CURRICULUM

FOR THE TRADE OF

OPERATOR CENTERLESS GRINDER

UNDER

APPRENTICESHIP TRAINING SCHEME

Designed in 2018

by

GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT AND ENTREPRENEURSHIP
DIRECTORATE GENERAL OF TRAINING

CONTENTS

1. BACKGROUND

1. 1. Apprenticeship Training Scheme under Apprentice Act 1961

The Apprentices Act, 1961 was enacted with the objective of regulating the programme of training of apprentices in the industry by utilizing the facilities available therein for imparting on-the-job training. The Act makes it obligatory for employers in specified industries to engage apprentices in designated trades to impart Apprenticeship Training on the job in industry to school leavers and person having National Trade Certificate (ITI pass-outs) issued by National Council for Vocational Training (NCVT) to develop skilled manpower for the industry. There are four categories of apprentices namely**; trade apprentice, graduate, technician and technician (vocational) apprentices.**

Qualifications and period of apprenticeship training of **trade apprentices** and Optional Trade apprentices vary from trade to trade. The apprenticeship training consists of basic training followed by practical training. At the end of the training, the apprentices are required to appear in a trade test conducted by NCVT and those successful in the trade **tests** are awarded the National Apprenticeship Certificate.

The period of apprenticeship training for graduate (engineers), technician (diploma holders and technician (vocational) apprentices is one year. Certificates are awarded on completion of training by the Department of Education, Ministry of Human Resource Development.

1. 2. Changes in Industrial Scenario

Recently we have seen huge changes in the Indian industry. The Indian Industry registered an impressive growth during the last decade and half. The number of industries in India have increased manifold in the last fifteen years especially in services and manufacturing sectors. It has been realized that India would become a prosperous and a modern state by raising skill levels, including by engaging a larger proportion of apprentices, will be critical to success; as will stronger collaboration between industry and the trainees to ensure the supply of skilled workforce and drive development through employment. Various initiatives to build up an adequate infrastructure for rapid industrialization and improve the industrial scenario in India have been taken.

1. 3. Reformation

The Apprentices Act, 1961 has been amended and brought into effect from 22nd December, 2014 to make it more responsive to industry and youth. Key amendments are as given below:

- Prescription of number of apprentices to be engaged at establishment level instead of trade-wise.
- Establishment can also engage apprentices in optional trades which are not designated, with the discretion of entry level qualification and syllabus.
- Scope has been extended also to non-engineering occupations.

- Establishments have been permitted to outsource basic training in an institute of their choice.
- The burden of compliance on industry has been reduced significantly.

2. RATIONALE

Need for Apprenticeship in Operator Centerless Grinder Optional trade

Success & Sustainability of the industry depends upon the availability of skilled and knowledgeable man power. Skilled Centerless Grinding Operators are required in most of the manufacturing industries. Skilled Centerless Grinding Operators are required in the:-

- Automobile and allied industries.
- Units manufacturing bearings, Engine Valves, Cutting Tools etc.
- Units manufacturing Defence related products.
- Public sector industries like BHEL, HAL, NTPC, Army based workshops and vehicle manufacturing units etc.
- Private industries in India & abroad.
- Self employment

Recognizing the importance of skill development more emphasis is given to practical training. The curriculum is designed in such a way that after successful completion of 15 months apprenticeship training in the trade, the apprentice will be responsible for his own work when employed in industry. Capabilities will be developed during apprenticeship training for further learning.

3. JOB ROLE

Brief description of Job role:

The Centerless Grinding operators, on receipt of shift planning for manufacturing of bright bars, automotive components of specific tolerances, shape and surface finish, checks the machine and measuring instruments prior to starting of the job.

He selects suitable grade grinding wheels for hard and soft materials for rough and final grinding.

The materials may be HSS, martenstic, austenitic steels and other non-ferrous materials. The range of products varies from pins, engine valves, cutting tools, shafts, bushes, sleeves, bearings and other automotive components.

Operator takes precautionary measures for machine and personal safety such as wearing helmets, shoes, ear plugs, mouth mask etc.

To operate Centerless Grinding machine and to manufacture quality products of different tolerances and surface finishes which can be sold in domestic and international market.

4. ASSESSABLE OUTCOMES WITH ASSESSMENT CRITERIA

Assessable outcome along with assessment criteria to be achieved after completion of Operator Centerless Grinder (Optional) Machine Course of 500 hrs duration.

Note:

1. The training shall be conducted as per the syllabus.
2. The trainee shall demonstrate the competencies which are defined below in assessable outcome and assessment criteria.
3. All the assessable outcomes are to be tested during formative assessment, observations, and viva-voce.
4. These assessable outcomes and assessment criteria will serve as a set of guidelines for Trainers and Assessors.

Generic Outcome			
	Assessable Outcomes		**Assessment Criteria**
1	Recognize & comply safe working practices, environment regulation and housekeeping (5S).	1.1	Follow and maintain procedures to achieve a safe working environment in line with occupational health and safety regulations and requirements and according to site policy.
		1.2	Identify and take necessary precautions on fire and safety hazards and report according to site policy and procedures.
		1.3	Report supervisor/ Competent authority in the event of accident or sickness of any staff and record accident details correctly according to site accident/injury procedures.
		1.4	Identify Personal Productive Equipment (PPE) and use the same as per related working environment.
		1.5	Identify basic first aid and use them under different circumstances.
		1.6	Recognize different components of 5S and apply the same in the working environment.

2	Understand and practice OSH, Communication.	2.1	To maintain procedures of OSH and Communication.
		2.2	Conduct appropriate discussions within the team and report to higher authority.
Specific Outcome			
	Assessable Outcomes		**Assessment Criteria**
3	Plan and organize the work for Centerless Grinding operations by applying appropriate grinding parameters measuring instruments and quality of work.	3.1	Acquaintance of through feed, in feed & end feed grinding operations with its components.
		3.2	Ascertain and select tools and materials for the job and make it available for use in working place in a timely manner
		3.3	Plan work in compliance with standard safety norms
		3.4	Perform through feed, in feed &end feed grinding in accordance with standard operating procedure using appropriate tools
		3.5	Check accuracy/correctness of job using appropriate measuring instrument.
4	Set the Grinding machine & tools in order to perform grinding operation as per specification.	4.1	Ensure the right material with right dimension as per plan
		4.2	Check the correctness of zero error of micrometer, check lobo meter and gauges
		4.3	Plan work in compliance with standard safety norms
5	Operate Centerless Grinding Machine and produce as per customers requirement	5.1	Check accuracy/correctness of job using appropriate measuring instruments
		5.2	Observe safety/precaution during machining

5. GENERAL INFORMATION

1. **Name of the Trade** **: Operator Centerless Grinder (Optional)**

2. **Duration of Apprenticeship Training**

(Basic Training + Practical Training) : 15 Months

2.1 **For Freshers: -**Duration of Basic Training: -

a) Block –: **3 months**

b) Practical Training (On Job Training) - 12 months

2.2 **For ITI Passed: -** Duration of Basic Training: - **NIL**

Duration of Practical Training (On -job Training): **12 months**

3. **Entry Qualification** **:**Passed 10th Class Examination

4. **Selection of Apprentices** **:** The apprentices will be selected as per Apprentices Act amended time to time.

5. **Rebate for ITI passed trainees** : i) **Three month** in the trade of **Operator Centerless Grinder (Optional)**

Note: Industry may impart training as per above time schedule, however this is not fixed. The industry may adjust the duration of training considering the fact that all the components under the syllabus must be covered. However, the flexibility should be given keeping in view that no safety aspect is compromised and duration of industry training remains as 1 year.

6. COURSE STRUCTURE

Training duration details: -

Time (in months)	1-3	4-15
Basic Training	Block– I	-----
Practical Training (On - job training)	----	Block – II

Components of Training	Duration of Training in Months →														
↓	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Basic Training Block - I															
Practical Training Block - II															

7. SYLLABUS

7.1 BASIC TRAINING (BLOCK – I)

DURATION: 03 MONTHS

GENERAL INFORMATION

1) **Name of the Trade** :Operator Centerless Grinder

2) **Hours of Instruction** : 500 Hrs./3 Months

3) **Batch size** : 15

4) **Power Norms** : 10 KW

5) **Space Norms** : 50 Sq.m.

6) **Examination** : The internal assessment will be held on completion of the each Block.

7) **Instructor Qualification** :

1. Instructor Qualification : Degree in Mechanical/Metallurgy/Production Engineering with one year experience in relevant field

OR

Diploma in Mechanical/Metallurgy/Production Engineering with two years experience in relevant field

OR

NTC/NAC in the trade with three years experience in the relevant field

8) **Tools, Equipments & Machinery required** : - As per Annexure – I

7.1.1. DETAIL SYLLABUS OF CORE SKILL

Block I
Basic Training

Duration : 500 hrs

Block- I				
Basic Training				
Sl.No.	**Workshop Calculation and Science**	**Duration (hrs.)**	**Engineering Drawing**	**Duration (hrs.)**
1.	**Unit**: Systems of unit- FPS, CGS, MKS/SI unit, unit of length, Mass and time, Conversion of units	20	Introduction to Engineering Drawing and Drawing Instruments : - Conventions - Viewing of engineering drawing sheets. - Method of Folding of printed Drawing Sheet as per BIS SP:46- 2003 - Drawing board, T-Square, Drafter (Drafting M/c), Set Squares, Protractor, Drawing Instrument Box (Compass, Dividers, Scale, Diagonal Scales etc.), Pencils of different Grades, Drawing pins / Clips.	30
2.	**Basic Mathematics** - BODMAS rule Fraction-Addition, Subtraction, multiplication and Division-Problem solving, Decimal- Addition. Simple calculation using Scientific Calculator.		Lines : - Definition, types and applications in Drawing as per BIS SP:46-2003 - Classification of lines (Hidden, centre, construction, Extension, Dimension, Section) - Drawing lines of given length (Straight, curved) - Drawing of parallel lines, perpendicular line - Methods of Division of line segment	
3.	Conversion of Fraction to Decimal and vice- versa.		Free hand drawing of - Lines, polygons, ellipse, etc. - geometrical figures and blocks with dimension Transferring measurement from the given object to the free hand sketches.	

4.	**Percentage**: Introduction, Simple calculation. Changing percentage to fraction and decimal & vice-versa.		Drawing of Geometrical Figures: Definition, nomenclature and practice of - Angle: Measurement and its types, method of bisecting. - Triangle -different types - Rectangle, Square, Rhombus, Parallelogram. - Circle and its elements.	
5.	**Material Science** : Definition, properties (physical & mechanical) and uses of Metal, Non-metal, Alloy &Insulator. Types of ferrous and Non-ferrous metals. Difference between Ferrous and Non-Ferrous metals.		Sizes and Layout of Drawing Sheets - Selection of sizes - Title Block, its position and content - Item Reference on Drawing Sheet (Item List)	
6.	**Mass, Weight and Density**: Mass, Unit of Mass, Weight, difference between mass and weight. Density, unit of density. Relation between mass, weight & density. Simple problems related to mass, weight, and density.		Method of presentation of Engineering Drawing - Pictorial View - Orthographic View - Isometric view	
7.	**Mensuration :** Area and perimeter of square, rectangle, parallelogram, triangle, circle, semi circle, Volume of solids – cube, cuboid, cylinder and Sphere. Surface area of solids – cube, cuboid, cylinder and Sphere.		- Drawing of Solid figures (Cube, Cuboids, Cone) with dimensions.	

8.	**Elasticity:** Elastic & Plastic material. Stress & strain and their units. Young's modules. Ultimate stress and breaking stress.		Free hand Drawing of Solid figures (Prism, Pyramid, Frustum of Cone and Pyramid.) with dimensions.	
9.	**Heat & Temperature**: Heat and temperature, their units, difference between heat and temperature, boiling point, melting point, Scale of temperature, relation between different scale of temperature. Thermometer, pyrometer. Transmission of heat, conduction, convection, radiation.		Free Hand sketch of hand tools and measuring tools used in respective trades.	
10.	**Basic Electricity:** Introduction and use of Electricity. AC, DC & their comparisons. Current, Voltage,Resistance& their units. Power, Energy & their units. Insulator and conductors & their uses.		Projections: - Concept of axes plane and quadrant. - Orthographic projections - Method of first angle and third angle projections (definition and difference) - Symbol of 1st angle and 3rd angle projection as per IS specification.	
11.	-----		Drawing of Orthographic projection in 3rd angle.	

7.1.2 DETAIL SYLLABUS OF PROFESSIONAL SKILL & PROFESSIONAL KNOWLEDGE			
Block – I			
	Professional Skills (275 Hours)		**Professional Knowledge (120 Hours)**
1	**OSH & General Safety**		
1.1	How to operate Fire extinguishers	1.1	Fire extinguishers and its types
1.2	General Safety of Tools &Equipments	1.2	Safe handling and use along with its maintenance of tools and equipments
1.3	Awareness on OSH Related to the job	1.3	OSH practices to be observed as a precaution
2	**Personal & Material Safety**		
2.1	Select, use, clean and store personal safety protective equipment	2.1	To describe personal safety measures during grinding
2.2	Use and storing of material in safe manner	2.2	Safe handling of materials
2.3	To demonstrate use of safety devices in Grinding Machines	2.3	Safety devices used for safe machining and Housekeeping, 1S, 2S
2.4	House Keeping, Knowledge on 5S	2.4	Effect of 5S
2.5	First Aid Box and Usages of First Aid materials		
3	**Units (British System & Metric System)**		
3.1	Units (System of Unit, British and Metric system and difference between them. Conversion of Units)	3.1	Types of measuring systems
3.2	Mass, weight and density		
3.3	Mass, Unit of Mass, weight and difference between them		
3.4	Simple problems related to mass, weight and Density		
4	**"My Machine Concept"**		

4.1	Cleaning of Machines	4.1	Description of machine and machine parts
4.2	Tightening of nuts and bolts from time to time	4.2	Housekeeping, , 1S, 2S
4.3	Checking & refitting of loose mechanical and electrical parts, replacement if required	4.3	Concept of preventive maintenance
5	Introduction and usages of measuring instruments, Principle of outside micro meter, three anvil micro meter and material measuring techniques by air gauges		
5.1	Careful handling of outside micro meter and three anvil micrometer and recognize parts of micrometer	5.1	Introduction to micrometer to include description of the principle of measuring instrument mainly with outside micro meter and anvil micrometer; its uses and care for measurement and setting up assembly operation
5.2	Zero adjustment and related maintenance	5.2	Zero error adjustment, least count calculation.
5.3	Identification and measuring of surface roughness	5.3	Concept of Surface Roughness
5.4	Material measuring techniques by air gauges.	5.4	Introduction of air gauges and its uses and care
6	**Introduction of Centerless Grinding operation**		
6.1	To show the components of Machine and their usages, Consumable identification and their requirements	6.1	Introduction of grinding machine
6.2	Centerless Grinding Machine operation system and production with appropriate work rest plate of h9, h10, h11 etc. tolerances	6.2	Bright bar tolerances i.e h9, h10, h11 etc. and quality with high surface finish

6.3	Machine operation for rough and final grinding for all the three types of grinding. e. in feed, through feed and end feed	6.3	Principles of through-feed grinding, in-feed and end-feed grinding for bar grinding and automobile components grinding.
6.4	Procedures of infeed and plunge Grinding		
7	**Specifications, selection, storage, mounting and dressing of Grinding Wheel, Regulating wheel**		
7.1	Wheel specification for rough and final grinding	7.1	Specifications of grinding wheels
7.2	Wheel balancing and mounting	7.2	Selection criteria of grinding wheels
7.3	Dressing of grinding wheel by diamond dresser	7.3	Fitting and dressing of grinding wheels and regulating wheels
7.4	Testing of cracks and defects of grinding wheel by sound method	7.4	Storage of wheels
8	**Importance and function of coolant**		
8.1	Application of coolant Water quality (i.e. plain water, Industrial Reverse Osmosis water, De-mineralized Water) and oil : water (ratio) to be added to get optimum results	8.1	Purpose and types of coolant oils to be used in grinding operation
8.2	Requirement of top up of oil on old used oil	8.2	Quality & Quantity of coolant oil top up and the disposal of old used oil water mixture from coolant tank
9	**Types of grinding defects and remedies. Inspection and packing and storage of finished goods**		
9.1	Reasons for generation of grinding defects and precaution including techniques to avoid these defects	9.1	Identification of defects i.e. cut marks, size variation, out of roundness, short length, burning marks, chattering marks, lobbing etc.
10	**Importance of dust collector system**		

10.1	Types of dust collector system for martens tic grades (magnetic material) Austenitic grades (non magnetic material)	10.1	Requirement of dust collector system in a grinding machine
10.2	Process of removal and disposal of grinding dust	10.2	Types of dust collector system to be used in machine considering grades of materials
10.3	Frequency of cleaning of dust collector	10.3	Use of filter paper roll dust collector and magnetic separators
11	**Industrial Training**		
11.1	Exposure to operation of grinding machine of various types and types of grinding in an industry	11.1	Introduction to industrial environment
11.2	Bright bar manufacturing processes from black bars through straightening, peeling, cold drawing and grinding route	11.2	Practical exposure to Bright Bar manufacturing process in an industrial environment
11.3	Concept on Peeling operation, straitening operation, cold drawing operation		
12	Exposure to inspection and storage of finished goods	12	Storage and inspection of finished goods
13	Trade Introduction	13	Introduction to Grinding Machine, grinding machine type, requirement of grinding
13.1	Properties of good operators		

Week No.	Professional Skills	Professional Knowledge
1 & 2	Familiarisation with the industry, Importance of trade training, List of tools & Machinery used in the trade. **Health, Safety & Environment:** Introduction to safety Equipments and their uses. Introduction of first aid, Occupational Safety & Health Importance of housekeeping & good shop floor practices. Demonstration of behaviour based safety. Health, Safety and Environment guidelines, legislations & regulations as applicable. Disposal procedure of waste materials like cotton waste, metal scraps etc. Basic safety introduction. Demonstration of 5S Concept on shop floor. Personal protective Equipments(PPE):- Basic injury prevention, Basic first aid, Hazard identification and avoidance, safety signs for Danger, Warning, caution & personal safety message. Preventive measures for electrical accidents & steps to be taken in such accidents.	Importance of safety and general precautions observed in the industry/shop floor. All necessary guidance to be provided to the new comers to become familiar with the working of industry System, stores procedures. Introduction of First aid. Operation of electrical mains. Behaviour based safety, unsafe act & situations. Safety at work. Accidents-their causes, General safety rules, Protective devices and guard, action taken in emergencies in industry perspective.
3-59	Hack sawing by Hand and Power Hacksaw. Filing on Surface and Right Angles. Drilling on drilling machine. Threading with hand Taps & Dies. Cleaning, Lubrication, Starting & stopping of CG Machine. Preventive maintenance Check points of CG Machine. Straightening of materials, rough grinding, finish grinding, dressing of wheels, use of coolant, setting of machine. Use of measuring instruments, scales, calipers, Vernier calipers, micrometre, size tolerances. Customers requirement, types of defects, storing, packing of rough and finish goods. Use of measuring instruments, measurement with Scale & Caliper, Vernier Caliper, Micrometer. Tolerances, Customer requirement, types of defects, storing, packing of rough and finished goods.	Further support or demonstration if required during performing related skills. Importance of Technical English terms used in industry (in simple definition only)- Technical forms, process charts, activity logs, in required formats of industry, estimation, cycle time, productivity reports, job cards.
60-65	Revision & Practice	
66	Assessment/Examination	

7.1.3 EMPLOYABILITY SKILLS

GENERAL INFORMATION

1)	**Name of the subject**	**:**	**EMPLOYABILITY SKILLS**
2)	**Applicability**	**:**	ATS- Mandatory for fresher only
3)	**Hours of Instruction**	**:**	**50 Hrs.**
4)	**Examination**	**:**	The examination will be held at the end of 15 months Training by NCVT.
5)	**Instructor Qualification**	**:**	

i)MBA/BBA with two years experience or graduate in sociology/social welfare/Economics with two years experience and trained in Employability skill from DGET Institute.

And

Must have studied in English/Communication Skill and Basic Computer at 12^{th} /diploma level

OR

ii) Existing Social Study Instructor duly trained in Employability Skill from DGET Institute.

7.1.3.1 SYLLABUS OF EMPLOYABILITY SKILLS

Block – I

Basic Training

Topic No.	Topic	Duration (in hours)
	English Literacy	**7**
1.	**Reading** Reading and understanding simple sentences about self, work and environment	
2.	**Writing** Construction of simple sentences Writing simple English	
3.	**Speaking / Spoken English** Speaking with preparation on self, on family, on friends/ classmates, on know, picture reading gain confidence through role-playing and discussions on current happening job description, asking about someone's job habitual actions. Taking messages, passing messages on and filling in message forms Greeting and introductions office hospitality,Resumes or curriculum vita essential parts, letters of application reference to previous communication.	
	I.T. Literacy	**10**
1.	**Basics of Computer** Introduction, Computer and its applications, Hardware and peripherals, Switching on-Starting and shutting down of computer.	
2.	**Word processing and Worksheet** Basic operating of Word Processing, Creating, opening and closing Documents, use of shortcuts, Creating and Editing of Text, Formatting the Text, Insertion & creation of Tables. Printing document. Basics of Excel worksheet, understanding basic commands, creating simple worksheets, understanding sample worksheets, use of simple formulas and functions, Printing of simple excel sheets. Use of External memory like pen drive, CD, DVD etc,	
3.	**Computer Networking and INTERNET** Accessing the Internet using Web Browser, Downloading and Printing Web Pages, Opening an email account and use of email. Social media sites and its implication.	

	Communication Skill	**18**
1	**Introduction to Communication Skills** Communication and its importance Principles of Effective communication Types of communication - verbal, non verbal, written, email, talking on phone. Non verbal communication - components-Para-language Body - language Barriers to communication and dealing with barriers.	
2	**Listening Skills** Listening-hearing and listening, effective listening, barriers to effective listening guidelines for effective listening.	
3	**Motivational Training** Characteristics Essential to Achieving Success The Power of Positive Attitude, Self awareness, Importance of Commitment Ethics and Values, Ways to Motivate Oneself, Personal Goal setting and Employability Planning.	
4	**Facing Interviews** Manners, Etiquettes, Dress code for an interview Do's & Don'ts for an interview	
	Entrepreneurship skill	
1.	**Concept of Entrepreneurship** **Entrepreneurship**- Entrepreneurship - Enterprises:- Conceptual issue. Source of business ideas, Entrepreneurial opportunities, The process of setting up a business.	**8**
2.	**Institutions Support** Role of Various Schemes and Institutes for self-employment i.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for financing/ non financing support agencies to familiarizes with the Policies /Programmes& procedure & the available scheme.	
	Productivity	
1.	**Productivity** Definition, Necessity.	
2.	**Affecting Factors** Skills, Working Aids, Automation, Environment, Motivation How improves or slows down.	
3.	**Personal Finance Management** Banking processes, Handling ATM, KYC registration, safe cash handling, Personal risk and Insurance.	
	Occupational Safety, Health & Environment Education	
1	**Safety & Health** Introduction to Occupational Safety and Health importance of safety and health at workplace.	**6**

2	**Occupational Hazards** Basic Hazards, Chemical Hazards, Vibro-acoustic Hazards, Mechanical Hazards, Electrical Hazards, Thermal Hazards. Occupational health, Occupational hygienic, Occupational Diseases/ Disorders & its prevention.	
3	**Accident & safety** Basic principles for protective equipment. Accident Prevention techniques - control of accidents andsafety measures.	
4	**First Aid** Care of injured & Sick at the workplaces, First-Aid & Transportation of sick person	
	Labour Welfare Legislation	
1	**Welfare Acts** Benefits guaranteed under various acts- Factories Act, Apprenticeship Act, Employees State Insurance Act (ESI), Employees Provident Fund Act.	
	Quality Tools	
1.	**Quality Consciousness :** Meaning of quality, Quality Characteristic	
2.	**Quality Circles :** Definition, Advantage of small group activity, objectives of quality Circle, Roles and function of Quality Circles in Organization, Operation of Quality circle. Approaches to starting Quality Circles, Steps for continuation Quality Circles.	**6**
3.	**House Keeping :** Purpose of Housekeeping, Practice of good Housekeeping.	
4.	**Quality Tools** Basic quality tools with a few examples	

7.2 PRACTICAL TRAINING (ON-JOB TRAINING)

(BLOCK – I)

DURATION: 12 MONTHS

GENERAL INFORMATION

1) **Name of the Trade**	:**Operator Centerless Grinder**
2) **Duration of On-Job Training**	: As per Apprenticeship Act amended time to time.
3) **Batch size**	:a) Apprentice selection as per Apprenticeship guidelines. b) Maximum 15 candidates in a group.
4) **Examination**	: i) The internal assessment will be held on completion of the block ii) NCVT exam will be conducted at the end of Apprenticeship Training
5) **Instructor Qualification**	:

(A) : Essential (any one of the below)

(i) NTC/NAC with Three years Experience in relevant field with Craft Instructors Training Certificate.

(ii) Diploma in Mechanical and allied with two years experience in relevant field.

(iii) Degree in Mechanical / Metallurgy / Production Engineering/Mechatronics with oneYear experience in relevant field.

(B) Desirable qualification: for (ii) & (iii) Craft Instructors Training Certificate.

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6) **Infrastructure for On Job Training** : - As per Annexure – II

BROAD SKILL COMPONENT TO BE COVERED DURING ON-JOB TRAINING

(Duration 12 Months)

The candidates should be competent to execute operation/skills after completion of the industrial training as under:-

1. Instructions in Safety precautions in shop floor and use of PPEs.
2. Use of Shop floor material handling equipments.
3. Use of measuring instruments i.e. scales, Vernier caliper, micrometer, surface roughness detection Machine.
4. Knowledge in straightening, peeling, cold drawing machines.
5. Knowledge in non destructive testing of rough and finish materials i.e. acid test, MPI, ZYGLO etc.
6. Identify grinding defects and its precautions and corrections.
7. 5S practices.
8. Plan and organize the work for Centerless Grinding operations by applying appropriate grinding parameters measuring instruments and quality of work.
9. Set the Centerless Grinding Machine and tools in order to perform grinding operation as per specification.
10. Operate Ceneterless Grinding Machine and produce as per customers requirement

8. ASSESSMENT STANDARD

8.1 Assessment guideline:

Appropriate arrangements should be made to ensure that there will be no artificial barriers to assessment. The nature of special needs should be taken into account while undertaking assessment. Due consideration to be given while assessing for team work, avoidance/reduction of scrap/wastage and disposal of scarp/wastage as per procedure, behavioral attitude, sensitive to environment and regularity in training. The sensitivity towards OSHE and self-learning attitude to be considered while assessing competency.

Assessment will be evidence based comprising of the following:-

(i). Job carried out in labs/workshop
(ii). Record book/ daily diary
(iii). Answer sheet of assessment
(iv). Viva-voce
(v). Progress chart
(vi). Attendance and punctuality
(vii). Assignment
(viii). Project work

Evidence of internal assessment to be preserved until forthcoming semester examination for audit and verification by examination body.

The following marking pattern to be adopted while assessing:

a) Weightage in the range of 60-75% to be allotted during assessment under following performance level:

For performance in this grade, the candidate with occasional guidance and showing due regard for safety procedures and practices, has produced work which demonstrates attainment of an acceptable standard of craftsmanship.

In this work there is evidence of:

- demonstration of good skill in the use of hand tools, machine tools and workshop equipment
- below 70% tolerance dimension achieved while undertaking different work with those demanded by the component/job.
- a fairly good level of neatness and consistency in the finish
- occasional support in completing the project/job.

b) Weightage in the range of above75%- 90% to be allotted during assessment under following performance level:

For this grade, the candidate, with little guidance and showing due regard for safety procedures and practices, has produced work which demonstrates attainment of a reasonable standard of craftsmanship.

In this work there is evidence of:

- good skill levels in the use of hand tools, machine tools and workshop equipment

- 70-80% tolerance dimension achieved while undertaking different work with those demanded by the component/job.
- a good level of neatness and consistency in the finish
- little support in completing the project/job

c) Weight age in the range of above 90% to be allotted during assessment under following performance level:

For performance in this grade, the candidate, with minimal or no support in organization and execution and with due regard for safety procedures and practices, has produced work which demonstrates attainment of a high standard of craftsmanship.

In this work there is evidence of:

- high skill levels in the use of hand tools, machine tools and workshop equipment
- above 80% tolerance dimension achieved while undertaking different work with those demanded by the component/job.
- a high level of neatness and consistency in the finish.
- minimal or no support in completing the project

8.2 FINAL ASSESSMENT- ALL INDIA TRADE TEST

(SUMMATIVE ASSESSMENT FOR ONE YEAR TRADE)

SUBJECTS	Marks	Sessional Marks	Full Marks	Pass Marks	Duration of Exam.
Practical	350	120	470	282	**08 hrs.**
Trade Theory	150	30	180	72	3 hrs.
Employability Skill	50		50	17	6 hrs.
Grand Total	**550**	**150**	**700**	**-**	

Note: - The candidate pass in each subject conducted under All India Trade Test.

9. FURTHER LEARNING PATHWAYS

- On successful completion of the course, trainees can opt for Diploma course (Lateral entry).
- On successful completion of the course, trainees can opt for CITS course.

Employment opportunities:

On successful completion of this course, the candidates shall be gainfully employed in the following industries:-

- Automobile and allied industries.
- Units manufacturing bearings, Engine Valves, Cutting Tools etc.
- Units manufacturing Defence related products.
- Public sector industries like BHEL, HAL, NTPC, Army based workshops and vehicle manufacturing units etc.
- Private industries in India & abroad.
- Self employment

ANNEXURE – I

10. List of Tool & Equipment for Basic Training
Batch Size of 15 Students
Trade: Operator Centerless Grinder

TOOLS AND EQUIPMENTS FOR CENTERLESS GRINDING		
S.N0.	**Items**	**Quantity**
1	Outside Micrometer (0-25 mm), digital	2 nos.
2	Outside Micrometer (0-25 mm), Plain	3 nos.
3	C-Clamp	2 nos.
4	Double end spanner (10 - 22)	1 set
5	Files (coarse, medium, smooth flat, half-round, round and tri-angular file of 200 mm)	1 each
6	1 carat diamond dresser for both grinding and control wheel and as required	2 nos.
7	200 mm dia. Grinding wheel for bench grinder (Green/black)	1 no each.
8	Blade Sharpening machine/hand grinding machine	2 nos.
9	4'' Grinding wheel for hand grinder	20 nos.
10	4'' parting wheel for hand grinder	10 nos.
11	Centerless Grinding machine with grinding wheel and regulating wheel	1 no.
12	Grinding wheel for CG Machine (A60 Grade)	1 no (As required).
13	Regulating Wheel for CG Machine (RR80 Grade)	1 no (As required).
14	Screw Driver with Handle (heavy duty)	2 nos.
15	Adjusting slide wrench 12''	2 nos.
16	Hammer 2 lbs with handle	2 nos.
17	Pipe wrench 12''	2 nos.
18	Wire Brush (MS)	4 nos.
19	Allen Keys (1.5 - 12 mm)	2 set
20	Safety Helmet	10 nos.
21	Mouth Mask	20 nos.
22	Hand Gloves (Cotton)	20 nos.
23	Safety Goggles	5 nos.
24	Ear Plug	20 nos.
25	Fire Extinguishers & Fire safety equipment's	1 set
26	C.I work rest plate (6 mm, 8 mm, 12 mm)	4 nos. each for through feed, in feed and end feed grinding of respective design

ANNEXURE – II

11. INFRASTRUCTURE FOR ON-JOB TRAINING

TRADE: Operator Centerless Grinder

For Batch of 15 APPRENTICES

Actual training will depend on the existing facilities available in the establishments. However, the industry should ensure that the broad skills defined against On-Job Training part (i.e. 12 months) are imparted. In case of any short fall the concern industry may impart the training in cluster mode/ any other industry/ at ITI.

ANNEXURE-III

12. GUIDELINES FOR INSTRUCTORS AND PAPER SETTERS

1.Due care to be taken for proper & inclusive delivery among the batch. Some of the following some method of delivery may be adopted:

A) LECTURE

B) LESSON

C) DEMONSTRATION

D) PRACTICE

E) GROUP DISCUSSION

F) DISCUSSION WITH PEER GROUP

G) PROJECT WORK

H) INDUSTRIAL VISIT

2. Maximum utilization of latest form of training viz., audio visual aids, integration of IT, etc. may be adopted.

3. The total hours to be devoted against each topic may be decided with due diligence to safety & with prioritizing transfer of required skills.