

**SYLLABUS OF SEMESTER SYSTEM
FOR THE TRADE OF**

“MACHINIST (GRINDER)”

SEMESTER PATTERN

Under

**Craftsmen Training Scheme (CTS)
(Two years/Four Semesters)**

**Revised in
2014**

**By
Government of India
Ministry of Labour & Employment (DGE&T)**

GENERAL INFORMATION

1. **Name of the Trade** : **MACHINIST (GRINDER)**
2. **N.C.O. Code No** : : 836.10, 836.25, 836.35, 836.36, 836.40, 836.55

3. **Duration of Craftsmen Training:** Two years (Four semesters each of six months duration).

4. **Power norms** : 23.4 KW
5. **Space norms** : 102Sq.mt.
6. **Entry Qualification** : Passed 10th Class with Science and Mathematics under 10+2 system of Education or its equivalent
7. **Trainees per unit** : 20
8a. **Qualification for Instructors** : Degree in Mechanical Engineering from recognized university with one year post qualification experience in the relevant field

OR

Diploma in Mechanical Engineering from recognized Board of Technical Education with two years post qualification experience in the relevant field

OR

NTC/NAC in the Trade of “**MACHINIST (GRINDER)**”
with 3 years post qualification experience in the relevant field.

- 8b. **Desirable qualification** : Preference will be given to a candidate with Craft Instructor Certificate (CIC).

Note:

- (i) Out of two Instructors required for the unit of 2(1+1), one must have Degree/Diploma and other must have NTC/NAC qualifications.
- (ii) Instructor qualification for WCS and E.D, as per the training manual.

9. **For Employability Skills:-** One contract/part time / guest faculty for Generic module
i) MBA/ BBA with two years experience **OR** Graduate in Sociology / Social Welfare / Economics with Two years experience **OR** Graduate / Diploma with Two years experience and trained in Employability Skills from DGET institutes
AND
Must have studied English / Communication Skills and Basic Computer at 12th / Diploma level and above
OR
Existing Social Study Instructors duly trained in Employability Skills from DGET institutes

Distribution of training on Hourly basis:

| Total hours /week | Trade practical | Trade theory | Work shop Cal. &Sc. | Engg. Drawing | Employability skills | Extra curricular activity |
|-------------------|-----------------|--------------|---------------------|---------------|----------------------|---------------------------|
| 40 Hours | 25 Hours | 6 Hours | 2 Hours | 3 Hours | 2 Hours | 2 Hours |

COURSE INFORMATION

1. Introduction:

- This course is meant for the candidates who aspire to become a professional Grinder.

2. Terminal Competency/Deliverables:

After successful completion of this course the trainee shall be able to perform the following skills with proper sequence.

- 1-The trainees can work in the industry as semiskilled machinist Grinder.
- 2-The trainee can work in basic fitting and operation in lathe, drilling, surface grinding, cylindrical grinding, center less grinding and tool and cutter grinding.
- 3- The trainee can work in CNC operating and programming.

11-Employment opportunities:

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

- 1 Production & Manufacturing industries.
- 2 Automobile and allied industries
- 3 Service industries like road transportation and Railways.
- 4 Ship building and repair
- 5 Infrastructure and defence organisations
- 6 In public sector industries like BHEL, BEML, NTPC, etc and private industries in India & abroad.
- 7 Self employment

3. Further learning pathways:

- On successful completion of the course trainees can pursue Apprenticeship training in the reputed Industries / Organizations.
- 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.

SYLLABUS FOR THE TRADE OF “MACHINIST (GRINDER)”

First Semester
(Semester Code no. MCG - 01)
Duration : Six Month

| Week No. | Trade Practical | Trade Theory |
|----------|--|--|
| 1. | <p>Importance of trade training, List of tools & Machinery used in the trade. Health & Safety: Introduction to safety equipments and their uses. Introduction of first aid, operation of Electrical mains.</p> <p>Occupational Safety & Health Importance of housekeeping & good shop floor practices. Health, Safety and Environment guidelines, legislations & regulations as applicable. Disposal procedure of waste materials like cotton waste, metal chips/burrs etc. Basic safety introduction, 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. Use of Fire extinguishers.</p> | <p>Importance of safety and general precautions observed in the in the industry/shop floor. All necessary guidance to be provided to the new comers to become familiar with the working of Industrial Training Institute system including stores procedures. Soft Skills: its importance and Job area after completion of training. Introduction of First aid. Operation of electrical mains. Introduction of PPEs. Introduction to 5S concept & its application. Response to emergencies eg; power failure, fire, and system failure.</p> |
| 2. | <p>Identification of tools & equipments as per desired specifications for marking & sawing(Hand tools , Fitting tools & Measuring tools) Selection of material as per application Visual inspection of raw material for rusting, scaling, corrosion etc., Marking out lines, gripping suitably in vice jaws, hacksawing to given dimensions, sawing different types of metals of different sections. Practical on marking, punching and rough grinding on pedestal grinder.</p> | <p>-Description of hand tools, Safety precautions, care and maintenance and material from which they are made. -Ferrous and nonferrous metal and their identification by different methods. Application and use of pedestal grinder.</p> |
| 3. | <p>Grinding of Chisels, Hack sawing, Measuring different types of jobs by steel rule caliper etc.</p> | <p>Theory of Semi precision instruments.</p> |
| 4. | <p>Drilling, reaming, tapping and threading with dies and use of coolants.</p> | <p>Relation between drill & tap sizes, care of taps and dies and their correct use. Types, properties and selection of coolants and lubricants.</p> |
| 5. | <p>Drilling different sizes of holes by hand</p> | <p>Brief description of drilling machine use</p> |

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| | and machine. Use of screw drivers, spanners, pliers etc. simple fitting. | and care. |
| 6&7 | Filing practice, simple fitting. | Heat treatment of metals, its importance, various methods of heat treatment such as hardening, tempering, normalizing, annealing etc. |
| 8. | Centre lathe and parts, setting of jobs and tools grinding of lathe tools of various angles. | Brief description of a Centre lathe, its use. |
| 9. | Parallel turning, taper turning and boring. Using compound rest and TT attachment. | Lathe tools and their uses taper and its types and problems on taper. Taper turning methods and calculations. i.e. Form tool, TT attachment, Compound rest etc. |
| 10. | Simple screw cutting (External and Internal) | Method of screw cutting simple calculation. Tap size drill size & vice versa. |
| 11. | Simple plain turning | Thread and its element types. |
| 12. | Safety rule on shop floor maintenance and control of grinding machines oiling cleaning etc. | Introduction to Grinding trade and machine safety precautions according to IS: 1991-1962. |
| 13. | Measurement of different types of job by steel rule, caliper etc. Taper by angular protractor. | General measuring tools (used in grinding shop) their description, use care and maintenance. |
| 14. | Setting grinding wheel on wheel flange, truing and balancing of wheels. Dressing of grinding wheel | General dressing tools used in grinding section such as wheel, diamond dresser, steel type dresser, abrasive dresser and nonferrous dresser. |
| 15. | Checking measuring various types of jobs using micrometers, Vernier caliper, Vernier Height gauge etc. Grinding practice on cylindrical grinding machine. | Precision instruments English and metric micrometer, vernier caliper, dial test indicator etc. their description and uses. |
| 16. | Grinding practice on surface and cylindrical grinding machine (Grinding should be performed both on soft and hardened materials). Checking dimension by Vernier height gauge. | Principle and value of grinding in finishing process, various types of grinding wheels their construction and characteristic glazed and loaded wheels. |
| 17. | Grinding practice on surface and cylindrical grinding machine. Grinding parallel block and plain mandrel to size. | -do- |
| 18-19. | Rough and finish grinding of surface and cylindrical job according to drawings. Include diamond and CBN | Different types of abrasive, manufacture of grinding wheels, their grades. |
| 20. | Demonstration on selection of grinding wheels for grinding different metals, selection of suitable wheel to obtain rough and IS: 1249- 1958. | Factors effecting selection of wheels, identification of wheel, marking system of grinding wheels IS: 551- 1966. |

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| 21. | Grinding different metals with suitable grinding wheels. | Grit and different types of bonds, such as vitrified, resinoid, rubber etc. Different types of metals and electroplated bond. |
| 22. | Externals and internal grinding operation, changing the wheel speed, obtain recommended wheel and controlling depth. Grinding sockets, morse taper and checking depth by depth gauge micrometer. Grinding External sleeve. | Grinding wheel speed, surface speed per minute conversion of peripheral speed to r.p.m. Depth of cut and range at usefulness. Depth micrometer and vernier caliper. Common types of surface grinding machine, plain surface, rotary surface, horizontal and vertical surface grinder etc. Method of grinding tapers. |
| 23-25 | Revision | |
| 26 | Examination | |

SYLLABUS FOR WORKSHOP SCIENCE AND CALCULATION
SEMESTER-I

| Week No | Workshop Science and Calculation |
|---------|--|
| 1 | - Introduction to Iron and Steel. Differences in Iron & steel. |
| 2 | - Introduction to Property and uses of C.I. and wrought Iron. - Iron and steel properties and uses. |
| 3 | - Properties and uses of plain carbon steel and alloy steel. |
| 4 | - Properties and uses of non ferrous metals and alloys Fraction and decimal - conversion fraction decimal and vice-versa. |
| 5 | - Properties and uses of copper, zinc, lead, tin, aluminum. |
| 6-7 | - Composition, properties and uses of brass, bronze, solder, bearing material, timber, rubber etc. |
| 8 | - System of units, British, metric and SI units for length, area, volume capacity, weight, time, angle, their conversions. - Effect of alloying elements in the properties of C.I. & steel. |
| 9 | - Unit of temperature for & related problems. Standard & absolute temp. |
| 10-11 | - Mass, volume, density, weight, sp. Gravity & specific weight. S.I. M.K.S. and F.P.S. units of force, weight etc. their conversion to related problems. |
| 12 | - Inertia, rest and motion, velocity and acceleration. |
| 13 | - Types of forces, its units and Weight calculation. |
| 14 | - Revision & Test - Power and roots Factor, Power base exponents number. Multiplication and division of power and root of a number. Square root of number and problems. |
| 15 | - Heat & temperature, thermometric scales, their conversions. |
| 16-17 | - Work energy and power, their units and applied problems. |
| 18-19 | - Percentage, changing percentage to decimal and fraction and vice versa. Applied problems. |
| 20 | - Problem on percentage related to trade. |
| 21 | - Different types of loads, stress, strain, modulus of elasticity. Ultimate strength, different types of stress, factor of safety, examples. |
| 22 | - Ratio & proportion- Ratio, finding forms ratio proportions, direct proportion and indirect proportion. Application of ratio and proportion & related problems. |
| 23-25 | Revision |
| 26 | Examination |

SYLLABUS FOR ENGINEERING DRAWING
SEMESTER-I

| Week No | Engineering Drawing |
|---------|---|
| 1-2 | - Engineering Drawing-- introduction to Engg. Drawing and its importance. |
| 3 | - Use of drawing instruments –Drawing of straight, inclined and curved lines. |
| 4 | - Exercise on linear and angular measurements. |
| 5 | - Types of lines their meaning & application as per BIS SP: 46-2003. |
| 6-7 | - Simple conventional symbols for material and parts as per BIS SP: 46-2003. - Geometrical construction of rectangles, square, circles. |
| 8 | - Geometrical construction of polygon and ellipse, parabola & hyperbola. |
| 9 | - Geometrical construction of involutes, oval, and helix. |
| 10-11 | - Free hand sketching of straight lines, rectangles, circles, square, polygons, ellipse. |
| 12 | - Standard printing style for letters and numbers as per BIS : SP: 46-2003 using stencils |
| 13 | - Free hand sketching of simple geometrical solids, cube, cone, prism, cylinder, sphere, pyramids. |
| 14 | - Scales- Types & its use. |
| 15 | - Revision & Test - Construction of diagonal scale. |
| 16 | - Simple dimensioning technique, size and location, dimensions of parts, holes angles, taper, screw etc. as per BIS SP: 46-2003. |
| 17 | - Transferring measurements for linear, angular, circular dimensions from the given object to the related free hand sketches using different measuring instruments. |
| 18-19 | - Pictorial drawings, isometric drawings of simple geometrical solids. |
| 20 | - Oblique/orthographic projection of simple geometrical solids. |
| 21 | - Orthographic drawings: Application of both the first angle and third angle. Isometric drawing of simple machined & casting blocks. |
| 22 | - Free hand sketches of trade related hand tools and measuring tools. |
| 23-25 | Revision |
| 26 | Examination |

SYLLABUS FOR EMPLOYABILITY SKILLS

SEMESTER-I

| 1. I.T. Literacy | |
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| Hours of Instruction : 20 Hrs. | Marks Allotted : 20 |
| Computer | - Introduction, Computer and its applications, Hardware and peripherals, Switching on and shutting down of computer. |
| WINDOWS | - Basics of Operating System, WINDOWS, The user interface of Windows OS, Customizing Windows Operating System, Create, Copy, Move and delete Files and Folders, Use of External memory like pen drive, CD, DVD etc, Use of Common applications. |
| MS office | - Basic operations of Word Processing, Creating, opening and closing Documents, use of shortcuts, Creation and Editing of Text, Formatting the Text, Printing document, Insertion & creation of Tables. - Basics of Excel worksheet, understanding basic commands, creating simple worksheets, understanding sample worksheets, use of simple formulas and functions, Printing of simple excel sheets |
| INTERNET | - Basic of Computer Networks (using real life examples), Definitions of Local Area Network (LAN), Wide Area Network (WAN), Internet, Concept of Internet (Network of Networks), Applications of Internet : Browsing, Searching, Emailing, Social Networking |
| WEB Browser | - Meaning of World Wide Web (WWW), Search Engines with examples, Web Browsing, Accessing the Internet using Web Browser, Downloading Web Pages, Printing Web Pages - Information Security and antivirus tools, Do's and Don'ts in Information Security, Awareness of IT – ACT, Importance of information security and IT act, types of cyber crimes. |
| 2. English Literacy | |
| Hours of Instruction: 15 Hrs. | Marks Allotted : 15 |
| Pronunciation | - Phonetics and pronouncing simple words. |
| Listening | - Interpreting conversation and discussions related to everyday life, Responding to spoken instructions in order to carry out requests and commands. |
| Speaking | - Asking and answering simple questions in English to describe people, things, situations and events. |
| Reading | - Reading and interpreting simple sentences, forms, hoardings, sign boards and notices. |
| Writing | - Writing sentences with simple words, reply to everyday office correspondence, - Writing CV & simple application forms. |
| 3. Communication skill | |
| Hours of Instruction: 15 Hrs. | Marks Allotted : 15 |
| Communication Skills | - Definition, Effective communication, Verbal communication, Use of right words, Non verbal communication, Body Languages. |
| Motivation | - Self awareness, Goal setting, Career planning, Values and Ethics |
| Time management | - Managing time effectively through planning |
| Facing Interviews | - Appearance and behaviour in an interview, Do's and don'ts |
| Behavioural Skills | - Attitude, Problem Solving, Thinking Skills, Confidence building |

Second Semester
(Semester Code no. MCG - 02)
Duration : Six Month

| Week No. | Trade Practical | Trade Theory |
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| 1 | Introduction Training- Revision of previous works. Machine setting for automatic movements and parallel grinding on cylindrical grinder. | Introduction Training- Revision of previous works. Common types of grinding machines. Plain cylindrical external and internal cylindrical grinder and universal grinder. |
| 2 | Testing and mounting wheels sleeves, truing and rebalancing and grinding parallel mandrel. | Test for alignment and checking, balancing at wheel, dressing different types of wheel, dressers, their description and uses. |
| 3 | Wheel balance and dressing grinding long bar using steady rest. | Test for alignment and checking, balancing of wheel, dressing different types of wheel, dressers their description and uses. |
| 4 | Grinding different types of jobs using machine chuck, face angle plate collets. | Holding devices such as Magnetic chuck, chucks and face plates collets their description and uses. Method of holding jobs on magnetic chuck, face plate and chucks. |
| 5 | Table alignment with the help of test bar and dial test indicator parallel grinding and taper grinding (by swiveling machine table) | External grinding operational steps in external grinding of a job and precautions to be taken. |
| 6 | Grinding of eccentric job and different types of jobs using jigs and fixtures angle plates. | Holding devices such as jig and fixture angle plates 'V' blocks etc. their description and uses. |
| 7 | Grinding of job by using face plate angle plate etc. | Internal grinding operational steps in internal grinding of a job precautions to be taken. |
| 8 | Grinding of plain/slot milling cutter. | Milling cutters and its nomenclature. |
| 9 | - do - | Grinding of bushes and cylinders steps and precautions to be taken. |
| 10 | Grinding bushes on mandrel within the close tolerance limits. | Rough and finish grinding limit fit and tolerances as per ISI: 919-1963. Basic size and its deviation, position of tolerances as per ISI: 919-1963. Basic size and its deviation, position of tolerance zones with respect of zero line. Fits different types clearance, interference and transition. Interchangeable system. Letter symbols for holes and shaft and fundamental deviation hole basis and shaft basis system. |
| 11 | Dry and wet grinding of different classes of metals such as cast iron , barzed carbide tip and different classes of steel. | Heat generated in grinding dry and wet grinding use of coolant, their composition and selection. Characteristic of coolant. |
| 12 | Grinding square block angle plate and angular block. | Grinding a square job grinding angular surface taker grinding by stane land taper and angle protractor. |

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| 13 | Grinding practice on drills reamers and taps. | Methods of grinding of drills reamers and taps. |
| 14 | Grinding slitting saw and side and face milling cutter. | Methods of grinding of milling cutters such as slitting saws, side and face milling cutter etc. |
| 15 | Checking tapered or angular jobs with help of sine bar, Dial gauge. | Use of snap gauges, sine bar and slip gauges their description and uses. Polishing, lapping powder and emery clothes lapping flat surface. |
| 16 | Grinding milling cutter with straight flutes | Tools and cutter grinder their description, working principles, operations care and maintenance. |
| 17 | Grinding milling cutter with helical flutes | Special types of grinding machines and centreless grinders. Their description, working principles, operations, care and maintenance. |
| 18 | Grinding internal bore of cylindrical job and use of telescopic gauge. | Grinding defects vibration, chattering, glazing and loading their causes and remedies. |
| 19 | -Do- | Grinding different defects and remedies on its. |
| 20 | Grinding carbide tipped tools and gauges (rough and finish grinding using disc and diamond wheels) | Applications of diamond wheel in grinding and grinding of tipped tools. |
| 21 | Making simple utility jobs with surface and cylindrical grinders. Preventive maintenance of grinding machines. | Preventive maintenance and its necessity. Mode of frequency of lubrication. Preparation of Maintenance schedule, simple estimation, use of hand book and reference table. |
| 22-23 | Implant training / Project work (work in a team) | |
| 24-25 | Revision | |
| 26 | Examination | |

SYLLABUS FOR WORKSHOP SCIENCE AND CALCULATION
SEMESTER-II

| Week No | Workshop Science and Calculation |
|---------|---|
| 1-2 | - Simple machines-principle, velocity ratio, mechanical advantage, efficiency, related problems. |
| 3 | - Algebraic symbols, fundamental algebra operations, sign and symbols used in algebra, coefficient terms, and unlike terms. |
| 4 | - Algebraic addition, subtraction, multiplication and division. |
| 5 | - Simple machines like winch pulley and compounding axle etc. |
| 6-7 | - Calculation of tap hole sizes for internal threads and blank size for cutting external threads. |
| 8 | - Factors and equations: Algebraic formula and solving simple equations. |
| 9 | - Factors and different types of factorization (LCM, HCF). |
| 10 | - Equations simple simultaneous equation. |
| 11 | - Simple simultaneous equation. |
| 12 | - Application, construction and solution of problems by equation. |
| 13-14 | - Atmospheric pressure, pressure gauge, gauge pressure and absolute pressure and their units. |
| 15 | - Simple problems on multiplication, division, power and root using calculator. |
| 16 | - Power and exponent. Laws of exponent. |
| 17 | - Relation between specific gravity and density simple experimental determination. |
| 18 | - Geometry: Fundamental geometrical definition- angles and properties of angles, triangles, and properties of triangles. |
| 19-20 | - Pythagoras theorem, properties of similar triangles. - Revision. |
| 21 | - Definition and units of torque. Pythagoras theorem, properties of similar triangles. - Revision. |
| 22-23 | Implant training / Project work (work in a team) |
| 24-25 | Revision |
| 26 | Examination |

SYLLABUS FOR ENGINEERING DRAWING
SEMESTER-II

| Week No | Engineering Drawing |
|---------|---|
| 1 | - Simple sketches of trade related hand tools & measuring instruments |
| 2 | - Introduction to Orthographic Views and its advantages. |
| 3-4 | - Orthographic drawings, application of both the first angle and third angle. Method of representing the drawings for simple and complex machine parts, exercises with dimensions. |
| 5 | - Standard method of sectioning as per BIS: SP: 46-2003. Exercises for different sectional views on the given orthographic drawing of machine part, castings etc. - Orthographic drawings in first angle projection. |
| 6 | - Orthographic drawings in the first angle projection. |
| 7-9 | - Orthographic drawings in the third angle projection |
| 10-11 | - Standard method of sectioning as per BIS. SP: 46-2003. Exercises for different sectional views on the given orthographic drawing of machine parts, casting etc. |
| 12-14 | - Conversion of isometric, oblique drawings to orthographic drawings and vice-versa. Related problems such as 'V' block oriented by various machining operations etc. |
| 15 | - Method of representing the drawings for simple and complex machine blocks given for exercises with dimensions. |
| 16 | - Reading of production drawing including machining symbol, GD&T. |
| 17-18 | - Surface development of simple geometrical solids like cube, rectangular block, cone, pyramid, cylinder, prism etc. |
| 19-20 | - Interpretation of solids and conventional application of intersectional curves on drawing. - Solution of NCVT test paper (preliminary) Revision. |
| 21 | - Sketches for bolts, nuts, screws and other screwed members. |
| 22-23 | Implant training / Project work (work in a team) |
| 24-25 | Revision |
| 26 | Examination |

SYLLABUS FOR EMPLOYABILITY SKILLS
SEMESTER-II

| 1.Entrepreneurship skill | |
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| Hours of Instruction: 10 Hrs. | |
| Marks Allotted : 10 | |
| Business & Consumer | Types of business in different trades and the importance of skill, Understanding the consumer, market through consumer behavior, market survey, Methods of Marketing, publicity and advertisement |
| Self Employment | Need and scope for self-employment, Qualities of a good Entrepreneur (values attitude, motive, etc.), SWOT and Risk Analysis |
| Govt Institutions | Role of various Schemes and Institutes for self-employment i.e. DIC, SIDBI, MSME, NSIC, Financial institutions and banks. |
| Initiation Formalities | Project Formation, Feasibility, Legal formalities i.e., Shop Act, Estimation & Costing, Investment Procedure - Loan Procurement - Agencies - banking Process |
| 2.Environment Education | |
| Hours of Instruction : 10 Hrs. | |
| Marks Allotted : 10 | |
| Ecosystem | Introduction to Environment, Relationship between Society and Environment, Ecosystem and Factors responsible for destruction. |
| Pollution | Pollution and pollutants including liquid, gaseous, solid and hazardous waste. |
| Energy Conservation | Conservation of Energy, re-use and recycle. |
| Global warming | Global warming, climate change and Ozone layer depletion. |
| Ground water | Hydrological cycle, ground and surface water and treatment of water. |
| Environment | Right attitude towards environment, Maintenance of in-house environment. |
| 3.Occupational Safety, Health & Environment | |
| Hours of Instruction : 10 Hrs. | |
| Marks Allotted : 10 | |
| Safety & Health | Introduction to Occupational Safety and Health and its importance at workplace |
| Occupational Hazards | Occupational health, Occupational hygiene, Occupational Diseases/ Disorders & its prevention |
| Accident & safety | Accident prevention techniques- control of accidents and safety measures |
| First Aid | Care of injured & Sick at the workplaces, First-aid & Transportation of sick person |
| Basic Provisions | Idea of basic provisions of safety, health, welfare under legislation of India |
| 4.Labour Welfare Legislation | |
| Hours of Instruction : 10 Hrs. | |
| Marks Allotted : 10 | |
| Welfare Acts | Benefits guaranteed under various acts- Factories Act, Apprenticeship Act, Employees State Insurance Act (ESI), Payment Wages Act, Employees Provident Fund Act, The Workmen's Compensation Act |
| 5.Quality Tools | |
| Hours of Instruction : 10 Hrs. | |
| Marks Allotted : 10 | |
| Quality Consciousness | Meaning of quality, Quality Characteristic |
| Quality Circles | Definition, Advantage of small group activity, objectives of Quality Circle, Roles and Functions of Quality Circles in organisation, Operation of Quality Circle, Approaches to Starting Quality Circles, Steps for Continuation Quality Circles |

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| Quality Management System | Idea of ISO 9000 and BIS systems and its importance in maintaining qualities. |
| House Keeping | Purpose of Housekeeping, Practice of good Housekeeping.5S Principles of Housekeeping: SEIRI – Segregation, SEITON – Arrangement, SEISO – Cleaning, SEIKETSU – maintenance of Standards, SHITSUKE - Discipline |

Third Semester
(Semester Code no. MCG - 03)
Duration : Six Month

| Week No. | Trade Practical | Trade Theory |
|-----------------|---|--|
| 01 | Cylindrical and surfaces grinding practice (Maintaining parallelism) on both soft and hard metals. | Cylindrical grinding machine, its parts, use care and maintenance surface grinding machine-its parts use care and maintenance Universal cylindrical grinding machines parts description use, care and maintenance. Internal grinding machine and its parts their description, use care and maintenance. |
| 02 | Practice on tools and cutter grinding machine. Machine manipulation and control Mounting jobs on mandrel. Mounting of wheel and guards sharpening of lathe tools and drill on pedestal grinder etc. | Tool and cutter grinding machine-parts and accessories, description use, care and maintenance, pedestal grinder and bench grinder-their description and uses. |
| 03 | Grinding practice on plain flat surface with close tolerances | Dial test indicators marking block, height gauge and surface plate their description. |
| 04 | Grinding practice on angular surface like V block | Principle of vernier caliper, protractors, micrometers (O/S, I/S and depth) and other instruments having vernier graduations. Combination sets-their use care and maintenance. |
| 05 | Parallel block grinding on surface grinding machine within close limits. Plane cylindrical grinding practice to close limit with accuracy of h7. | Bonding materials their kinds description and uses. Grade and structure at grinding wheels. Brief about I.S.O. 9000. Importance of Quality. |
| 06 | Cylindrical bore grinding practice. Setting and turning of jobs on chucks and face plates. | Wheel marking system selection of wheels. Specification and types (shapes & size) of grinding wheels, diamond wheels and their uses. |
| 07 | Balancing and mounting of grinding wheel Rt. angle grinding practice on surface grinding machine. | Mounting of grinding wheels, grinding wheels, collets and mandrels, balancing of grinding wheels by different methods. |
| 08 | Wheels dressing for rough and finishing grinding. Grinding a cube to close limit. | Types of dresses-steel type, abrasive Diamond tool and rotary dresses abrasive bricks and sticks their description, use, care and maintenance. |
| 09 | Shoulder grinding practice on cylinder-grinding machine to close limit h7. | Dressing and truing of grinding wheels advantage of balancing, inspections and care of grinding wheels. Wheel storage. |
| 10 | Slot grinding practice on surface grinding machines to close limits H7. Finding of different faults while grinding-Cracks, blow holes, chatters. | Heat generated in grinding dry and wet grinding, use of coolants their composition and selection, limit, fit and tolerances as per ISI : 919-1963. Basic size and its deviation position of tolerance zone with respect to zero lines. Fits different types clearance, interference and transition Interchangeable |

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| | | system Letter symbols for holes and shafts and fundamental deviation hole basis and shaft basis systems. |
| 11 | Snap gauge grinding practice in close limit. | Gauges-feeler, taper gauge radius, plug, ring snap (fixed and adjustable) and slip their description use care and maintenance. |
| 12 | Grinding practice on cylindrical taper using standards ring gauges. | Inside micrometer depth gauge, special types of micrometers, universal dial test indicator their construction and function. |
| 13 | Grinding practice of ring gauge using plug gauge. | Special type of grinding machine centreless, thread crankshaft etc. their description, use care and maintenance. |
| 14 | Grinding long cylindrical using steady rest to close limit h6. | Essential mechanism of grinding machines, wheel is guards to IS: 1991-1962 machine guards etc. Process of cleaning and oiling at grinding machines (care and Maintenance) types of steady rests their description and use |
| 15 | Grinding thin plates using coolants to close limits h6. | Principle types of grinding fluids importance of uniform temperature, selection and use at grinding fluids, method of supplying grinding fluids. |
| 16 | Grinding practice on parallel and taper pins using chuck and collets-h6. | Types of holding devices methods of holding work, type of centres - holdong work between centres types of chucks and holding process in chucks. |
| 17 | Selection of grinding wheel and grinding practice on rectangular bar of non-ferrous metals. | Holding work on face plate, pneumatic chuck and magnetic chuck. Precautions to taken before grinding, peripheral of surface speed of grinding wheels, importance of constant wheel speeds, calculations at S.F.P.M. |
| 18 | Grinding practice on machine centre to close limit h6 or H6. | Calculation at R.P.M. and S.F.P.M. of grinding wheels calculation of work speed for cylindrical grinding speed and feeds for cylindrical grinding speed and feeds for internal grinding. |
| 19 | Facing and Chamfering practice. | Traverse and over run of traverse, width of wheel and depth of cut in different types of grinding achiness. Grinding allowance and time estimation. Rough and finish grinding process. |
| 20 | Step grinding practice on surface grinding machine to close limit h6 or H6. | Surface grinding methods of surface grinding by using periphery of grinding wheel and ring edge of grinding wheel. Types of surface grinding machines. Work finish, wheel selection holding of work. |

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| 21 | V-block grinding practice. | Process of grinding angular surfaces. Grinding slots and grooves. Grinding "V" blocks. Recommended wheel speeds for surface grinding machines. |
| 22-23 | Implant training / Project work (work in a team) | |
| 24-25 | Revision | |
| 26 | Examination | |

SYLLABUS FOR WORKSHOP SCIENCE AND CALCULATION
SEMESTER-III

| Week No | Workshop Science and Calculation |
|---------|---|
| 1 | - Revision of 1 st year course. |
| 2 | - Heat and temperature, thermometric scales their conversions. |
| 3 | - Rectangle, square, Rhombus, parallelogram and their properties. |
| 4 | - Circle and properties circle: regular polygons. - Application of geometrical to shop problems. |
| 5-6 | - Forces definition. - Compressive, tensile, shear forces and simple problems. |
| 7 | - Temperature measuring instruments. Specific heats of solids & liquids, quantity of heat. |
| 8 | - Heat loss and heat gain, with simple problems. |
| 9 | - Mensuration: Plain figures-triangles, square, rectangle, parallelogram. |
| 10 | - Mensuration : Plain figures-segment and sector of circle, ellipse, fillets. - Plain figures. Trapezium, regular polygons, circle, hollow circles. |
| 11 | - Mensuration: Solid figures: Prism, cylinder, pyramid, cone. - Solid figures: frustum of a cone, sphere, spherical segment. |
| 12 | - Material weight and cost problems related to trade. |
| 13 | - Trigonometry: trigonometric ratios, use of trigonometric table. |
| 14 | - Area of triangle by trigonometry. |
| 15 | - Finding height and distance by trigonometry. |
| 16 | - Application of trigonometry in shop problems. - Industrial visit. |
| 17-18 | - Application of trigonometry in shop problems. |
| 19-20 | - Levers-definition, types and principles of levers. |
| 21 | - Mechanical Advantage, velocity ratio and mechanical efficiency. |
| 22-23 | Implant training / Project work (work in a team) |
| 24-25 | Revision |
| 26 | Examination |

SYLLABUS FOR ENGINEERING DRAWING
SEMESTER-III

| Week No | Engineering Drawing |
|---------|---|
| 1 | - Revision of first year topics. |
| 2 | - Machined components and surface finish symbols. |
| 3 | - Screw thread, their standard forms as per BIS, external and internal thread, conventions on the features for drawing as per BIS. |
| 4 | - Sketches for bolts, nuts, screws and other screwed members. |
| 5 | - Sketching of foundation bolts and types of washers. |
| 6 | - Standard rivet forms as per BIS. |
| 7 | - Riveted joints-Butt & Lap. |
| 8-9 | - Sketches of keys, cotter and pin joints. |
| 10-11 | - Sketches for simple pipe, unions with simple pipe line drawings. |
| 12 | - Concept of preparation of assembly drawing and detailing. Simple assemblies & their details of trade related tools/job/exercises with the dimensions from the given sample or models. |
| 13 | - Single Tool post for the lathe with washer and screw. |
| 14 | - Details and assembly of Vee-blocks with clamps. |
| 15 | - Details and assembly of Vee-blocks with clamps. |
| 16 | - Details of assembly of shaft and pulley. - Industrial visit. |
| 17 | - Details1 of assembly of shaft and pulley. |
| 18 | - Details of assembly of bush bearing. |
| 19 | - Details of assembly bush bearing. |
| 20 | - Details of assembly of a simple coupling. |
| 21 | - Sketching of different gear wheels and nomenclature. |
| 22-23 | Implant training / Project work (work in a team) |
| 24-25 | Revision |
| 26 | Examination |

Fourth Semester
(Semester Code no. MCG - 04)
Duration : Six Month

| Week No. | Trade Practical | Trade Theory |
|-----------------|---|--|
| 01. | Introduction to CNC machine operation like Jog, Reference Edit, MDI ,Auto Mode Prog. Call & Entry, Simulation, Tool off-set & Tool changing /Orientation. | Introduction to CNC Technology CNC M/c. principle advantages classification, drives, controls. Basic information on CNC machine & maintenance of CNC M/c. computer aided CNC Language. |
| 02. | Angular form grinding practice. | Cylindrical-types of cylindrical grinding operation traverse method, plunge cut method and form grinding method. Alignment of head stock and tail stock. |
| 03- | Grinding cylindrical steps with shoulder and chamfer. | Method of plain cylindrical surface grinding step-grinding and shoulder and face grinding. |
| 04 | Compound or double taper grinding practice on cylindrical grinder. | Method of grinding external and angle (simple) taper and steep. Taper double compound taper. |
| 05. | Steep taper, grinding practice on lathe centre. | Use of universal head for angular grinding. Measuring and checking of taper and angles. Use of taper plug and ring gauges. |
| 06 | Morse taper-plug grinding metric tapers. | Taper and angle checking by using protractors, micrometer and rollers. |
| 07 | Taper grinding using sine bar D.T.I. and gauge blocks to close limit h6. | Use of sine bar and gauge block-taper checking by sine bar gauge block D.T.I. micrometer and rollers. Other out of round surfaces. Holding work with fixed steady rest. |
| 08 | Prepare different types of documentation as per industrial need by different methods of recording information | 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 |
| 09. | Grinding Taper up to close limit H6.Grinding lathe centre. | Centreless grinding process of holding job, and types of operations. Effect of setting work above and below wheel centre. Jig and fixture holding work by fixture and vice non-electric and magnetic chuck. Use of three jaw and two jaw steady rest |
| 10. | Internal step grinding to close limit, ring gauge, grinding to close limit-H6. Grinding of single angle cutter. | Internal centreless grinding methods of holding jobs and processes of grinding. Selection of wheels. Internal grinding work movement and wheel movement. Rotation and reciprocation of |

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| | | job and wheel spindle, Internal grinding allowance, selection of wheels for internal grinding allowance, selection of wheels for internal grinding. Thread grinding method of holding jobs methods of grinding threads and thread calculation. |
| 11. | Cylindrical slot grinding to close limit h5. | Thread grinding method of holding jobs method of grinding threads and thread calculation. |
| 12. | Grinding of angular cutter by using work head. | Various types of thread grinding wheels and their selection. Types of dressers and process of process of dressing selection of coolants and their use. |
| 13. | Lapping practice on flat surface. Lapping practice on cylindrical surface and buffing practice to close limits h5. | Laps and lapping material, types of laps lapping abrasives rotary diamond lap lapping lubricants lapping pressures wet and dry lapping. Hand lapping and machine lapping. Lapping flat surface lapping cylindrical surface polishing wheels polishing operations abrasive buffing wheels |
| 14. | Sharpening tools and drills, sharpening scrapers and chisels. | Grinding boring tools shaping tools, slotting tools, tools planning and drills, grinding of scrapers, chisels and carbide tipped tools. Selection of wheels fluids etc. and methods of grinding. |
| 15. | Grinding of spiral path. | Grinding defects and their corrections, inaccurate work out of round, out of parallel taper on and irregular marks spiral scratches, discoloured burnt surface etc. |
| 16. | Form grinding radius angle, Grinding of concave & convex cutter. | Grinding defects and their correction. Waviness marks of surface, chatters-short close evenly spaced long and regularly spaced, marks in phase with vibration of floor, random marks, random waves etc. Glazing of wheel and loading of wheel. |
| 17. | Slitting saw sharpening practice using tooth rest. | Cutter grinding necessity of sharpening. General method of sharpening milling cutters-clearance angles. Use of setting gauges. Sharpening methods of plain or key way cutters |
| 18 | Side and face milling cutter sharpening practice. | Method of indexing direction of wheel rotation, wheel dressing. Types of cutter grinding wheels and their selection. Types of tooth rests and their location. Grinding peripheral teeth on a side and face milling cutter use of indexing attachment. |
| 19 | Spiral milling cutter sharpening practice. | Calculation of clearance angle. Setting for cup wheels and straight wheels. Recommended clearance angles for different materials to be cut primary and secondary clearance width of lands. |
| 20 | Sharpening end mill cutter. | Sharpening of helical milling cutter using linear and angular setting methods. Sharpening shell end mill and angular cutters |

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| 21 | Sharpening tap | Grinding flutes of form cutters, grinding taps, reamers, similar types of cutting tools, use of universal attachment. Hones and honing- Type of honing stones-their description and use. Amount and rate of stock removal. Adjustment for elementary honing condition, honing tolerances. |
| 22-23 | In-plant training / Project work (work in a team) | |
| 24-25 | Revision | |
| 26 | Examination | |

SYLLABUS FOR WORKSHOP SCIENCE AND CALCULATION
SEMESTER-IV

| Week No | Workshop Science and Calculation |
|---------|---|
| 1-2 | - Centre of gravity, simple experimental determination, stable, unstable & neutral equilibrium, simple explanation |
| 3 | - Friction- co-efficient of friction. Simple problem related to friction. |
| 4 | - Magnetic substances- natural and artificial magnets. |
| 5 | - Method of magnetisation. Use of magnets. |
| 6 | - Electricity & its uses. Electric current-positive & negative terminals. |
| 7 | - Use of fuses and switches, conductors and insulators. |
| 8 | - Simple electric circuits, simple calculations. |
| 9 | - Simple calculation based on Ohm's law. - electrical insulating materials. |
| 10-11 | - Transmission of power by belt, pulleys & gear drive. - Calculation of Transmission of power by belt pulley and gear drive. |
| 12-13 | - Read images, graphs, diagrams –bar chart, pie chart. - Graphs: abscissa and ordinates, graphs of straight line, related to two sets of varying quantities. |
| 14 | - Stress, strain, Hooks law, ultimate strength, factor of safety definitions and problems on them. |
| 15-16 | - Mechanical properties of metals. - Heat treatment and advantages. |
| 17 | - Basic Electronic: Introduction to wiring symbols, units, resistor, capacitor and inductor. |
| 18-21 | - Solution of NCVT test papers. |
| 22-23 | In-plant training / Project work (work in a team) |
| 24-25 | Revision |
| 26 | Examination |

SYLLABUS FOR ENGINEERING DRAWING
SEMESTER-IV

| Week No | Engineering Drawing |
|----------------|---|
| 1-2 | - Details and assembly of simple hand – vice. |
| 3-4 | - Blue print Reading. Simple exercises related to missing lines. |
| 5-6 | - Simple exercises relating missing symbols. - Missing views |
| 7-10 | - Simple exercises related to missing section. |
| 11-12 | - Sketching of different types of bearings and its conventional representation. |
| 13 | - Solution of NCVT test. - Basic electrical and electronic symbols |
| 14 | - Study of drawing & Estimation of materials. |
| 15-16 | - Solution of NCVT test papers. |
| 17-21 | - Solution of NCVT test papers. |
| 22-23 | In-plant training / Project work (work in a team) |
| 24-25 | Revision |
| 26 | Examination |

TRADE: MACHINIST (GRINDER)

LIST OF TOOLS & EQUIPMENTS FOR 15 TRAINEES

A : TRAINEES TOOL KIT:-

| Sr. No. | Description | Quantity |
|---------|--|----------|
| 1. | Steel Rule 150mm (graduated both English and Metric). | 16 Nos. |
| 2. | Try Square Engineer 150mm | 16 Nos. |
| 3. | Outside Calipers (spring) 250mm | 16 Nos. |
| 4. | Inside Calipers (spring) 150 mm | 16 Nos. |
| 5. | Hammer Ball Peen with handle 0.50 kg. | 16 Nos. |
| 6. | Odd leg Caliper 150 mm | 16 Nos. |
| 7. | Scriber 150 x 3 mm | 16 Nos. |
| 8. | Plier 150 mm | 16 Nos. |
| 9. | Goggles (fiber plastic cup) safety glasses (interchangeable glasses) | 16 Nos. |

B : TOOLS, MEASURING INSTRUMENTS AND GENERAL SHOP OUTFIT :-

| Sr. No. | Description | Quantity |
|---------|--|----------|
| M 1. | Hammer Copper 0.50 kg. | 2 Nos. |
| M 2. | Hammer Engineers, Ball Peen 0.50 kg. | 2 Nos. |
| M 3. | Scribing Block with adjustable Vertical spindle 225 mm 4 Angle Plate, adjustable (graduated in degrees) 150 x 150 x 150 mm | 2 Nos. |
| M 4. | Blocks Vee 150 x 100 x 100 mm (fitted with clamps, hardened and ground) | 2 Pairs. |
| M 5. | Blocks Vee (grooved and fitted with clamps) (Hardened and ground) 75 x 75 x 50 mm | 2 Pairs. |
| M 6. | Block parallel, adjustable 150 mm long, 42 mm wide, 18 mm height (hardened and ground) | 2 Pairs. |
| M 7. | Block, parallel, adjustable 100 mm long, 50 mm wide, 32 mm height (hardened and ground) | 2 pairs. |
| 8. | Calipers, Vernier 200 mm, inside and outside (graduated in inches and millimeters) | 1 Each |
| 9. | Calipers, Vernier, outside 300 mm (graduated in inches and millimeters) | 4 Nos. |
| 10. | C-clamps 50 mm, 100 mm and 150 mm | 2 Each |
| M 11. | Oil can, Pressure delivery $\frac{1}{4}$ point capacity | 4 Nos. |
| M12. | Oil can Drip delivery (long spout) $\frac{1}{4}$ point capacity | 4 Nos. |
| 13. | Height Gauge (Metric and English graduated) | 1 No. |
| 14. | Combination set (consisting of 300 mm rule centre) | 2 Nos. |
| 15. | Comparator Gauge, complete with stand and brackets. | 2 Nos. |
| 16. | Chuck, Drill 12 mm cap. (Taper shank) | 1 No. |
| 17. | Chuck, Drill 16 mm capacity (Taper shank) | 1 No. |
| 18. | Dial Test Indicator complete with stand (universal type with magnetic base 1/100 mm) | 2 Nos. |
| 19. | Diamond, Wheel Dressing (single stone mounted) | 4 Nos. |
| 20. | Files, Hand Flat, 200 mm smooth | 8 Nos. |
| 21. | Files, Hand Flat, 250 mm smooth | 8 Nos. |
| 22. | Files, 150 mm Half round smooth | 8 Nos. |

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|-------|--|--------|
| 23. | Files, round Dead smooth 200 mm | 4 Nos. |
| 24. | Files, Triangular, Dead smooth 200 mm and 150 mm | 2 Each |
| 25. | Files, Triangular Dead smooth 150 mm | 4 Nos. |
| A 26. | File Flat Rough 300 mm | 4 Nos. |
| A 27. | File Flat 250 mm Second Cut | 4 Nos. |
| A 28. | Chisel Cold Flat 18 mm | 4 Nos. |
| A 29. | Chisel Cold Flat 12 mm | 4 Nos. |
| 30. | Feeler Gauge Metric Set | 1 set |
| 31. | Gauge Radius (Inside and Outside) (Metric) | 2 Nos. |
| 32. | Gauge, Slip (Metric) workshop grade | 2 Sets |
| 33. | Sine Bar 100 mm and 150mm | 1 Each |
| 34. | Gauge, Telescopic 12 to 150 mm | 2 Sets |
| 35. | Gauge, Morse Taper, Plug Nos. 1,2,3,4 | 1 Each |
| 36. | Gauge, Morse Taper, Ring Nos. 1,2,3,4 | 1 Each |
| 37. | Glass, Magnifying 250 x 25 x 75 mm dia with handle | 1 No. |
| 38. | Hacksaw frame 200 to 300 mm adjustable | 2 Nos. |
| M 39. | Keys, Allen 1 mm to 14 mm by 1 mm | 4 sets |
| 40. | Keys, Allen 3 to 12 mm, by 1.5 mm | 1 Set |
| 41. | Spirit Level, Engineers 25 mm precision | 1 No. |
| 42. | Micrometer outside 0 to 25 mm | 3 nos. |
| 43. | Micrometer outside 25 to 50 mm | 2 nos. |
| 44. | Micrometer outside 50 to 75 mm | 1 no. |
| 45. | Micrometer outside 75 to 100 mm | 1 no. |
| 46. | Internal Micrometer 25 to 150 mm with extension Rods. | 1 no. |
| 47. | Depth Gauge Micrometer with extension rods to 150 mm with 70 mm Base | 1 no. |
| A 48. | Indicating Micrometer 0.25 mm range, graduation, 01" mm graduation of dial 0.001 mm range of dial + 0.02 | 1 No. |
| 49. | Oil Stone Carborandum, Coarse on one side and fine on the other 200 x 50 x 25 mm | 2 Nos. |
| 50. | Oil Stone Carborandum, Coarse on one side and fine on other slip 100 x 12 mm triangular. | 2 Nos. |
| 51. | Oil Stone Carborandum, Coarse on one side and fine on other slip 100 x 18 mm triangular | 2 Nos. |
| 52. | Try Square, Engineer's 100 mm blade | 2 Nos. |
| 53. | Straight Edge Engineer's 300 x 50 x 12 mm bevelled edge. | 1 No. |
| 54. | Screw Driver 200 mm blade | 2 Nos. |
| 55. | Screw Driver 300 mm blade | 2 Nos. |
| 56. | Spanner D.E. open jaw 3 to 18 mm by 3 mm | 2 Sets |
| 57. | Scraper Flat 25 x 200 mm with handle | 2 Nos. |
| 58. | Scraper Half round 75 x 12 x 200 mm with handle | 2 Nos. |
| 59. | Scraper Triangular 62 x 9 x 200 mm with handle | 2 Nos. |
| 60. | Tachometer with male and female rubber attachments (upto 0-10,000 RPM) | 1 No. |
| 61. | Table Chuck 75 mm Jaw Swivel Base 200 mm dia. 3 Jaw with bolting arrangement and graduated in degrees | 1 No. |
| 62. | Vices, Machine Plain 150 Jaws x 100 mm openings | 2 Nos. |
| 63. | Vices, Machine, Swivelling Base 150 mm x 100 mm | 2 Nos. |
| 64. | Universal Machine Vice 100 mm for Grinding | 2 Nos. |
| 65. | Wheel Dressers, Steel Type (Huntington) (Large) | 2 Nos. |
| 66. | Wheel Dressers, Steel (Huntington type Small) | 3Nos. |

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| 67 | Radius Truing Attachment for surface grinding machine | 1No. |
| 68 | Radius Truing Attachment for cylindrical grinding machine. | 1No. |
| 69 | Angle Truing Attachment for surface grinding machine. | 1 No. |
| 70 | Demagnetizer Chuck | 1 No. |
| M 71 | Centre Punch 150 x 6 mm dia | 4 Nos. |
| 72 | Reamer Adjustable 6 to 16 x 1.5 mm | 1 Set |
| 73. | Surface Plate 60 x 60 cms | 1 No. |
| 74. | Marking Table 90 x 60 x 90 cms | 1 No. |
| A 75. | Hand Drill 6 mm | 1 Set |
| A 76 | Taps and Dies complete set in box (Metric) | 1 Set |
| A 77 | Taps and Dies set B.A.B.S.F.B.S.W. and American | 1 Set |
| A 78. | Drill Twist (Straight Shank) 1/8" to 1/2" by 1/64" | 1 Set |
| A 79. | Drill Twist (Metric) 3 mm to 12 mm, in step of 1 mm | 1 Set |
| A 80. | Set of Sockets Morse taper (0-1, 1-2 and 2-3) | 1 Set |
| A 81. | Drill Chuck 0 to 12 mm Morse Taper | 1 No. |
| 82. | Combination Drill (Centering) | 2 Nos. |
| 83. | Screw Pitch Gauge | 2 Nos. |
| 84. | Working Benches 340 x 120 x 75 cms with 4 bench vices, 125 mm jaw | 1 No. |
| S 85. | Fire Extinguisher | 1 No. |
| S 86. | Fire Buckets with stand | 4 Nos. |
| 87. | Steel lockers with 6 drawers | 2 Nos. |
| 88. | Metal Rack 180 x 150 x 45 cms | 1 No. |
| 89. | Desk | 1 No. |
| 90. | Stool | 1 No. |
| 91. | Black Board with Easel | 1 No. |
| A 92. | Magnifying Glass with surface illuminator | 1 No. |
| A 93. | CMTI surface finish standards (in Bakelite) | 1 No. |
| A 94. | Adjustable Wrench 250 mm size | 1 No. |
| A 95. | Hammer (Nylon face) 30 mm | 4 Nos. |
| A 96. | Grease Gun | 2 Nos. |
| A 97. | Magnetic V-Block with push button switch | 1 Set |
| A 98. | Magnetic V-Block base for Dial Indicator 75 x 75 x 100 mm | 2 Nos. |
| A 99. | Diamond Dresser Cluster type | 2 Nos. |
| A 100. | Adjustable Parallel Clamps (Hardened and ground) 100 mm long | 2 Pairs |
| 101. | Granite Stone Surface Plate Grade A 600 x 500 x 1000 mm | 1 No. |
| 102. | Static balancing stand for grinding wheel | 1 No. |
| 103. | Soft Board for display 1.25 mm x 1.85 mm x 10 mm thick | 1 No. |
| A 104. | Dial Test Indicator-Lever type-long point | 2 Nos. |
| A 105. | Magnetic Stand Flexible type base 60 mm x 47.5 mm Magnetic Power 75 kg. ON-OFF Lever control | 2 Nos. |
| A 106. | Cutter Clearance Gauge to Suit Clearance all cutter diameters angle 0"-30". | 1 Set |
| M 107. | Glass Show Case for display of jobs 450 mm x 600 x 850mm | 1 No. |
| Desirable:- | | |
| 1. | Shadeograph projector with diasopic and epidia scopic projection, magnification 50, 100, 200, rotary screen 1 minute accuracy and centering, attachment. | 1 No. |

C : GENERAL MACHINERY

| Sr. No. | Description of Machinery | Quantity |
|---------|--|----------|
| S 1. | Lathe 75 cm between centers x 180 cm centre height 4 jaw independent chuck, self centering chuck set of lathe tools, lathe carriers etc. complete. | 2 Nos. |
| S 2. | Drilling machine pillar 0-12 capacity | 1 No. |
| S 3. | Grinding machine external cylindrical fully motorized and supplied with face plates and driving dogs, 3-jaw self centering chuck 4- jaw independent chuck tail stock assorted centers, stud pumps tank all guards and pipe fittings spanners and grease gun (each machine to be supplied with assorted grinding wheels and tool grinding machine for general purpose work with internal grinding attachment) | 2 Nos. |
| S 4. | Grinding machine plain surface, wheel dia. 175 mm (or near) with reciprocating table having longitudinal table traverse 200 mm (or near) fully automatic and fitted with adjustable traverse steps, machine to be fully motorized and fitted with ace guards and pumps, tank and pump fittings and also to be supplied with magnetic chuck 250 x 112 mm. Diamond tool holder, set of spanners, grease gun, oil-can and spare grinding wheel for general purpose grinding. | 2 Nos. |
| S 5. | Grinding machine plain surface with horizontal and vertical spindle, reciprocating table having longitudinal table traverse fully motorized and supplied with set of spanners, necessary equipment, diamond tool holders for wheel sized 175 x 30 x 18 mm suitable cup wheels for vertical spindle, spare wheel proper guards and coolant pump with fittings. | 2 Nos. |
| S 6. | Tool and cutter grinding machine of size 250 x 375 mm fully motorized supplied with chuck, centers tool rest, height gauge, table clamps universal vice tooth rest. Diamond dressing tool and holding attachment equipment for tool grinding and assorted grinding wheels for all tool room work (with twist drill grinding attachment). | 2 Nos. |
| S 7. | Lapping machine with motor and chuck 132 cm dia. | 1 No. |

NOTE :-

- (1) No additional items are required to be provided for the batches working in the second shift except the items under the trainees tool kit and lockers.
- (2) Additional number of items marked 'S' are not required to be provided for additional number of batches.
- (3) Items marked 'A' are to be obtained from the main store.
- (4) The specifications of the items in the above list have been given in metric units. The items which are available in the market nearest to the specifications as mentioned above if not available as prescribed, should be produced. Measuring instruments such as steel rules which have graduation both in English and Metric units may be produced, if possible.
- (5) Simple hand tools for fitting etc. such as hammers, scribing blocks, V block parallel block, angle plate Allen keys centre punch, oil cans etc. mentioned in the above list and marked 'M' may be made in the Institute as far as possible.

D : ADDITIONAL LIST OF TOOLS AND EQUIPMENTS REQUIRED FOR 3RD AND 4TH SEMESTERS (For a batch of 15 trainees)

| Sr. No. | Description | Quantity |
|--------------------------|---|----------|
| 1. | 2. | 3. |
| GENERAL MACHINERY | | |
| 1. | Grinding machine universal, machine to be motorized and supplied with assorted arbors spindles for internal work, 3-jaw self centering chuck, 4-jaw independent chuck face plate driving dogs, tail stock and centers, machine to be completed with all guards, sud and driving dogs, 3-jaw self centering chuck pump and tank, pipe fittings, diamond tool holder fixtures, radius dressing attachment and with spanners (internal and external) and general purpose grinding cylindrical magnetic chuck (permanent) 2,000 mm dia. | 2 Nos. |
| 2. | Small type hand honing machine with motors sand and bracket and with sets of different types of honing stones and other accessories. | 1 nos. |
| 3. | Lathe machine with taper turning attachment 4-jaw chuck and 3-jaw chuck. | 1 nos. |

LIST OF TRADE COMMITTEE MEMBERS

| Sl. No. | Name & Designation Sh/Mr/Ms. | Organization | Mentor Council Designation |
|---|--|--|-------------------------------|
| Members of Sector Mentor council | | | |
| 1. | A. D. Shahane, Vice-President, (Corporate Trg.) | Larsen & Turbo Ltd., Mumbai:400001 | Chairman |
| 2. | Dr. P.K.Jain, Professor | IIT, Roorkee, Roorkee-247667, Uttarakhand | Member |
| 3. | N. Ramakrishnan, Professor | IIT Gandhinagar, Gujarat-382424 | Member |
| 4. | Dr. P.V.Rao, Professor | IIT Delhi, New Delhi-110016 | Member |
| 5. | Dr. Debdas Roy, Asstt. Professor | NIFFT, Hatia, Ranchi-834003, Jharkhand | Member |
| 6. | Dr. Anil Kumar Singh, Professor | NIFFT, Hatia, Ranchi-834003, Jharkhand | Member |
| 7. | Dr. P.P.Bandyopadhyay Professor | IIT Kharagpur, Kharagpur- 721302, West Bengal | Member |
| 8. | Dr. P.K.Ray, Professor | IIT Kharagpur, Kharagpur- 721302, West Bengal | Member |
| 9. | S. S. Maity, MD | Central Tool Room & Training Centre (CTTC), Bhubaneswar | Member |
| 10. | Dr. Ramesh Babu N, Professor | IIT Madras, Chennai | Member |
| 11. | R.K. Sridharan, Manager/HRDC | Bharat Heavy Electricals Ltd, Ranipet, Tamil Nadu | Member |
| 12. | N. Krishna Murthy Principal Scientific Officer | CQA(Heavy Vehicles), DGQA, Chennai, Tamil Nadu | Member |
| 13. | Sunil Khodke Training Manager | Bobst India Pvt. Ltd., Pune | Member |
| 14. | Ajay Dhuri | TATA Motors, Pune | Member |
| 15. | Uday Apte | TATA Motors, Pune | Member |
| 16. | H B Jagadeesh, Sr. Manager | HMT, Bengaluru | Member |
| 17. | K Venugopal Director & COO | NTTF, Peenya, Bengaluru | Member |
| 18. | B.A.Damahe, Principal L&T Institute of Technology | L&T Institute of Technology, Mumbai | Member |
| 19. | Lakshmanan. R Senior Manager | BOSCH Ltd., Bengaluru | Member |
| 20. | R C Agnihotri Principal | Indo- Swiss Training Centre Chandigarh, 160030 | Member |
| Mentor | | | |
| 21. | Sunil Kumar Gupta (Director) | DGET HQ, New Delhi. | Mentor |
| Members of Core Group | | | |
| 22. | N. Nath. (ADT) | CSTARI, Kolkata | Co-ordinator |
| 23. | H.Charles (TO) | NIMI, Chennai. | Member |

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|---------------------------------------|--|---|-------------|
| 24. | Sukhdev Singh (JDT) | ATI Kanpur | Team Leader |
| 25. | Ravi Pandey (V.I) | ATI Kanpur | Member |
| 26. | A.K. Nasakar (T.O) | ATI Kolkata | Member |
| 27. | Samir Sarkar (T.O) | ATI Kolkata | Member |
| 28. | J. Ram Eswara Rao (T.O) | RDAT Hyderabad | Member |
| 29. | T.G. Kadam (T.O) | ATI Mumbai | Member |
| 30. | K. Mahendar (DDT) | ATI Chennai | Member |
| 31. | Shrikant S Sonnavane (T.O) | ATI Mumbai | Member |
| 32. | K. Nagasrinivas (DDT) | ATI Hyderabad | Member |
| 33. | G.N. Eswarappa (DDT) | FTI Bangalore | Member |
| 34. | G. Govindan, Sr. Draughtsman | ATI Chennai | Member |
| 35. | M.N.Renukaradhya, Dy.Director/Principal Grade I., | Govt. ITI, Tumkur Road, Banglore, Karnataka | Member |
| 36. | B.V.Venkatesh Reddy. JTO | Govt. ITI, Tumkur Road, Banglore, Karnataka | Member |
| 37. | N.M.Kajale, Principal, | Govt. ITI Velhe, Distt: Pune, Maharashtra | Member |
| 38. | Subrata Polley, Instructor | ITI Howrah Homes, West Bengal | Member |
| 39. | VINOD KUMAR.R Sr.Instructor | Govt.ITI Dhanuvachapuram Trivendrum, Dist., Kerala | Member |
| 40. | M. Anbalagan, B.E., Assistant Training Officer | Govt. ITI Coimbatore, Tamil Nadu | Member |
| 41. | K. Lakshmi Narayanan, T.O. | DET, Tamil Nadu | Member |
| Other industry representatives | | | |
| 42. | Venugopal Parvatikar | Skill Sonics, Bangalore | Member |
| 43. | Venkata Dasari | Skill Sonics, Bangalore | Member |
| 44. | Srihari, D | CADEM Tech. Pvt. Ltd., Bengaluru | Member |
| 45. | Dasarathi.G.V. | CADEM Tech. Pvt. Ltd., Bengaluru | Member |
| 46. | L.R.S.Mani | Ohm Shakti Industries, Bengaluru | Member |