

**SYLLABUS for FITTER cum
BASIC MACHINE OPERATOR**



**UNDER CODE OF
REGULATIONS FOR INDUSTRIAL SCHOOLS**

**As Approved by
DEPARTMENT OF EMPLOYMENT
AND TRAINING,
CHEPAUK, CHENNAI – 600 005.**

.....2005

COURSE DETAILS 3

Name of Trade : **FITTER CUM
BASIC MACHINE OPERATOR**

Qualification : **10TH PASS / FAIL**

Age : **14-40 Years**

Duration : **1 Year**

Number of Trainees : **20**

Number of Practical hours : **32 hrs. per week**

Number of Theory Hours : **8 hrs. per week**

Number of Workshop Calculation hours : **2 hrs. per week.**

Number of Engineering Drawing hours : **2 hrs. per week**

Space Required

Workshop : **450sq. feet**

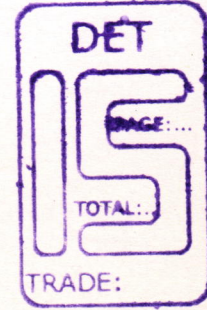
ClassRoom : **200 sq. feet**

Power Required in KW : **10 k.w.**

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**List of Committee Members for the
Trade of Fitter cum Basic Machine Operator**

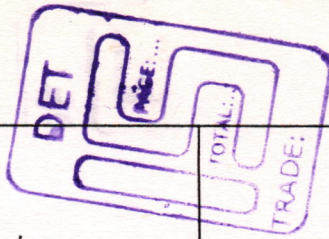
Members and Experts



1. **Thiru. S.Subbiah M.E.,**
RJD Coimbatore Region
2. **Thiru.S.Alagiri Samy B.E.,**
Asst. Director, RI Centre, Coimbatore-29.
3. **Thiru.R.Shanmuga Sundaram B.E.,**
JTO (AT), Govt. ITI, Coimbatore-29.
4. **Thiru.K.M.Sri Kumar D.M.E.,**
Senior Training Officer, GKDITR, Coimbatore.

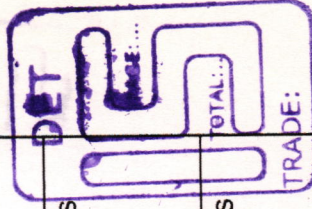
SYLLABUS FOR THE TRADE OF FITTER CUM BASIC MACHINE OPERATOR

WEEK No	PRACTICAL	THEORY	ENGINEERING DRAWING	WORKSHOP CALCULATION
1	Induction training. Familiarisation with the institution. Importance of the trade. Various types of machines used and safety precautions.	Importance of house keeping of shop and safety to be observed. Accidents and their causes.	Engineering Drawing and its importance and instruments used in Engineering Drawing	Units of measurement
2	Marking out lines. Gripping suitably in vice jaws. Flat filing of channel	Hand tools and its uses. Steel rule, Try square, Calipers, dividers, Scriber, V-Block, Surface Gauge.	Lettering Practice	Units of measurement
3	Filing Channel- Flat filing. Parallel filing, and Square filing. (Rough Finish)	Bench vice- Construction, Types, Uses and Care and Maintenance. Vice clamps. Hacksaw Frames. Blades. Setting of saw teeth. Hack sawing.	Lettering Practice	Conversion of units from one system to other
4	Marking straight lines and arcs using scribing block and dividers. Chipping flat surfaces along a marked line.	Files- Parts of files - classification of files - Material, Care and maintenance of files. Filing methods.	Types of Lines and its applications	Common Fraction
5	Marking. Filing flat, Filing Square and checking with try square.	Surface plate. Angle plate. Parallel Blocks. Care and maintenance. Marking media.	Types of Lines and its applications	Decimal fraction



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WEEK No	PRACTICAL	THEORY	ENGINEERING DRAWING	WORKSHOP CALCULATION
6	Marking - Hacksawing and filing. Hacksawing different section of metals - Flat, Angle and Pipe.	Vernier Caliper - Micrometer - Types - Description and uses.	Geometrical construction of Lines and angles	Arithmetic operations of fractions
7	Marking - Punching letters and Numbers. Use of different types of punches.	Combination Square - Vernier Bevel Protractor - Construction and uses - Care and maintenance.	Geometrical construction of plain figures - Triangle and Square	Arithmetic operations of fractions
8	Marking - Curving and flattening of steel strap.	Chisels - Types and uses. Hammers - Types and uses.	Geometrical construction of Rectangle and Polygons	Arithmetic operations of fractions
9	Chipping flat surfaces. Marking and cutting oil grooves.	Drills - Parts and function of a drill - Types - Cutting angle - Sharpening of drill - Points to be observed.	Geometrical construction of Polygons	Percentage - Problems involving percentage
10	Marking - Filing and fitting flat surfaces. V fitting.	Drill Holding devices. Drilling machines - Bench and Pillar types. Drill size defects - causes and remedies.	Free Hand Sketching of Solid Figures - Cube, Prism, Cylinder	Percentage - Problems involving percentage
11	Marking - Filing round surfaces. Half round fitting.	Vernier Height Gauge - Construction and use. Dial Test Indicator - Construction - Use. Care and Maintenance.	Free Hand Sketching of Solid Figures - Cube, Prism, Cylinder	Percentage - Problems involving percentage
12	TEST	TEST	TEST	TEST



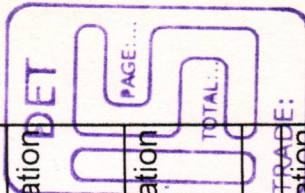
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WEEK No	PRACTICAL	THEORY	ENGINEERING DRAWING	WORKSHOP CALCULATION
13	Marking - Centre Punching and drilling.	Cutting speed and feed for drilling. Selection and calculation of cutting speed and RPM for different materials.	Free Hand Sketching of Solid Figures - Pyramid and cone	Percentage - Problems involving percentage
14	Counter sinking, Counter Boring, Reaming and Tapping	Reamers - types and uses. Reaming - Determination of hole size.	Method of dimensioning	Square root of numbers
15	External threading with dies. Prepare nut and match with bolt.	Thread Terminology. Taps and Dies - Types and applications - Care and Maintenance - Drill size calculations.	Method of dimensioning	Square root of numbers
16	Marking - Filing and fitting Radius and angular surfaces.	Ferrous and Non Ferrous metals - Properties and uses.	Isometric view of simple solids - Cube	Ratio and Proportion - Problems involving Ratio and Proportion
17	Marking - Filing and fitting tongue and groove fitting.	Properties of materials - Physical and mechanical properties.	Isometric view of simple solids - Rectangular Prism	Ratio and Proportion - Problems involving Ratio and Proportion
18	Marking - Filing and fitting of Dove tail fitting.	Steel - Types - uses - Effect of carbon on hardness of steel.	Isometric view of simple solid blocks	Ratio and Proportion - Problems involving Ratio and Proportion
19	Marking - Key way fitting. Slide fitting.	Heat Treatment of steel - Annealing, Normalising, Hardening and Tempering, Case Hardening.	Orthographic Projection - First angle and Third angle methods	Ratio and Proportion - Problems involving Ratio and Proportion



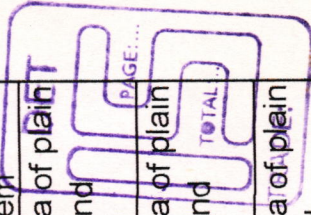
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WEEK No	PRACTICAL	THEORY	ENGINEERING DRAWING	WORKSHOP CALCULATION
20	Inside square fitting	Interchangeability. Limit, Fit and Tolerances as per BIS standard. Limit systems. Different types of fits. Designation of fits. Hole basis and Shaft basis.	Orthographic Projection of Cube	Ratio and Proportion - Problems involving Ratio and Proportion
21	Drill on cylindrical surfaces.	Geometrical tolerances. Specification and representation on drawings.	Orthographic Projection of Rectangular Block	Simple Algebra - Addition and Subtraction
22	Make a snap gauge	Bearings - Types and uses	Orthographic views of simple solids	Simple Algebra - Multiplication and Division
23	Assembly Fitting	Scrapers - Types and uses	Isometric and orthographic views of simple solids	Solution of simple equation
24	Scraping Exercise	Preventive and break down Maintenance	Isometric and orthographic views of simple solids	Solution of simple equation
25	TEST	TEST	TEST	TEST
26	Introduction to lathe - Main components - controls - Holding of round jobs in 4 jaw chuck	History and development of lathe. Classification and specification.	Isometric and orthographic views of simple solids	Solution of simple equation
27	Turning a round stock on 4 jaw chuck. Use of 3 jaw chuck.	Construction of different parts of lathe. Head stock - Cone pulley and all gear drive. Back gear.	Isometric and orthographic views of simple solids	Solution of simple equation



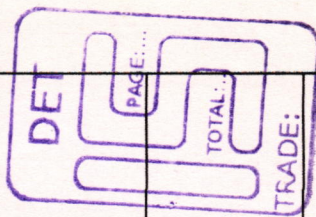
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WEEK No	PRACTICAL	THEORY	ENGINEERING DRAWING	WORKSHOP CALCULATION
28	Facing, Centre drilling, Tool grinding.	Lathe chucks - 3 jaw and 4 jaw chucks. Face plate and other work holding devices and their uses.	Orthographic views of simple solids	Factorisation
29	Step turning.	Lathe tools - Combination drill - Uses.	Orthographic views of simple solids	Factorisation
30	Parallel turning.	Lathe apron mechanism.	Orthographic views of simple solids	Factorisation
31	Drilling on lathe. Step drilling.	Cutting speed and feed for turning. RPM recommended for different materials.	Orthographic views of simple solids	Geometry - Properties of Triangles
32	Turning between centres.	Lathe accessories. Fixed and travelling steadies.	Sectional Views	Problems involving Pythagores Theorem
33	Boring practice - Plain and step boring.	Taper turning methods. Calculations - standard tapers.	Sectional Views of simple solid blocks	Mensuration - Area of plain figures - Square and Rectangle
34	Grooving and Knurling - Various types of knurling.	Lathe centres - Types and uses.	Sectional Views of simple solid blocks	Mensuration - Area of plain figures - Square and Rectangle
35	External taper turning. Compound rest method calculation of angle and setting. Tail stock offset method.	Taper turning attachment - setting - Calculations involved.	Sectional Views of simple solid blocks	Mensuration - Area of plain figures - Circle and Polygons
36	Taper turning - External and internal taper turning and fitting.	screw thread - various types of threads - Fundamentals of thread cutting on lathe.	Sectional Views of simple solid blocks	Mensuration - Area of Plain figures - Circle and Polygons



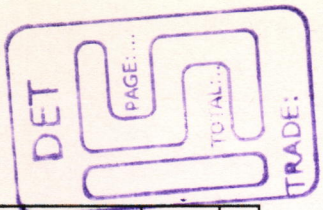
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WEEK No	PRACTICAL	THEORY	ENGINEERING DRAWING	WORKSHOP CALCULATION
37	Eccentric Turning and eccentric boring.	Thread cutting calculations. Metric thread cutting on inch lead screw lathe.	TEST	TEST
38	Thread Cutting - V thread and square thread. External thread cutting.	Tool materials. Selection of proper cutting tools.	Nomenclatures of V-Thread	Volume of solids
39	Internal thread cutting - fitting with external threads.	Different types of cutting fluids and lubricants. Methods of lubrication.	Types of Thread sections	Volume of solids
40	Gear blank turning using mandrels.	Lathe fixtures and its uses.	Types of Thread sections	Volume of solids
41	Introduction to milling machine. Working principles.	Milling machine types and specifications. Driving and feed mechanism of milling machine.	Blue Print Reading Exercises	Volume of solids
42	setting of job and cutter on vertical and horizontal milling machine.	Different types of milling cutters and their uses. Nomenclature of milling cutter.	Blue Print Reading Exercises	Volume of solids
43	Plain milling and step milling.	Different milling operations and different milling attachments.	Blue Print Reading Exercises	Volume of solids
44	Pocket milling.	Indexing head - Types and uses. Different indexing methods.	Blue Print Reading Exercises	Simple shop problems



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WEEK No	PRACTICAL	THEORY	ENGINEERING DRAWING	WORKSHOP CALCULATION
45	Angular Milling.	Gear - Introduction - Use - Types - Elements of spur gear. Spur gear calculations.	REVISION	Simple shop problems
46	Keyway Milling - open, Blind and closed keyways.	Cutting speed and feed - Calculation of machining time for milling.	REVISION	REVISION
47	Hexagonal and Square Milling using indexing head.	Maintenance of milling machine.	REVISION	REVISION
48	TEST	TEST	TEST	TEST



Achievement



Fitting:

The Trainees be able to

1. File surfaces Flat, Square and Parallel to an accuracy of $\pm 0.04\text{mm}$.
2. Chip and Scrap flat surfaces, slots and oil grooves.
3. File and Fit internal and external profiles.
4. Do sharpen drill, drill holes, counter bore, spot faces reaming.

Turning and Milling:

The Trainees should able to

1. To study simple Blue print drawings.
2. Do Tool grinding – different angles and shapes.
3. Do Parallel turning, Taper turning, Borings, Threading and Knurling.
4. Do plain Milling, Step milling, angular and Key way milling.
5. Do machine setting and machining of simple engineering components in Lathe and Milling Machines.

Industrial School

Long Term Trade - Syllabus – Revised

Name of the Trade : Fitter cum basic machine operator

Space required:

Work shop / Lab : 450 Sq. ft.

Class Room : 200 Sq. ft.

Trade Theory : NO CHANGE

Trade Practical : NO CHANGE

Work shop calculation : NO CHANGE

Engineering drawing : NO CHANGE

TOOLS AND EQUIPMENT FOR THE TRADE FITTER CUM BASIC MACHINE OPERATOR:

S/NO	NAME OF THE ITEM	QUANTITY REVISED
1.	STEEL RULE 30 CM GRADUATED IN MM & INCH	10
2	OUTSIDE SPRING CALIPER 150 MM	10
3	INSIDE SPRING CALIPER 150 MM	10
4	HERMAPHRODITE CALIPER 150 MM	10
5	DIVIDER SPRING 150 MM	10
6	CENTER PUNCH 100 MM	10
7	HAMMER BALL PANE 500 GM	4
8	SAFETY GLASS	10
9	FILE FLAT BASTARD 300 MM	10
10	FILE FLAT 2 ND CUT 250	10
11	FILE FLAT SMOOTH 200 MM	10
12	FILE HALF ROUND 2 ND CUT 150 MM	10
13	HACK SAW FRAME ADJUSTABLE 20-30 CM	10
14	DOT PUNCH	10
15	ENGINEERS SCREW DRIVER	10
16	TRY SQUARE 15 CM BLADE	10
17	CHISEL COLD FLAT 19MM	10

S/NO	NAME OF THE ITEM	QUANTITY REVISED
	TOOLS, INSTRUMENTS & GENERAL SHOP OUTFIT	
18	SURFACE PLATE 400 X 400 MM GRADE I	1
19	TABLE FOR SURFACE PLATE	1
20	MARKING OFF TABLE 900 X 1200 MM	1
21	SCRIBING BLOCK UNIVERSAL 300 MM	2
22	V - BLOCK PAIR 7 CM	1 PAIR
23	ANGLE PLATE 100 X 200 MM	1
24	LETTER PUNCH	1 SET
25	NUMBER PUNCH	1 SET
26	COMBINATION SET	2
27	DRILL TWIST S.S. 3 MM TO 13 MM	1 SET
28	DRILL CHUCK 20 MM CAPACITY	1
29	ALLEN KEY 2.5 TO 12 MM	1 SET
30	SPANNER D.E.	2 SET
31	ADJUSTABLE SPANNER 300 MM	2
32	REDUCTION SLEEVE MORSE TAPER	1 SET
33	OIL CAN PRESSURE FEED 250 ML	3
34	TAP & DIE SET METRIC SIZE	1 SET
35	TAP & DIE SET BSW	1 SET
36	CENTER DRILL A1 TO 5	1 SET
37	FILE TRIANGULAR SMOOTH 200 MM	4
38	FILE SQUARE 2 ND CUT 250 MM	4
39	FILE ROUND BASTARD 250 MM	4
40	NEEDLE FILE	2 SET
41	FILE CARD	5
42	SCREW PITCH GAUGE METRIC	1
43	SCREW PITCH GAUGE BSW	1
44	FEELER GAUGE	1
45	OIL STONE 15X 5X 2.5 MM	1
46	BENCH VICE 12 CM JAW	10
47	WORK BENCH 240 X 120 X 60 CM	5
48	REAMER 6 MM TO 25 MM	1 SET
49	MACHINE VICE SWIVEL BASE 200 MM	2
50	HSS TOOL BIT 6 MM SQUARE	6
51	HSS TOOL BIT 10 MM SQUARE	6
52	TOOL BIT HOLDER L.H.	4
53	TOOL BIT HOLDER R.H.	4
54	PARTING TOOL HOLDER WITH HSS BLADE	4
55	BORING TOOL HOLDE FOR 6 MM SQ BIT	4
56	DOG CARRIER	1 SET
57	CYLINDRICAL MILLING CUTTER 63 X90 DIA	2

58	SIDE AND FACE MILLING CUTTER 80 X 8	2
59	SIDE AND FACE MILLING CUTTER 100 X 12	2
60	EQUAL ANGLE CUTTER 60 DEGREE	2
61	DOUBLE ANGLE UNEQUAL CUTTER 50 X 12 X 55 DEGREE	2
62	SINGLE ANGLE CUTTER 63 X 18 X 45 DEGREE RH	1
63	SINGLE ANGLE CUTTER 63 X 18 X 45 DEGREE LH	1
64	KNURLING TOOL STRAIGHT & DIAMOND	1 SET
65	MICROMETER OS 0 – 25 MM / 0.01 MM	1
66	MICROMETER OS 25 – 50 MM / 0.01 MM	1
67	MICROMETER OS 50 – 75 MM / 0.01 MM	1
68	DEPTH MICROMETER 0 – 200 MM	1
69	INSIDE MICROMETER 50 – 200 MM	1
70	VERNIER CALIPER 200 MM / 0.02 MM	2
71	VERNIER HEIGHT GAUGE 300 MM / 0.02MM	1
72	VERNIER BEVEL PROTRACTOR	1
73	SINE BAR 200 MM	1
74	DIAL TEST INDICATOR WITH MAGNETIC BASE STAND	1
75	RADIUS GAUGE	2 SET
76	STEEL CUP BOARD 180 X 90 X 45 CM	2
77	BLACK BOARD WITH EASEL	1
78	FIRST AID BOX	1
79	FIRE EXTINGUISHER	2

GENERAL INSTALLATION

S/NO	NAME OF THE TOOL & EQUIPMENT	QUANTITY REVISED
1	DRILLING MACHINE BENCH TYPE 12 MM CAPACITY	1
2	DRILLING MACHINE PILLAR TYPE 20 MM CAPACITY	1
3	BENCH GRINDER	1
4	LATHE GENERAL PURPOSE ALL GEARED 150 MM HEIGHT OF CENTRE, 750 MM BETWEEN CENTERS WITH ACCESSORIES	2
5	MILLING MACHINE HORIZONTAL UNIVERSAL NO.1 WITH ALL ATTACHMENTS	1
6	MILLING MACHINE VERTICAL NO.1 WITH ALL ATTACHMENTS	1