tolerances Sequential procedures followed</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Interpretation of drawing <input checked="" type="checkbox"/> Working Procedure <input checked="" type="checkbox"/> Safety precautions rules <input checked="" type="checkbox"/> Machine controls <input checked="" type="checkbox"/> Handling m/c tools <input checked="" type="checkbox"/> Importance of center drilling and pilot drilling <input checked="" type="checkbox"/> Enlarging hole sizes <input checked="" type="checkbox"/> Boring operation

Tools, equipment and materials:

Same set of machine, tools and equipment specified in previous task Material: Steel Rod.....

Additional requirements: 1. Set of drills (increment 3-5mm) 2. Boring tool

Safety:

Abide by safety precaution rules mentioned in previous tasks!

Note: Working procedures/operational sequences sheet must be submitted.

Task Analysis

Task No. 5: Manufacture a Knurled head V thread Screw

Time: 11.0 hrs.

Theory: 1.0 hr.

Practical: 10.0 hrs.

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Follow stages of work(1-13) applied for plain shaft manufacture Task no1., with exception that the length of work piece is taken longer than the actual size to facilitate clamping in the lathe chuck 2. Clamp the w/p protruding about 10 mm plus to the entire length of the specimen 3. Face the end 4. Center drill the face 5. Support the w/p using tailstock with the help of Revolving center 6. Perform plain turning to bigger external diameter as per drawing 7. Set and align knurling tool 8. Bring knurling rolls in contact with the Knurling surface apply pressure (feed) 9. Move the carriage to and fro along the knurling surface 10. Repeat applying pressure (feed) and carriage movement until the desired pattern is accomplished 11. Step turn the thread diameter 12. Turn undercut diameter as shown 13. Chamfer thread end and prepare for die threading 14. Switch off the machine 15. Bring the die onto the edge of thread and press hold it using tailstock spindle 16. Let the die handle rest on the compound slide or tool post or as convenient 17. Rotate the chuck by one hand moving tailstock spindle by another hand rotating hand wheel simultaneously 18. Continue the process until the desired length is threaded 19. Release the tailstock spindle from w/p face and slide far away 	<p><u>Condition (Given):</u> Workshop Area Spacious perimeter Well ventilated Sufficient lightings Safety arrangements</p> <p><u>Task (What):</u> Manufacture a knurled head v thread screw (Task 5.)</p> <p><u>Standards (How well):</u> W/p completed in time W/p produced within specified tolerances Sequential procedures followed</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Interpretation of drawing <input checked="" type="checkbox"/> Working Procedure <input checked="" type="checkbox"/> Safety precautions rules <input checked="" type="checkbox"/> Machine controls <input checked="" type="checkbox"/> Handling m/c tools <input checked="" type="checkbox"/> Knurling patterns and tool <input checked="" type="checkbox"/> Parting off, operation and cutting agent <input checked="" type="checkbox"/> Split die and stock <input checked="" type="checkbox"/> Die threading on lathe

<ol style="list-style-type: none"> 20. Holding the chuck fixed, undo the die releasing from the w/p 21. Clean and brush swages from threaded surface 22. Chamfer the end of knurled diameter (protruding face) 23. Set and align parting off tool for cutting 24. Mark knurled width with allowance for facing 25. Feed the parting off tool to allow cutting 26. Clamp a thread bush in lathe chuck(thread size matching with the w/p thread size) 27. Screw in the specimen with full tightness 28. Face the end to required width 29. Chamfer the end as shown 30. Screw out the w/p from thread bush (adaptor) 31. Check size for correctness 32. Finish and stamp reference number 		<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Interpretation of drawing <input checked="" type="checkbox"/> Working Procedure <input checked="" type="checkbox"/> Safety precautions rules <input checked="" type="checkbox"/> Machine controls <input checked="" type="checkbox"/> Handling m/c tools <input checked="" type="checkbox"/> Knurling patterns and tool <input checked="" type="checkbox"/> Parting off, operation and tool <input checked="" type="checkbox"/> Split die and stock <input checked="" type="checkbox"/> Die threading on lathe
--	--	--

Tools, equipment and materials:

Same set of machine, tools and equipment as specified in previous task.

Material; Steel rod

Additional requirements: 1. Knurling tool 2. Parting off tool 3. Matching thread bush
4. Threading die 5. Die stock 6. Wire brush

Note: A wide- faced nut can be used as an adaptor.

Safety:

Abide by safety precaution rules mentioned in the previous tasks!

Note: Working procedures/operational sequences sheet must be submitted.

Task Analysis

Task No. 6: Manufacture a Knurled head V thread Screw Ring

Time: 12.0 hrs
Theory: 1.0 hr
Practical: 11.0 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
1.obtain drawing 2.obtain w/p as per drawing (w/p length to cut off after threading is completed) 3.clamp w/p in 3 jaw chuck 4.set and align the cutting tool 5.set machine speeds 6.face the end 7.turn the diameter 8.set and align knurling tool 9.follow stages of work applied for knurled thread screw (7-10).Task 5. 10.chamfer the end as shown in drawing 11.center drill and pilot drill 12.drill tapping drill size (hole depth deeper than w/p width-about 5mm more 13.chamfer /countersink hole) 14.switch off machine 15. place Taper tap into the hole (tap held with a tap wrench) 16.support and guide threading tap with revolving center on the tail stock spindle 17.follow stages of work applied for knurled thread screw (17-19) 18.use middle threading tap (follow stages of work applied for cutting inside thread with taper tap(step 16) 19.holding chuck fixed, undo the middle tap and take out from w/p 20. use bottom or plug threading tap (follow stages of work applied for cutting inside thread with middle tap (step 18)	<p><u>Condition (Given):</u> Workshop Area Spacious perimeter Well ventilated Sufficient lightings Safety arrangements</p> <p><u>Task (What):</u> Manufacture a Knurled head V thread screw (Task 6)</p> <p><u>Standards (How well):</u> W/p completed in time W/p produced within specified tolerances Sequential procedures followed</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Interpretation of drawing <input checked="" type="checkbox"/> Working Procedures <input checked="" type="checkbox"/> Safety precautions rules <input checked="" type="checkbox"/> Machine controls <input checked="" type="checkbox"/> Handling m/c, tools <input checked="" type="checkbox"/> Knurling patterns and tool <input checked="" type="checkbox"/> Parting off, operation and cutting agent <input checked="" type="checkbox"/> Set of threading taps (taper, middle, plug) <input checked="" type="checkbox"/> Tap wrench <input checked="" type="checkbox"/> Use of set of taps on lathe m/c (manual threading)

21.holding chuck fixed, undo plug tap and take out from w/p 22.set and align parting off tool 23.mark the screw Ring width(include facing allowance) 24.feed the parting off tool to allow cutting off 25.clamp w/p placing rough face(cut face) outside to allow facing 26.face the width and chamfer the end 27.chamfer the hole(countersink) 28.clean and brush swages from w/p 29. check size for correctness 30.finish and stamp reference number		<input checked="" type="checkbox"/> Interpretation of drawing <input checked="" type="checkbox"/> Working procedures <input checked="" type="checkbox"/> Safety precautions rules <input checked="" type="checkbox"/> Machine controls <input checked="" type="checkbox"/> Handling m/c tools <input checked="" type="checkbox"/> ..cont as above
---	--	--

Tools, equipment and materials:

Same set of m/c, tools and equipment specified in previous task no. 5.Material: Steel Rod.....

Additional requirements: 1. Set of threading taps 2.Tap wrench 3.countersunk

Safety

Abide by Safety precaution rules mentioned in previous tasks!

Note: Working procedures/operational sequences sheet must be submitted.

Task Analysis

Task No. 7: Manufacture a Single step V pulley

Time: 15.0 hrs.

Theory: 1.0 hr.

Practical: 14.0 hrs.

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> 1. Obtain drawing 2. Obtain w/p as per drawing 3. Clamp w/p in 3 jaw chuck allowing smaller diameter to turn (stepped turning) 4. face the end 5. turn w/p diameter and length to size as per drawing 6. chamfer the edge 7. clamp w/p holding smaller diameter in 3 jaw chuck allowing bigger diameter to machine 8. face the end making the width 9. center drill and support w/p using revolving center 10. cut groove in the middle using a grooving tool to allow V belt profile turning around the periphery of bigger diameter 11. set and align V belt profile tool 12. gradually, feed the tool towards the groove moving the tool to depth and sideways (left and right) 13. complete profile turning and finish the V groove profile 14. pilot drill and drill hole size as specified in drawing 15. finish bore hole size as per drawing 16. deburr sharp edges 17. drill tapping drill size on smaller diameter as per drawing 18. cut inside thread using set of taps and tap wrench 19. finish the w/p and check for correctness 20. Stamp the reference number 	<p><u>Condition (Given):</u> Workshop Area Spacious perimeter Well ventilated Sufficient lightings Safety arrangements</p> <p><u>Task (What):</u> Manufacture a Single step V Pulley Task No. 7.</p> <p><u>Standards (How well):</u> W/p completed in time W/p produced within specified tolerances Sequential procedures followed</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Interpretation of drawing <input checked="" type="checkbox"/> Working Procedure <input checked="" type="checkbox"/> Safety precautions rules <input checked="" type="checkbox"/> Machine controls <input checked="" type="checkbox"/> Handling m/c tools <input checked="" type="checkbox"/> Profile turning <input checked="" type="checkbox"/> V belt Pulley

Tools, equipment and materials: same set of mc/, tools and equipment specified in task 4.

Additional requirements: 1. Grooving tool 2. Profile tool

Safety: Abide by safety rules as mentioned in previous tasks.

Note: Working procedures/operational sequences sheet must be submitted.

Module:7: Applied Mathematics

	Description: It consists of skills and knowledge related to mathematical calculations applicable in the related occupational performances.					
	Objective: To carry out simple mathematical calculations that must be done for the effective performance in the occupational job.					
	Tasks: To fulfill the objective the trainees are expected to get proficiency on the following tasks/skills/steps together with their related technical knowledge:					
	Th.(4 hrs) + Pr.(16hrs) = Tot.(20 hrs)			Time(hrs)		
SN	Tasks or skills/ steps	Related technical knowledge	Th.	Pr.	Tot.	
1.	Carry out simple addition applicable in job situation	<u>Addition:</u> <input type="checkbox"/> Concept <input type="checkbox"/> Simple calculations <input type="checkbox"/> Application in the occupation	0.2	0.8	1	
2.	Carry out simple subtraction applicable in job situation	<u>Subtraction:</u> <input type="checkbox"/> Concept <input type="checkbox"/> Simple calculations <input type="checkbox"/> Application in the occupation	0.2	0.8	1	
3.	Carry out simple multiplication applicable in job situation	<u>Multiplication</u> <input type="checkbox"/> Concept <input type="checkbox"/> Simple calculations <input type="checkbox"/> Application in the occupation	0.2	0.8	1	
4.	Carry out simple division applicable in job situation	<u>Division:</u> <input type="checkbox"/> Concept <input type="checkbox"/> Simple calculations <input type="checkbox"/> Application in the occupation	0.2	0.8	1	
5.	Carry out measurements	<u>Measurement:</u> <input type="checkbox"/> Concept <input type="checkbox"/> Application in the occupation	0.2	0.8	1	
6.	Convert units of measurement	<u>Units of measurement:</u> <input type="checkbox"/> Concept <input type="checkbox"/> Units of measurement <input type="checkbox"/> Unit conversion <input type="checkbox"/> application	0.2	0.8	1	
7.	Convert units of measuring temperature	<u>Units of measuring temperature:</u> <input type="checkbox"/> Concept <input type="checkbox"/> Units of temperature measurement <input type="checkbox"/> Unit conversion <input type="checkbox"/> application	0.2	0.8	1	

8.	Calculate area	<u>Area:</u> <input type="checkbox"/> Concept <input type="checkbox"/> Formula <input type="checkbox"/> Calculation <input type="checkbox"/> Application	0.2	0.8	1
9.	Calculate volume	<u>Volume:</u> <input type="checkbox"/> Concept <input type="checkbox"/> Formula <input type="checkbox"/> Calculation <input type="checkbox"/> Application	0.2	0.8	1
10	Calculate weight	<u>Weight:</u> <input type="checkbox"/> Concept <input type="checkbox"/> Formula <input type="checkbox"/> Calculation <input type="checkbox"/> Application	0.2	0.8	1
11	Calculate percentage	<u>Percentage:</u> <input type="checkbox"/> Concept <input type="checkbox"/> Formula <input type="checkbox"/> Calculation <input type="checkbox"/> Application	0.2	0.8	1
12	Calculate ratio and proportions	<u>Ratio and proportions:</u> <input type="checkbox"/> Concept <input type="checkbox"/> Formula <input type="checkbox"/> Calculation <input type="checkbox"/> Application	0.2	0.8	1
13	Apply Pythagoras formula	<u>Pythagoras formula:</u> <input type="checkbox"/> Concept <input type="checkbox"/> Formula <input type="checkbox"/> Calculation <input type="checkbox"/> Application <input type="checkbox"/>	0.2	0.8	1
14	Apply unitary method	<u>Unitary method:</u> <input type="checkbox"/> Concept <input type="checkbox"/> Calculation <input type="checkbox"/> Application	0.2	0.8	1
15	Calculate simple interest	<u>Simple interest:</u> <input type="checkbox"/> Concept <input type="checkbox"/> Formula <input type="checkbox"/> Calculation <input type="checkbox"/> Application	0.2	0.8	1
16	Calculate unit cost	<u>Unit cost:</u> <input type="checkbox"/> Concept <input type="checkbox"/> Formula <input type="checkbox"/> Calculation <input type="checkbox"/> Application <input type="checkbox"/>	0.2	0.8	1

17	Calculate per unit income	<u>Per unit income:</u> <input type="checkbox"/> Concept <input type="checkbox"/> Formula <input type="checkbox"/> Calculation <input type="checkbox"/> Application	0.2	0.8	1
18	Calculate profit and loss	<u>Profit and loss:</u> <input type="checkbox"/> Concept <input type="checkbox"/> Formula <input type="checkbox"/> Calculation <input type="checkbox"/> Application	0.2	0.8	1
19	Perform billing	<u>Billing:</u> <input type="checkbox"/> Concept <input type="checkbox"/> Calculation <input type="checkbox"/> Bill format <input type="checkbox"/> Procedure <input type="checkbox"/> Application	0.2	0.8	1
20	Prepare simple balance sheet	<u>Balance sheet:</u> <input type="checkbox"/> Concept <input type="checkbox"/> Format <input type="checkbox"/> Procedure <input type="checkbox"/> Application	0.2	0.8	1
	Total:		4	16	20

Module: 8: Occupational Health, Safety and First Aid

	Description: It consists of skills and knowledge related to occupational health and safety applicable in the related occupational performances					
	Objectives:					
	<ul style="list-style-type: none"> • To be familiar with hazards related to this occupation • To apply preventive measures for occupational health and safety 					
	Tasks: To fulfill the objective the trainees are expected to get proficiency on the following tasks/skills/steps together with their related technical knowledge:					
	Th.(2 hrs) + Pr.(8hrs) = Tot.(10 hrs)				Time(hrs)	
SN	Tasks or skills/ steps	Related technical knowledge	Th.	Pr.	Tot.	
Be familiar with hazards related to this occupation						
1.	Be familiar with accident hazards	<u>Accident hazards:</u> <input checked="" type="checkbox"/> Concept <input checked="" type="checkbox"/> Causes <input checked="" type="checkbox"/> Procedures for managing this hazard	0.2	0.8	1	
2.	Be familiar with physical hazards	<u>Physical hazards:</u> <input checked="" type="checkbox"/> Concept <input checked="" type="checkbox"/> Causes <input checked="" type="checkbox"/> Procedures for managing this hazard	0.2	0.8	1	
3.	Be familiar with chemical hazards	<u>Chemical hazards:</u> <input checked="" type="checkbox"/> Concept <input checked="" type="checkbox"/> Causes <input checked="" type="checkbox"/> Procedures for managing this hazard	0.2	0.8	1	
4.	Be familiar with biological hazards	<u>Biological hazards:</u> <input checked="" type="checkbox"/> Concept <input checked="" type="checkbox"/> Causes <input checked="" type="checkbox"/> Procedures for managing this hazard	0.2	0.8	1	
5.	Be familiar with organizational factors:	<u>organizational factors:</u> <input checked="" type="checkbox"/> Concept of : <ul style="list-style-type: none"> ▪ organizational factors <input checked="" type="checkbox"/> Procedures for managing hazards caused by these factors	0.2	0.8	1	
	Sub total:		1	4	5	

Apply preventive measures for occupational health and safety					
1.	Use safety wears	<u>Safety wears:</u> <input type="checkbox"/> Identification <input type="checkbox"/> Needs <input type="checkbox"/> Wearing procedures	0.2	0.5	0.7
2.	Inspect workplace before working	<u>Workplace inspection:</u> <input type="checkbox"/> Concept <input type="checkbox"/> Principle and procedures <input type="checkbox"/> Records keeping	0.2	0.5	0.7
3.	Check tools/materials/equipment before use	<u>Checking of tools/materials/equipment:</u> <input type="checkbox"/> Concept and identification <input type="checkbox"/> Principle and procedures <input type="checkbox"/> Records keeping	0.1	0.5	0.6
4.	Be prevented from accident hazards	<u>Prevention of accident hazards:</u> <input type="checkbox"/> Concept <input type="checkbox"/> Being prevented from accident hazards <input type="checkbox"/> Records keeping	0.1	0.5	0.6
5.	Be prevented from physical hazards	<u>Prevention of physical hazards:</u> <input type="checkbox"/> Concept <input type="checkbox"/> Being prevented from physical hazards <input type="checkbox"/> Records keeping	0.1	0.5	0.6
6.	Be prevented from chemical hazards	<u>Prevention of chemical hazards:</u> <input type="checkbox"/> Concept <input type="checkbox"/> Being prevented from chemical hazards <input type="checkbox"/> Records keeping	0.1	0.5	0.6
7.	Be prevented from biological hazards	<u>Prevention of biological hazards:</u> <input type="checkbox"/> Concept <input type="checkbox"/> Being prevented from biological hazards <input type="checkbox"/> Records keeping	0.1	0.5	0.6
8.	Be prevented from organizational factors that create problems/hazards.	Prevention of <u>organizational factors that create problems/hazards:</u> <input type="checkbox"/> Concept <input type="checkbox"/> Being prevented from ergonomic/psychological / organizational factors that create problems/hazards <input type="checkbox"/> Records keeping	0.1	0.5	0.6
	Sub total:		1	4	5
	Total:		2	8	10

First Aid							
	Description: It consists of skills and knowledge related to first aid measures applicable in the related occupational performances.						
	Objective: • To apply first aid measures						
	Tasks: To fulfill the objective the trainees are expected to get proficiency on the following tasks/skills/steps together with their related technical knowledge:						
	Th.(1 hrs) + Pr.(4hrs) = Tot.(5 hrs)				Time(hrs)		
SN	Tasks or skills/ steps	Related technical knowledge			Th.	Pr.	Tot.
1.	Carryout simple dressings	<u>Carryout simple dressings:</u> <input type="checkbox"/> Concept <input type="checkbox"/> Needs <input type="checkbox"/> Procedures <input type="checkbox"/> Precautions <input type="checkbox"/> Recording			0.10	0.40	0.5
2.	Apply simple bandages	<u>Apply simple bandages:</u> <input type="checkbox"/> Concept <input type="checkbox"/> Needs <input type="checkbox"/> Procedures <input type="checkbox"/> Precautions <input type="checkbox"/> Recording			0.10	0.40	0.5
3.	Apply first aid for simple wounds	<u>Apply first aid for simple wounds:</u> <input type="checkbox"/> Concept <input type="checkbox"/> Needs <input type="checkbox"/> Procedures <input type="checkbox"/> Precautions <input type="checkbox"/> Recording			0.10	0.40	0.5
4.	Apply first aid for heat /chemical burns	<u>Apply first aid for heat /chemical burns:</u> <input type="checkbox"/> Concept <input type="checkbox"/> Needs <input type="checkbox"/> Procedures <input type="checkbox"/> Precautions <input type="checkbox"/> Recording			0.10	0.40	0.5
5.	Apply first aid for injuries/cuts	<u>Apply first aid for injuries/cuts:</u> <input type="checkbox"/> Concept <input type="checkbox"/> Needs <input type="checkbox"/> Procedures <input type="checkbox"/> Precautions <input type="checkbox"/> Recording			0.10	0.40	0.5
6.	Apply first aid for fracture	<u>Apply first aid for fracture:</u> <input type="checkbox"/> Concept <input type="checkbox"/> Needs			0.10	0.40	0.5

		<input type="checkbox"/> Procedures <input type="checkbox"/> Precautions <input type="checkbox"/> Recording			
7.	Apply first aid for simple bleeding	<u>Apply first aid for simple bleeding:</u> <input type="checkbox"/> Concept <input type="checkbox"/> Needs <input type="checkbox"/> Procedures <input type="checkbox"/> Precautions <input type="checkbox"/> Recording	0.10	0.40	0.5
8.	Apply first aid for electrical shock	<u>Apply first aid for electrical shock:</u> <input type="checkbox"/> Concept <input type="checkbox"/> Needs <input type="checkbox"/> Procedures <input type="checkbox"/> Precautions <input type="checkbox"/> Recording	0.05	0.20	0.25
9.	Apply first aid for choking/ drowning	<u>Apply first aid for choking/ drowning:</u> <input type="checkbox"/> Concept <input type="checkbox"/> Needs <input type="checkbox"/> Procedures <input type="checkbox"/> Precautions <input checked="" type="checkbox"/> Recording	0.05	0.20	0.25
	Total:		1	4	5

Module: 9 : Communication

	Description: It consists of the skills and knowledge related to communication in the related occupation. Each task consists of its steps, related technical knowledge and hour distribution.					
	Objectives: After its completion the trainees will be able:					
	<ul style="list-style-type: none"> • To handle telephone calls • To handle fax • To handle mail • To write letters • To write memos / tips / notes / notice • To perform internal communication • To perform external communication • To perform oral communication • To perform written communication 	<ul style="list-style-type: none"> • To communicate with donors To communicate with financial institutes • To link with media • To disseminate information • Write job application • Prepare Resume. • Communicate with senior. • Communicate with juniors. • Deal with customers • Request / purchase tool, supplies, materials and equipment. • Fill up leave requisition form. 				
	Tasks: To fulfill the objective the trainees are expected to get proficiency on the following tasks/skills/steps together with their related technical knowledge:					
	Th.(2 hrs) + Pr.(8hrs) = Tot.(10 hrs)			Time(hrs)		
SN	Tasks or skills/ steps	Related technical knowledge	Th.	Pr.	Tot.	
1.	Handle telephone calls	<u>Handling telephone calls:</u> <input checked="" type="checkbox"/> Concept, need, and importance <input checked="" type="checkbox"/> Operating principles and procedures <input checked="" type="checkbox"/> Care and maintenance <input checked="" type="checkbox"/> Safety precautions to be taken <input checked="" type="checkbox"/> Keeping activity records	0.1	0.4	0.5	
2.	Handle fax	<u>Handling fax:</u> <input checked="" type="checkbox"/> Concept, need, and importance <input checked="" type="checkbox"/> Operating principles and procedures <input checked="" type="checkbox"/> Care and maintenance <input checked="" type="checkbox"/> Safety precautions to be taken <input checked="" type="checkbox"/> Keeping activity records	0.1	0.4	0.5	

3.	Handle mail	<u>Handling mail:</u> <input type="checkbox"/> Concept, need, and importance <input type="checkbox"/> Operating principles and procedures <input type="checkbox"/> Care and maintenance <input type="checkbox"/> Safety precautions to be taken <input type="checkbox"/> Keeping activity records	0.1	0.4	0.5
4.	Write letters	<u>Writing letters:</u> <input type="checkbox"/> Concept, need, and importance <input type="checkbox"/> Types of letter <input type="checkbox"/> Component parts of each type of letter <input type="checkbox"/> Format of each type of letter <input type="checkbox"/> Writing letters <input type="checkbox"/> Precautions to be taken <input type="checkbox"/> Keeping activity records	0.1	0.4	0.5
5.	Write memos / tips / notes / notice	<u>Writing memos / tips / notes / notice :</u> <input type="checkbox"/> Concept, need, and importance <input type="checkbox"/> Component parts of memos / tips / notes / notice <input type="checkbox"/> Format of memos / tips / notes / notice <input type="checkbox"/> Writing memos / tips / notes / notice <input type="checkbox"/> Precautions to be taken <input type="checkbox"/> Keeping activity records	0.1	0.4	0.5
6.	Prepare simple report	<u>Preparing simple report:</u> <input type="checkbox"/> Concept, need, and importance <input type="checkbox"/> Component parts of a report <input type="checkbox"/> Format of a report <input type="checkbox"/> Writing a report <input type="checkbox"/> Precautions to be taken <input type="checkbox"/> Keeping activity records	0.1	0.4	0.5

7.	Perform internal/ external communication	<u>Performing internal/ external communication:</u> <input checked="" type="checkbox"/> Concept, need, and importance <input checked="" type="checkbox"/> Principles, procedures, and application <input checked="" type="checkbox"/> Performing internal/ external communication <input checked="" type="checkbox"/> Precautions to be taken <input checked="" type="checkbox"/> Keeping activity records	0.1	0.4	0.5
8.	Perform oral/ written communication	<u>Performing oral/ written communication:</u> <input checked="" type="checkbox"/> Concept, need, and importance <input checked="" type="checkbox"/> Principles, procedures, and application <input checked="" type="checkbox"/> Performing oral/ written communication <input checked="" type="checkbox"/> Precautions to be taken <input checked="" type="checkbox"/> Keeping activity records	0.1	0.4	0.5
9.	Communicate with financial institutes	<u>Communicating with financial institutes:</u> <input checked="" type="checkbox"/> Concept, need, and importance <input checked="" type="checkbox"/> Principles, procedures, and application <input checked="" type="checkbox"/> Communicating with financial institutes <input checked="" type="checkbox"/> Precautions to be taken <input checked="" type="checkbox"/> Keeping activity records	0.1	0.4	0.5
10.	Link with media	<u>Linking with media:</u> <input checked="" type="checkbox"/> Concept, need, and importance <input checked="" type="checkbox"/> Principles, procedures, and application <input checked="" type="checkbox"/> Linking with media <input checked="" type="checkbox"/> Precautions to be taken <input checked="" type="checkbox"/> Keeping activity records	0.1	0.4	0.5
11.	Disseminate information	<u>Disseminating information:</u> <input checked="" type="checkbox"/> Concept, need, and importance <input checked="" type="checkbox"/> Principles, procedures, and application <input checked="" type="checkbox"/> Disseminating information <input checked="" type="checkbox"/> Precautions to be taken <input checked="" type="checkbox"/> Keeping activity records	0.1	0.4	0.5

12.	Write job application	<u>Writing job application:</u> <input type="checkbox"/> Concept, need, and importance <input type="checkbox"/> Component parts of job application <input type="checkbox"/> Format of job application <input type="checkbox"/> Writing job applications <input type="checkbox"/> Precautions to be taken <input type="checkbox"/> Keeping activity records	0.1	0.4	0.5
13.	Prepare resume	<u>Preparing resume:</u> <input type="checkbox"/> Concept, need, and importance <input type="checkbox"/> Component parts of a resume <input type="checkbox"/> Format of a resume <input type="checkbox"/> Writing resume <input type="checkbox"/> Precautions to be taken <input type="checkbox"/> Keeping activity records	0.1	0.4	0.5
14.	Communicate with senior.	<u>Communicating with senior:</u> <input type="checkbox"/> Concept, need, and importance <input type="checkbox"/> Principles, procedures, and application <input type="checkbox"/> Communicating with senior <input type="checkbox"/> Precautions to be taken <input type="checkbox"/> Keeping activity records	0.1	0.4	0.5
15.	Communicate with juniors.	<u>Communicating with juniors:</u> <input type="checkbox"/> Concept, need, and importance <input type="checkbox"/> Principles, procedures, and application <input type="checkbox"/> Precautions to be taken <input type="checkbox"/> Keeping activity records	0.1	0.4	0.5
16.	Deal with customers/stake holders	<u>Dealing with customers/stake holders:</u> <input type="checkbox"/> Concept, need, and importance <input type="checkbox"/> Principles, procedures, and application <input type="checkbox"/> Communicating with juniors <input type="checkbox"/> Precautions to be taken <input type="checkbox"/> Keeping activity records	0.1	0.4	0.5

17.	Request / purchase tool, supplies, materials and equipment.	<u>Requesting / purchasing tool, supplies, materials and equipment:</u> <input type="checkbox"/> Concept, need, and importance <input type="checkbox"/> Principles, procedures, and application <input type="checkbox"/> Requesting / purchasing tool, supplies, materials and equipment <input type="checkbox"/> Precautions to be taken <input type="checkbox"/> Keeping activity records	0.1	0.4	0.5
18.	Fill up leave requisition form	<u>Filling up leave requisition form:</u> <input type="checkbox"/> Concept, need, and importance <input type="checkbox"/> Principles, procedures, and application <input type="checkbox"/> Filling up leave requisition form <input type="checkbox"/> Precautions to be taken <input type="checkbox"/> Keeping activity records	0.1	0.4	0.5
Total:			2	8	10

Module 10. Entrepreneurship Development

Time: 18 hrs (Th.) + 22 hrs (Pr.) =40 hrs

Course description

This course is designed to impart the knowledge and skills necessary for micro enterprise startup. The entire course intends to provide basics of entrepreneurial characteristics, finding viable business idea and developing business plan.

Course objectives

After completion of this course students will be able to:

1. Understand concept of entrepreneurship and business
2. Explore viable business idea
3. Learn to prepare business plan

SN	Task statements	Related technical knowledge	Time (hrs)		
			T	P	Tot.
1.	State the concept of entrepreneurship/ business/enterprises	<ul style="list-style-type: none"> • Introduction to entrepreneurship • Classification of enterprises • Benefits of self employment 	2		2
2.	Grow entrepreneurial attitudes	<ul style="list-style-type: none"> • Wheel of success • Risk taking attitude 	3		3
3.	Generate viable business ideas	<ul style="list-style-type: none"> • Business idea generation • Evaluation of business ideas • Creativity and innovation 	3		3
4.	Prepare business plan	<ul style="list-style-type: none"> • Concept of market and marketing • Description of product or service • Selection of business location • Estimation of market share • Promotional measures • Required fixed assets and cost • Required raw materials and costs • Operation process flow • Required human resource and cost • Office overhead and utilities • Working capital estimation • Unit price calculation • Cost benefit analysis • Information collection guidelines 	9	20	29
5.	Prepare basic business records	<ul style="list-style-type: none"> • Day book • Payable & receivable account 	1	2	3
Total:			18	22	40

Text book:

- क) प्रशिक्षकहरूका लागि निर्मित निर्देशिका तथा प्रशिक्षण सामग्री, प्राविधिक शिक्षा तथा व्यावसायिक तालीम परिषद्, २०६९
 ख) प्रशिक्षार्थीहरूका लागि निर्मित पाठ्यसामग्री तथा कार्यपुस्तिका, प्राविधिक शिक्षा तथा व्यावसायिक तालीम परिषद् (अप्रकाशित), २०६९

Reference book:

Entrepreneur's Handbook, Technonet Asia, 1981

Suggested Reference Books:

SN	Name	Author	Publication
1.	Technology of the Metal Trade		GTZ, Deutsche Gesellschaft fur Technische Zusammenarbeit
2.	Mechanical engineering.	ILO learning element	
3.	All about MACHINE TOOLS	Heinrich Gerling	
4.	Instructional manual Lathe Machine Techniques		The institute of vocational training, The ministry of Labour, Japan.
5.	Machining Operations (II) Turning manual		O V T Association
6.	Sharpening of cutting tools		MIR Publishers, MOSCOW

व्यवसायमा आवश्यक तालीम गुणस्तर सूचक

प्रशिक्षणको पेसा: लेथ सेटर अपरेटर

समूहको आकार: २० प्रशिक्षार्थी

अवधि: ३९० घन्टा

क्र.सं.	मापक/विधि	सूचकाङ्क (अनिवार्य)	सूचकाङ्क (भएमा राम्रो)
१.	प्रशिक्षण स्थलमा हुनुपर्ने विशेष आवश्यकता	<ul style="list-style-type: none"> विद्युत आपूर्ति खानेपानी व्यवस्था Structural Facility 	<ul style="list-style-type: none"> प्राथमिक उपचार कक्ष
२.	कक्षाकोठा र बस्ने तथा लेख्ने सुविधा (फर्निचर)	<ul style="list-style-type: none"> क्षेत्रफल : कम्तीमा २० वर्ग मी. लेख्ने पाता भएका २० कुर्सी वा २० जना प्रशिक्षार्थीलाई पुग्ने पर्याप्त टेबल र बेन्च सेतो पाटी/कालो पाटी पर्याप्त प्रकाश र हावा खेल्ने कोठा 	<ul style="list-style-type: none"> मल्टिमिडिया प्रोजेक्टर कम्प्युटर
३.	प्रयोगशाला र बस्ने तथा लेख्ने सुविधा (फर्निचर)	<ul style="list-style-type: none"> कम्तीमा ५० वर्ग मी. को क्षेत्र बेन्च अनुसार प्रत्येक बेन्चमा जोडिएको काम गर्ने टेबल (प्रत्येकलाई छुट्टाछुट्टै टेबल वा २ जनालाई १ टेबल अथवा ४/४ जनालाई पुग्ने ५ वटा ठूलो टेबल) 	<ul style="list-style-type: none"> प्रत्येक प्रशिक्षार्थीहरूलाई छुट्टाछुट्टै सामग्री बाकस प्रत्येक प्रशिक्षार्थीहरूलाई ५ वर्ग मी. पुग्ने कार्यकक्ष (फाइलिड, कटाइ र जोडाइका लागि)
४.	व्यावसायिक स्वास्थ्य र सुरक्षा	<ul style="list-style-type: none"> सुरक्षा सामग्री २० सेट (पञ्जा, चस्मा र छात्रालाका जुता) कार्यशालामा आधारभूत प्राथमिक उपचार बाकस (आधारभूत औषधीहरू सिटामोल, हातेपट्टी, आयोडिन र ब्यान्डेज सहितको) सुरक्षा सम्बन्धी जानकारी (चार्ट, चिन्ह र सङ्केतहरू) 	<ul style="list-style-type: none"> आगो नियन्त्रण गर्ने मेसिन (Fire Estinguisher) (कम्तीमा २ वटा) आगो लागेको जानकारी दिने यन्त्र
५.	प्रशिक्षकहरू	<ul style="list-style-type: none"> कम्तीमा २ जना प्रशिक्षक लेथ सेटर अपरेटर तह १ को सीप परिक्षा उत्तीर्ण र कम्तीमा ३ वर्षको अनुभव वा मेकानिकल विषयमा डिप्लोमा वा सो सरह गरि कम्तीमा १ वर्षको सम्बन्धि व्यवसायको अनुभव भएको । 	<ul style="list-style-type: none"> लेथ सेटर अपरेटर तह २ को सीप परिक्षा उत्तीर्ण र कम्तीमा ३ वर्षको अनुभव प्रशिक्षण सम्बन्धी सिप/ प्रशिक्षक प्रशिक्षण लिएको
६.	प्रशिक्षार्थीहरू	<ul style="list-style-type: none"> साधारण लेखपढ गर्न सक्ने तथा यस व्यवसायमा अभिरुचि राख्ने व्यक्तिहरू । कम्तीमा १६ वर्ष उमेर पुगेका व्यक्तिहरू । 	<ul style="list-style-type: none"> १० कक्षा उत्तीर्ण उमेर २० देखि २५ वर्ष
७.	औजार तथा उपकरणहरू	<ul style="list-style-type: none"> नत्थी गरिएको सूचीअनुसार 	
८.	कार्यस्थलमा व्यवहारिक सिपको प्रयोग	<ul style="list-style-type: none"> वास्तविक कार्य क्षेत्रमा सिप प्रदर्शन गर्ने भ्रमण 	<ul style="list-style-type: none"> ४ हप्ताको व्यावहारिक कक्षा
९.	मूल्याङ्कन	<ul style="list-style-type: none"> नियमित कार्यकक्षमा अवलोकन सिप तहको विकासका लागि योजना र उत्पादन मूल्याङ्कन उपस्थिति/प्रवृत्ति नियन्त्रण मध्यम तहको सिप परीक्षा (कोर्स पूरा भएपछि) 	<ul style="list-style-type: none"> दैनिक मूल्याङ्कन प्रणाली
१०.	प्रयोग हुने सामग्री	<ul style="list-style-type: none"> नत्थी गरिएको सूचीअनुसार 	

सामान्य गुणस्तर सूचक

उपलब्धि तह

क्र.सं	मापक	उद्देश्य प्रमाणीकरण हुने सूचक	प्रमाणीकरणको साधन
१.	श्रम बजारमा तालिमको आवश्यकता छनोट गर्ने विधि/उपाय	तालिमको आवश्यकता निर्धारण, द्रुत बजार सम्भावना सर्वेक्षण वा अन्य उपयुक्त विधि अवलम्बन गरी कम्तीमा वर्षको एकपटक स्थानीय बजारमा माग हुने दक्ष/सिपयुक्त कामदारका लागि आवश्यक तालिम प्रतिबिम्बित हुनेगरी बजार अवलोकनमार्फत सम्भावना पत्ता लगाइन्छ ।	टिएमए अथवा द्रुतबजार सर्वेक्षण प्रतिवेदन
		टी.र ई. उद्योग वाणिज्य सङ्घका कार्यालयमा नियमित भेटनुका साथै स्थानीय उद्योग व्यवसायी र ठूला उद्योगपतिका प्रतिनिधिसमेत स्थानीय रूपमा रोजगारी उपलब्ध गराउने विषयका बैठकमा सहभागी हुनेछन् र तालिमबारे समीक्षा गर्छन् ।	बैठकको सङ्ख्या, सहभागीहरूको नामावली र बैठकपुस्तिका
२.	भिएसटीमा राम्रो पहुँचका लागि प्रयोग गरिएको योजनाहरू	तालिम सम्बन्धी आवश्यकताका सूचना स्थानीय पत्रपत्रिका र एफएमलगायत आमसञ्चारका माध्यमबाट व्यापक प्रसारण गरिन्छन् । साथै यस्ता स्थानीय एफएम, पोस्टर र स्थानीय सामुदायिक कार्यकर्तासमेतको माध्यमबाट घोषणा गरिन्छ ।	सञ्चार माध्यमबाट प्रसारण भएका सूचनाका विषयहरू र प्रसारण संख्या
		प्रशिक्षार्थीहरू कार्यक्रमको प्रशिक्षार्थी छनोट निर्देशिकामा उल्लेख भएको विधि अपनाइ छनोट गरिन्छ ।	छनोट प्रक्रिया र छनोट गरिएका तालिम लिने व्यक्तिहरूको जानकारी, योग्यता र सूची
३.	तालिमसम्बन्धी पाठ्यक्रम र तालिम पुस्तिकाको उपलब्धता	सिटिइभिटीद्वारा गुणस्तर कायम गरी बनाइएको पाठ्यक्रम प्रशिक्षकहरूलाई उपलब्ध गराइन्छ ।	तालिम अवलोकन प्रतिवेदन
		तालिम पुस्तिका तथा तालिम सामग्रीहरू सिटिइभिटीको स्तरीय पाठ्यक्रमलाई आधार मानी निर्माण गरिन्छ । यसलाई स्थानीय श्रम बजार अनुकूलको बनाइन्छ ।	तालिम पुस्तिका/अन्य साधन
४.	तालिम दिने व्यक्तिहरूको छनोट	कम्तीमा दुइ वटा	तालिमकर्ताहरूको विस्तृत जानकारी तालिम अवलोकन प्रतिवेदन
		दुईजना प्रशिक्षकमध्ये कम्तीमा एकजनाले सम्बन्धित विषयमा डिप्लोमा गरी एक वर्ष सम्बन्धित व्यवसायको कार्य अनुभव हासिल गरेको अथवा सिप परीक्षा तह १ उत्तीर्ण गरी सम्बन्धित विषयमा तीन वर्षको कार्य अनुभव भएको हुनु पर्नेछ ।	सबै तालिमकर्ताहरूको विस्तृत जानकारी
		त्यस्तै दुईजना प्रशिक्षकमध्ये कम्तीमा एकजनाले निर्धारित पाँचदिने प्रशिक्षार्थी प्रशिक्षक तालिम सफलतापूर्वक सम्पन्न गरेको हुनुपर्ने र आधारभूत/प्रारम्भिक सिप तहका लागि राष्ट्रिय रूपमा प्रतिष्ठित संस्था जस्तै- टिआइटीआईबाट चारदिने तालिम सम्पन्न गरेको हुनुपर्ने ।	सबै तालिमकर्ताहरूको विस्तृत जानकारी
		समग्र कार्यक्रम तालिमको पाठ्यक्रम र तालिम सामग्रीहरूबारे तालिम हनुअघि नै तालिमका सबै प्रशिक्षकहरूलाई अभिमुखीकरण तालिम दिइन्छ ।	तालिम अगाडिको अभिमुखीकरण प्रतिवेदन
५.	नियमित तालिम व्यवस्थापन	तालिमको सुरुवात, अन्त्य, कार्यगत तालिम, पदस्थापन योजना, सिप परीक्षण मिति, रोजगारी स्थापना सम्बन्धी योजना र तालिमपछिको सहयोग योजनाजस्ता विषयहरूलाई समेटेर उपयुक्त समयमा तालिम पात्रोको निर्माण हुने ।	तालिम पात्रो

प्रक्रियागत तह

क्र.सं	मापक	उद्देश्य प्रमाणीकरण हुने सूचक	प्रमाणीकरणको साधन
१.	तालिममा सहभागिता	प्रशिक्षार्थीहरू लिंग, जाती, जनजाती, शिक्षाको तह र भौगोलिता लगायत समग्र क्षेत्रहरू र त्यो सम्बन्धित योग्य एवम् सम्बन्धित क्षेत्रको लक्षित समूहलाई ध्यानमा राखेर छानिन्छ ।	तालिम लिनेहरूको सूची
		एउटा समूहमा बढीमा २० जना	तालिम लिनेहरूको सूची तालिम अवलोकन प्रतिवेदन
		कम्तीमा ८०% प्रशिक्षार्थीहरू तालिमको पूरा अवधीभर उपस्थित हुनपर्ने ।	सहभागीहरूको हाजिरी पुस्तिका, तालिम अवलोकन प्रतिवेदन
२.	तालिमकर्ताको संलग्नता	प्रशिक्षार्थी र प्रशिक्षकको अनुपात सैद्धान्तिक तालिमको अवधिमा बढीमा २० जना प्रशिक्षार्थी = एकजना प्रशिक्षक र व्यावहारिक तालिमको अवधिमा १० जना प्रशिक्षार्थी = एकजना प्रशिक्षक हुनुपर्ने ।	तालिम अवलोकन प्रतिवेदन तालिम सत्र योजना
३.	भौतिक साधन	तालिम कार्यक्रमको दस्तावेजमा उल्लेख भए अनुसारको भौतिक सुविधा पर्याप्त मात्रामा उपलब्ध हुनुपर्ने । नियमित पानी र हात धुने साबुन सहितका पुरुष र महिला शौचालय छुट्टाछुट्टै व्यवस्था हुनपर्छ ।	तालिम अवलोकन प्रतिवेदन
		सबैखाले सामग्री र मेसिनहरूको प्रयोग गर्दा अवलम्बन गर्ने सुरक्षा विधिहरूको व्यवस्था, सुरक्षासँग सम्बन्धित जानकारी र त्यससँग सम्बन्धित वस्तुहरूको सूची कार्यशाला तथा प्रयोगशालामा टाँसिएको हुनपर्छ । प्रशिक्षार्थी एवम् प्रशिक्षकहरूलाई स्वास्थ्य र सुरक्षाको उपायहरूबारे निर्देशन दिइन्छ । प्राथमिक उपचार बाकस नियमित रूपमा (औषधीसहित) सम्बन्धित कक्षमा उपलब्ध रहन्छ । साथै, त्यो बाकसमा प्राथमिक उपचारसँग सम्बन्धित चिह्न पनि स्पष्ट रूपमा लेखिन्छ । प्रशिक्षार्थीहरूलाई कसरी प्राथमिक उपचार गर्ने भन्ने विधिको जानकारी गराइन्छ ।	तालिम अवलोकन प्रतिवेदन तालिम सत्र योजना
४.	व्यावहारिक तालिम सम्बन्धी व्यवस्था	सैद्धान्तिक कक्षा र व्यावहारिक कक्षाको अनुपात २० सैद्धान्तिक कक्षा = ८० व्यावहारिक कक्षा हुन्छ ।	तालिम अवलोकन प्रतिवेदन तालिम सत्र योजना
		प्रत्येक प्रशिक्षार्थीहरूले आ-आफ्नो व्यवसायसँग सम्बन्धित साधन/ मेसिनहरूमा मात्रै आफ्नो अभ्यास र अन्य काम गर्नुपर्छ । साथै, अन्य सामग्री पेसा/सिपसँग सम्बन्धित रही वर्गीकरण गरेर राखिएको क्षेत्रमा गुणस्तर निर्धारण हुनेगरी सोही स्थानमा सबै प्रशिक्षार्थीले सम्बन्धित रही काम गरेको हुनुपर्छ ।	तालिम अवलोकन प्रतिवेदन तालिम सत्र योजना
		स्तरीय पाठ्यक्रम बमोजिम सबै प्रशिक्षार्थी कार्यगत तालिम, औद्योगिक अभ्यास, सिप प्रदर्शन भ्रमण लगायत गतिविधिमा अनिवार्य सहभागी हुनुपर्छ ।	तालिम अवलोकन प्रतिवेदन कार्यगत तालिम पदस्थापनको औद्योगिक अभ्यास र सिप प्रदर्शन भ्रमणको सूची
५.	नरम तथा व्यावसायिक सिप तालिमको व्यवस्था	सबै प्रशिक्षार्थीलाई श्रमअधिकार, एचआइभी/एड्स, प्रजनन स्वास्थ्य, व्यवसायिक सिप तालिम, जीवनोपयोगी तालिम र वैदेशिक रोजगार सम्बन्धी अभिमुखीकरण जस्ता आफ्नो आवश्यकता अनुसारका तालिम मा पहुँच पुर्याइन्छ ।	तालिम अवलोकन प्रतिवेदन तालिम सत्र योजना

क्र.सं	मापक	उद्देश्य प्रमाणीकरण हुने सूचक	प्रमाणीकरणको साधन
६.	तालिम दिने योजना तथा त्यसलाई लागू गर्ने विधि	सम्पूर्ण तालिम कार्यविधि तालिम पात्रोअनुसार नै लागू गरिन्छ ।	तालिम अवलोकन प्रतिवेदन तालिम पात्रो
		पाठ्यक्रम र तालिम पात्रोअनुसार तालिमको दैनिक पाठयोजना बनाइन्छ र त्यससम्बन्धी दैनिक कार्य पुस्तिकाको व्यवस्था हुनुपर्छ ।	तालिम अवलोकन प्रतिवेदन
		सिटिइभिटीबाट गुणस्तर कायम गरी निर्धारण गरिएको पाठ्यक्रमलाई तालिममा लागू गरिन्छ र त्यसैअनुसार बनाइएको तालिम पुस्तिकालाई प्रशिक्षक र प्रशिक्षार्थीहरूले प्रयोग गर्छन् ।	तालिम सत्र योजना, तालिम गतिविधि, अवलोकन प्रतिवेदन
७.	पदस्थापन र सरसल्लाह सम्बन्धी सहयोगको व्यवस्था	रोजगारीको पदस्थापना र अन्य स्थान विशेष सल्लाहहरू उपयुक्त कर्मचारीहरूद्वारा पर्याप्त मात्रामा उपलब्ध गराइन्छ ।	अवलोकनप्रतिवेदन
		प्रशिक्षार्थी छनोट गर्न र सिप परीक्षाको लागि रोजगारदाताहरू मध्येका विशिष्ट र सम्बन्धित क्षेत्रमा विशिष्टता हासिल गरका दक्ष व्यक्तिहरूलाई सामेल गराइन्छ । रोजगारदाताहरूले नै कार्यगत तालिमको सुविधा उपलब्ध गराउँछन् । सफल प्रशिक्षार्थीहरूलाई तालिमपछि तत्काल रोजगारी उपलब्ध गराइन्छ ।	अवलोकन प्रतिवेदन, रोजगारी र आम्दानी प्रमाणीकरण प्रतिवेदन
		सफल प्रशिक्षार्थीहरूलाई ऋण सुविधा र व्यवसाय स्थापना गर्न आवश्यक पर्ने 'सिड मनी' उपलब्ध गराई उद्योग व्यवसायको स्थापना र प्रवर्द्धन गराउन उनीहरूलाई तालिमपछि आर्थिक कारोबार गर्ने संस्थाहरूसँग सम्बन्ध स्थापना गराई सहयोग प्रदान गर्ने ।	अवलोकन प्रतिवेदन, तालिम दिन् संस्था र वित्तिय संस्थाहरू बीचको करारपत्र

परिणाम/उपलब्धि तह

क्र.सं	मापक	उद्देश्य प्रमाणीकरण हुने सूचक	प्रमाणीकरणको साधन
१.	तालिम पूरा गर्ने दर	प्रशिक्षार्थीमध्ये १० प्रतिशत भन्दा बढीले तालिम अधुरो पारी विचमान छोड्ने	प्रशिक्षार्थीहरूको सूची
२.	क्षमता/सिप परीक्षा	कम्तीमा ९० प्रतिशतभन्दा बढीले तालिम पूरा गरी सिप परीक्षा दिने	एनएसटिबी सिप परीक्षाको परिणाम
		कम्तीमा ८० प्रतिशत प्रशिक्षार्थीहरूले सिप परीक्षा उत्तीर्ण गर्नुपर्ने	एनएसटिबी सिप परीक्षाको परिणाम
३.	सफल प्रशिक्षार्थीहरूको पदस्थापन दर	प्रत्येक तालिमबाट सफल ६० प्रतिशत प्रशिक्षार्थीलाई रोजगारीको व्यवस्था भएको/रोजगारी पाएका छन् ।	आम्दानी प्रमाणीकरण प्रतिवेदन/ट्रेसर अध्ययन प्रतिवेदन
		रोजगार पाएका प्रशिक्षार्थीहरूले विशेष रूपमा व्यवस्था गरिएको वर्गीकरण (यदि गरेको भएमा) अनुसारको सामान्य अवस्थाको आम्दानी गरेका छन् ।	आम्दानी प्रमाणीकरण प्रतिवेदन/ट्रेसर अध्ययन प्रतिवेदन
४.	तालिमबाट प्राप्त सिपहरूको कार्यस्थलमा भएको प्रयोग बारे	९० प्रतिशत जागिरमा संलग्न प्रशिक्षार्थीहरूले आफ्नो सिपसँग सम्बन्धित व्यावसायिक तालिममा संलग्न भएको हुनुपर्छ ।	आम्दानी प्रमाणीकरण प्रतिवेदन/ट्रेसर अध्ययन प्रतिवेदन
		कम्तीमा ८० प्रतिशत रोजगारमा संलग्न प्रशिक्षार्थीहरू आफ्नो कामप्रति सन्तुष्ट रहेको साथै ६० प्रतिशत रोजगारदाताहरू प्रशिक्षार्थीहरूको कार्यबाट सन्तुष्ट रहेको देखिन्छ । रोजगारदाताहरू तालिमबाट प्रशिक्षार्थीहरूले पाएको सिपबाट सन्तुष्ट छन् ।	ट्रेसर अध्ययन प्रतिवेदन रोजगारदाताहरूको सर्वेक्षण

Tools, equipment and materials for 10 participants

S. No.	Particulars	Specification	No	Remarks
1.	Center Lathe Machine		10 nos	
2.	Three Jaw universal Chuck	According to m/c spindle	10 set	
3	Three Jaw independent Chuck	According to m/c spindle	10 set	
4	Four Jaw chuck	According to m/c spindle	10 set	
5	Four Jaw chuck	According to m/c spindle	10 set	
6	Collect chuck with draw bar	Set	10 set	
7	Face plate	According to m/c spindle	10 set	
8	Lathe dog clamps with face plate	Set	10 set	
9	Lathe centers: Live, Dead, Revolving	According to m/c spindle	10 set	
10	Drill chuck with chuck keys		10 set	
11	Spanner	Set	10 set	
12	Allen keys	Set	10 set	
13	Steel Hammer	500 g	10 set	
14	Center punch	60°	10 set	
15	Boring tool		12 set	
16	Counter Sink	60 and 90	10 set	
17	Hand hacksaw Frame with blade		10 set	
18	Steady Rest		10 set	
19	Follower Rest		10 set	
20	HSS tool bit	½" x 6"	20 set	
21	Center Drill	5 x 3	12 set	
22	Drill bits	Set	5 set	
23	Surface Gauge		10 set	
24	Vernier caliper		10 set	
25	Bevel Protractor (Vernier Bevel Protactor)		10 set	
26	Odd leg caliper	Outside, Inside	10 set	
27	Height gauge		10 set	
28	Vernier height gauge with marking block		5 set	
29	Tool grinding gauge	Angle	10 set	
30	Safety goggles		10 set	
31	Grinding machine	Bench or Pedestrian	5 set	
32	Grinding wheel dresser		5 set	
33	Threading Die with handle set	60 and 55	10 set	
34	Knurling tool	Diamond + Straight	10 set	
35	Dial test indicator with magnetic stand		10 set	
36	Bench vice with working bench		10 set	
37	Set of file	Medium	10 set	
38	Thread plug gauge set	Metric	10 set	
39	Thread Pitch gauge (Screw pitch Gauge)	60 and 55	10 set	

S. No.	Particulars	Specification	No	Remarks
40	Check nut set	60 and 55	10 set	
41	Champher Tool		10 nos	
42	Oil Can		10 nos	
43	Clamping set with T bolts and nuts	M10, M12	10 set	
44	Cleaning brush	36mm	10 nos	
45	Mobil Oil		40 liter	
46	sleeve set		10 set	
47	leather work shoes		10 set	