

Syllabus for the subject

of

**TRADE THEORY-I  
&  
TRADE PRACTICAL-I**

Under

**CRAFT INSTRUCTOR TRAINING SCHEME (CITS)**

**Trade: MECHANIC MACHINE TOOL MAINTENANCE**

Re-Designed in

- 2014 -

By

**Government of India  
Ministry of Labour & Employment  
Directorate General of Employment & Training**

## **CONTENTS**

<b>SECTION</b>	<b>DESCRIPTION</b>	<b>PAGE NO.</b>
<b>A.</b>	<b>Rationale</b>	3
<b>B.</b>	<b>General Information for Semester-I</b>	4
<b>C.</b>	<b>Semester wise Allotment of Time &amp; Marks among the Subjects</b>	5
<b>D.</b>	<b>Topic Wise Distribution of Time &amp; Marks Semester I</b>	6
<b>E.</b>	<b>Details of Syllabus for Semester-I</b>	7-10
<b>F.</b>	<b>List of Tools &amp; Equipments Semester I</b>	11-19
<b>G.</b>	<b>General Information for Semester-II</b>	21
<b>H.</b>	<b>Topic Wise Distribution of Time &amp; Marks Semester-II</b>	22
<b>I.</b>	<b>Details of Syllabus for Semester-II</b>	23-29
<b>J.</b>	<b>List of Tools &amp; Equipments Semester-II</b>	30-33
<b>K.</b>	<b>Furniture, Accessories And Audio Visual Aids</b>	34
<b>L.</b>	<b>List of Expert Members</b>	35-36

## **A.RATIONALE**

Success & Sustainability of any Training System depends upon, given other things, availability of good quality instructors. An Instructor should possess good trade skills to impart skill training.

Ability to understand and interpret the course content is imperative to ensure proper delivery. It is the domain Skills and Knowledge which enable comprehending the prescribed contents and subsequent lesson/demonstration planning for effective delivery. Thus it is imperative for any trade instructor to have adequate domain skills so that same can be transferred.

To deliver effectively, both knowledge and skills, in depth know how are very much needed. At the same time the main objective of Instructor training programme is enabling instructors to demonstrate higher productivity and higher accuracy in performing a task/job.

Recognizing this importance more emphasis has been given to the Trade Practical & Trade Theory in all Engineering Trades in Craft Instructors Training Scheme (CITS) under NCVT.

## **B. GENERAL INFORMATION**

- 1. Name of the Course** : **Craft Instructors' Training Scheme**
- 2. Duration of Instructor Training** : 1 Year (Two semesters each of six months duration).
- 3. Subjects covered in the Semesters** : Detailed in Section - C
- 4. Name of the Subject** : **TRADE THEORY-I & TRADE PRACTICAL-I**
- 5. Applicability** : **Mechanic Machine Tool Maintenance**
- 6. Examination** : AITT to be held at the end of each semester.
- 7. Space Norms** :  
a) One class room of minimum 30 sq. m. area having Minimum width of 5 m. and with 6000 lumen  
(b) Workshop: 360 sq. meter having minimum width of 8 m. and with 150000 lumen  
**The electrical equipments of Class room should conform to minimum 3 star Building energy rating as per Bureau of Energy Efficiency (B.E.E.)**
- 8. Power Norms** :  
(a) Class Room : 1 kw  
(b) Workshop : 9 kw
- 9. Unit strength(Batch Size)** : 20
- 10. Entry qualification** :  
Diploma/Degree in Mechanical/Production Engineering from AICTE recognized Board / University.  
OR  
National Trade Certificate in the Mechanic Machine Tool Maintenance trade  
OR  
National Apprenticeship Certificate in the Mechanic Machine Tool Maintenance trade.
- 11. Trainers' Qualification** :  
Diploma or Degree in Mechanical / Production Engineering from AICTE recognized Board / University with five / two years experience respectively.
- 12. Desirable** :  
Passed National Craft Instructor Training course in Mechanic Machine Tool Maintenance trade.  
In case of two units, one trainer must be Degree in Engineering.

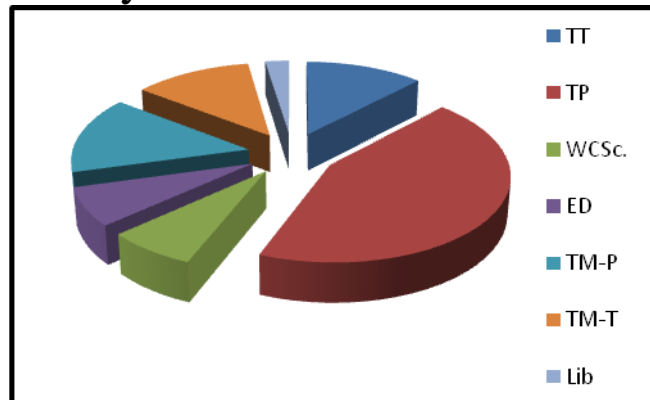
**Note: Degree/Diploma candidate may directly appear for Semester-I exam without attending classes for lateral entry in semester-II.**

### C. SEMESTER WISE ALLOTMENT OF TIME & MARKS AMONG THE SUBJECTS FOR CITS

	SUBJECTS	Hrs. / Week	% of time allotted	Marks	Sessional	Full Marks	Pass Marks		
							Exam.	Sessional	Total
First semester	Trade Practical – 1	20	50	200	30	230	120	18	138
	Trade Theory - 1	6	15	100	20	120	60	12	72
	Workshop Cal. & Sc.	6	15	50	-	50	30	-	30
	Engineering Drawing	6	15	100	-	100	60	-	60
	Library	2	5	-	-				
	<b>TOTAL for Sem. - I</b>	<b>40</b>		<b>450</b>	<b>50</b>	<b>500</b>	<b>270</b>	<b>30</b>	<b>300</b>
Second semester	Trade Practical – 2	16	40	200	30	230	120	18	138
	Trade Theory - 2	4	10	100	20	120	60	12	72
	Training Methodology - Practical	12	30	200	30	230	120	18	138
	Training Methodology - Theory + IT	6+2	20	100	20	120	60	12	72
	<b>TOTAL</b>	<b>40</b>		<b>600</b>	<b>100</b>	<b>700</b>	<b>360</b>	<b>60</b>	<b>420</b>
	<b>GRAND TOTAL</b>	<b>80</b>		<b>1050</b>	<b>150</b>	<b>1200</b>	<b>630</b>	<b>90</b>	<b>720</b>

#### Hourly Distribution

TOTAL: 1200 marks for 2 semesters Pass marks: 720



Subject	Time in %	Marks in %
Trade Practical	45	38
Trade Theory	12.5	20
<b>Total for Trade</b>	<b>57.5</b>	<b>58</b>
Training Methodology (Practical)	15	19
Training Methodology (Theory) + IT	12.5	10
<b>Total for Training Methodology &amp; IT</b>	<b>27.5</b>	<b>29</b>
Engineering Drawing	7.5	12
Workshop Cal. & Sc.	7.5	4
Library	2.5	-

**D. TOPIC WISE DISTRIBUTION OF TIME & MARKS**  
**TRADE: MECHANIC MACHINE TOOL MAINTENANCE**  
**CRAFT INSTRUCTOR TRAINING SCHEME**  
**SEMESTER-I**

Note: During the discussion of any machine tools, related precautions and safety measures should be discussed.

Trade Theory				Trade Practical		
Sl. No.	Topics	Hours	Marks	Topics	Hours	Marks
1	Safety	06	05	Safety	20	09
2	Measuring instruments	12	09	Measuring instruments	40	18
3	Scraping	06	05	Scraping	30	15
4	Threaded fasteners, Pins, Keys	06	05	Inspection of scraped surface	10	04
5	Drilling machine & Lathe	12	09	Dismantling & Assembly of machines	80	36
6	Transmission of motion/power	12	09	Dismantling & assembly of drive elements	80	36
7	Friction & Bearings	12	09	Preparation of coolant	10	04
8	coolant & lubricant	12	09	Lubrication	30	15
9	Heat treatment	06	05	Heat treatment	20	09
10	Interchangeability& assembly	06	05	Geometrical testing/inspection	40	18
11	Surface finish & finishing process	12	09	Welding	40	18
12	Maintenance documentation	06	04	Sheet metal work	40	18
13	Welding	12	08			
14	Sheet metal work	12	09			
	<b>TOTAL</b>	<b>132</b>	<b>100</b>	<b>TOTAL</b>	<b>440</b>	<b>200</b>
	<b>THEORY 1 ---22 WEEKS X 06 Hrs / WEEK=132hrs</b>			<b>PRACTICAL 1 --22 WEEKS X 20 Hrs / WEEK=440hrs</b>		

**E. DETAIL SYLLABUS FOR THE TRADE: Mechanic Machine Tool Maintenance**  
**UNDER CRAFT INSTRUCTOR TRAINING SCHEME**  
**SEMESTER-I**

Note: During the discussion of any machine tools, related precautions and safety measures should be discussed.

Tentative Week No.	Theory.	Practical
1	<p>Introduction of First aid. Operation of electrical mains. Introduction of PPEs. Response to emergencies e.g.; power failure, fire, and system failure  <b>Soft Skills:</b> its importance and Job area after completion of training. <b>Introduction to 5S</b> concept &amp; its application. Importance of 5S implementation throughout CITS course-workplace cleaning, machine cleaning, signage, proper storage of equipment etc.</p> <p><b>Importance of Technical English</b> 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.</p> <p><b>Basic Life support (BLS):-</b></p> <p>Basic Life Support (BLS) techniques for drowning, choking, electrocution, neck and spinal injury, including CPR (cardiopulmonary resuscitation).</p>	<p><b>Occupational Safety &amp; Health</b>  <b>Importance of housekeeping &amp; good shop floor practices.</b>            Health, Safety and Environment guidelines, legislations &amp; 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 &amp; personal safety message.            Preventive measures for electrical accidents &amp; steps to be taken in such accidents.            Use of Fire extinguishers.</p> <p><b>Technical English:</b>            Prepare different types of documentation as per industrial need by different methods of recording information.</p> <p><b>Basic Life support training:</b>            Be able to perform DRSABCD:            D: Check for Danger            R: Check for a Response            S: Send for help            A: Open the Airway            B: Check for normal Breathing</p>

		C: Perform CPR (Cardio Pulmonary Resuscitation) D: Attach Defibrillator / Monitor as soon as available.
2,3.	Care and maintenance of measuring instruments – steel rule, vernier caliper, height gauge, vernier bevel protractor, flange, inside, outside micrometers, slip gauges, sine bar.	Practice on care and maintenance of precision measuring instruments
4,5.	Scrapers-different types and their correct uses. Importance of scraping, Difference method of scraping checking of scrapped surfaces, use of spirit level. hand tools uses for dismantling and re-assembly and their specifications:- Types of spanner –Materials and uses (Box, socket, tubular, hook-spanner ) Thread fastener- Nut and lock nut-Types and function. Bolt - types and function. Screws – types and application, washers, cir clips and split pin-types and their application key and cotters – classification, comparison and uses.	Scraping on flat & Curved surface taking impression for high spot using Prussian blue. Sharpening of scrapers using diamond wheel and oil stone / Lappers stone. Inspection and checking of scraped surfaces.
6,7.	Drill machine types, functioning, construction and maintenance. Lathe types, functioning, construction and maintenance.	Dismantling and assembly of various parts of different types of drilling machines and lathes.
8,9.	Clutches, brakes and couplings. Power transmission elements –shafting –line shaft & types of shaft –rigid, flexible and hollow. types of pulleys-solid split, v-grooved, step cone taper guided and jokey or rider pulleys their functions and uses consideration of drive to driven ratio. Crowing of pulley. Fast and loose pulley. Function, types, specification and use of belts. Belt fasteners and materials use for belt. Frictional and universal coupling, advantages and disadvantages over each other and their application.	Assembly and removing of matched set of belts. Tension adjustments, removing gear box from various machines for inspection and demonstration of gear trains and their functional relationship. Assembly of gear box and remounting on the machine, demonstration on coupling keys-fitting procedure and removing. use of keys in power transmission.  Dismantling and assembly of various clutches, brakes and couplings.
10,11.	Friction –Its effects and types. Sources of reduction of friction. Wear-Its effects and types, Wear and damage .Indication of wear. Method of finding the amount of wear prevention of wear. Bearings –Its types and use,	Dimensional relationship of the shaft with bearing. Type of load, Method of clamping and fitting the bearing in the housing, Method of mounting and dismantling, uses of pulleys and extractors, maintenance and inspection of bearing.



	bearing materials and their properties, construction feature of anti-friction bearing –ball & rollers, housing and lubrication specification of rolling bearing –IS-examples, preparation selection of fit for bearing mounting. Angular contact ball bearings, specifications, visual inspection, leveling, clearing, lubricating, fitting and satisfaction test.	Practice on angular contact ball bearing in respect of handling, cleaning and lubrication.
12, 13	Viscosity and its measurement using various apparatus, cutting fluids and coolants, various types, composition, health hazards of coolants, grades and designation systems. Types of lubricants, colour coding such as high speed long life grease, heat resistant and water resistant grease. Centralized lubrication system – parts, functioning and mechanism.	Coolant preparation, cleaning of coolant tank, filters, replacing coolant, identifies lubrication points, clean and lubricate. Checking the lubrication line for proper suction and delivery at end points.
14.	Heat treatment processes, effects & methods.	Practice of heat treatment processes in muffle Furnace. Testing of hardness
15.	Elements of Interchange able system its terms & application. Method of selective assembly, Hole & shaft basis of system.	Practice different types of fits following inter changeability system. Process of fitting ordinary type Brass Bearing Method of fitting ball and roller bearing on the shaft.
16, 17.	Definition of surface Finish-terms used to describe the surface finish dimensional. Tolerance of surface finish, surface quality and symbolic, Representation. Instruments used for testing and measuring surface quality. Unit of surface finish. Surface finishing process-Lapping, honing, Electra-plating, Method spraying galvanizing, Packing and Metallization, Introduction to thread and gear Measurements.	Application and use of dial test indicator slip gauges, height gauge and other measuring instruments for checking, centre distance, Angle, concentricity, eccentricity, Dovetail, slot. Measurement of various elements of threads, spur gear etc.
18, 19	Maintenance Activity – Maintenance Definition. Different types of maintenance. Work Procedures, job cards, Schedule, History record sheet.	Dismantling of machine vice, three jaw chucks, Indexing head, tail stock, slotting attachment, coolant pumps, using various hand tools with specific reference to functional part of their machine and oiling of dismantled parts. Assemble and testing for operation.

20.	<b>ALLIED SKILL :- Welder (G &amp; E)</b> Flame cutting principle and use of equipments, safety precaution and maintenance of equipments, symbols of welding.	Connecting and setting of Arc welding plant and gas welding plant. Hand on practice on Arc, gas and Spot welding. Safety to be observed in welding work.
21, 22.	Sheet Metal Worker (SMW) Over view of SMW, Name and description of common tools and equipments. Different type of joints employed in sheet metal work. Rivet and riveting. The object of riveting, relation between size of rivet and thickness of sheet, pitch of rivet, types, uses, method of riveting using snap and dolly Rivet joints, defects in riveting and their remedies.	Familiarization and uses of hand tools in the SMW trade. Development of surface from working, Drawing. Marking out location and drilling of holes for riveting. Use of dolly and snap forming river heads. Lap and butt joint by cold riveting.
23	<b>Industrial visit &amp; Submission of Report</b>	
24 - 26	<b>Revision &amp; Trade Test</b>	

**F. List of Tools & Equipment**  
**Trade– Mechanic Machine Tool Maintenance**  
**Under CITS**  
**For a batch of 20 Trainees**  
**Semester-I**

**(A) List of Hand Tools**

<b>Sl. No.</b>	<b>Name of Tools &amp; Equipments</b>	<b>Quantity</b>
1.	Steel rule 300 mm	20 Nos.
2.	Inside Caliper 150 mm (spring)	8 Nos.
3.	Outside Caliper 150 mm. (spring)	8 Nos.
4.	Divider 150 mm. (spring)	8 Nos.
5.	Hermaphrodite caliper 150 mm.	8 Nos.
6.	Try Square 150 mm.	8 Nos.
7.	Hacksaw Frame adjustable Type.	20Nos.
8.	Hammer Ball Peen 200gm.with handle.	8 Nos.
9.	Hammer Ball Peen 400.with handle.	8 Nos.
10.	Cold Chisel 20x200 mm	8 Nos.
11.	Cross cut Chisel 10x150 mm.	8 Nos.
12.	Half round Chisel 10x150 mm.	8 Nos.
13.	Diamond point Chisel 10x150 mm.	8 Nos.
14.	Centre Punch 100mm.	8 Nos.
15.	Prick Punch 100mm.	8 Nos.
16.	File Flat Bastard 300mm.	20Nos.
17.	File Flat 2 <sup>nd</sup> cut250	20Nos.
18.	File Flat Bastard 350mm.	20Nos.
19.	File Flat smooth 200mm.	20Nos.
20.	Round Nose Pliers 200mm.	8 Nos.
21.	Combination Pliers 200mm.	8 Nos.
22.	File half Round 2 <sup>nd</sup> cut 250mm.	20Nos.
23.	File Three sq. Smooth 200mm.	20Nos.
24.	File Round Smooth 200mm.	20Nos.
25.	File Square Smooth 200mm.	20Nos.
26.	File Needle Set of 12 nos.	8 Nos.
27.	Scraper A 250mm. (Flat)	8 Nos.
28.	Scraper B 250 mm (Triangular)	8 Nos.
29.	Scraper D 250 mm (Half Round)	8 Nos.
30.	Spindle Blade Screw Driver 100mm	8 Nos.
31.	Screw Driver 200 mm.	8 Nos.
32.	Allen Hexagonal keys 2 to 16 mm.	8 Nos.

33.	File Card	20Nos.
34.	Scriber 150x3 mm.(one side offset)	8 Nos.
35.	Offset Screw Driver	8 Nos.
36.	Screw Driver 300 mm heavy duty	8 Nos.

**Note: - Trainees Tool kit for a Group of 4 Trainees.**

### **TOOLS & INSTRUMENTS FOR MAINTENANCE SHOP**

<b>Sl. No.</b>	<b>Name of Tools &amp; Equipments</b>	<b>Quantity</b>
1.	Master Flat-scraping test bar 600mm length, 75 x 75 mm sq. in cross section all sizes scraped to an accuracy of 0.02 mm. per 300mm. seasoned.	1 No.
2.	Tap and die set M6 to M12 with necessary tap wrench and die holder	1 Set
3.	Spanner Socket set of 25 pieces (10 to 25, 27, 30, 32mm =18 pcs. and accessories =7 Nos.)	1 Set
4.	Hammer Soft (faced 30 mm dia. Plastic tipped )	4 Nos.
5.	Pipe Wrench 450 mm .	2 Nos.
6.	Chain Pipe Wrench 650 mm.	1 No.
7.	Self alignment Roller ball bearing	1 No.
8.	Telescopic gauges 13 mm to 300 mm	1 Set
9.	Lubricant trolley 2400x200x1200mm (8 chamber)	1 No.
10.	Collapsible tool Kit 5 compartments	1 No.
11.	Tap Extractor	2 Nos.
12.	Linear Actuator (single & double acting Cylinder)	1 Each
13.	Vibrometer	1 No.
14.	Machine tool calibrator	1 No.
15.	Lathe tool Dynamometer	1 No.
16.	Stud Extractor.	2 Nos.
17.	Magnifying glass 75 mm.	2 Nos.
18.	Pin spanner set.	1 Set
19.	Hand keyway broacher	1 No.
20.	C.I. Surface plate 400x400 mm with wooden stand and cover	1 No.
21.	Head lamp	2 Nos.
22.	Pneumatic scraper with adjustable stroke	2 Nos.
23.	Hydraulic wheel and bearing puller	1 No.
24.	Master test Bar (Different sizes)	1 Set
25.	Spirit level 150 mm	2 Nos.
26.	Gasket Hollow Punches 5, 6,8,10,12,19,25 mm. dia .	1 Each
27.	Bar Type Torque Wrench up to <u>14 kg f-m.</u>	1 No.
28.	Cam Lock Type Screw Driver	1 No.
29.	Flaring Tool	1 No.

30.	Tube Expander up to 62 mm.	1 Set
31.	Circlip Pliers 150mm (inside and outside, straight & Bend)	2 Each
32.	SRDG Ball Bearing, DRDG Ball Bearing, Self aligning Ball Bearing, SRAC Ball Bearing, Needle Bearing, Single Row Cylindrical Roller Bearing, Tapered Roller Bearing, Plain Bush Bearing, Thin walled Bearing.	1 Each
33.	Viscometer (Red Wood)	1 No.
34.	Adjustable spanner 12"	2 Nos
35.	Adjustable spanner 8"	2 Nos
36.	Adjustable spanner 6"	2 Nos
37.	Screw driver heavyduty-12"	4 Nos.
38.	Screw driver medium duty-10"	4 Nos.
39.	Screw driver light	4 Nos.

### **PRECISION INSTRUMENT**

<b>Sl. No.</b>	<b>Name of Tools &amp; Equipments</b>	<b>Quantity</b>
1.	Vernier height Gauge 0-300mm, Accuracy 0.02mm.	2 Nos.
2.	Vernier Bevel Protractor with 150 mm blade, L.C=5 (5 min)	4 Nos.
3.	Vernier Caliper 200mm (0-200mm), L.C=0.02mm.	8 Nos.
4.	Digital Caliper 200mm (0-200mm)	2 Nos.
5.	Dial Caliper 200mm (0-200mm), L.C=0.02mm, 2mm/Rev.	2 Nos.
6.	Outside Micrometer 0 to 25 mm. L.C=0.01mm and Outside Vernier Micrometer L.C.=0.001mm	Each 2 Nos.
7.	Outside Micrometer 25 to 50mm. L.C=0.01mm and Outside Vernier Micrometer L.C.=0.001mm	Each 2 Nos.
8.	Outside Micrometer 50 to 75 mm. L.C=0.01mm & Outside Vernier Micrometer L.C.=0.001mm	Each 1 No.
9.	Outside Micrometer 75 to 100 mm. L.C=0.01mm & Outside Vernier Micrometer L.C.=0.001mm	Each 1 No.
10.	Combination Set 300 mm	8 Nos.
11.	Sine Bar 200 mm .	2 Nos.
12.	Slip gauge (Tungsten carbide, Grade I 112 nos.)	1 Set
13.	Internal Micrometer 12 to 20 mm. (3 point)	2 Nos.
14.	Gear Tooth Vernier Caliper (Metric)	1 No.
15.	Bevel Gauge 200	1 No.
16.	Plunger Dial Gauge 0-10mm L.C=0.01mm with magnetic stand	2 Nos.
17.	Plunger Dial Gauge 0-1mm L.C=0.001mm with magnetic stand.	2 Nos.
18.	Feeler Gauge (0.05mm to 1.0mm)-No. of leaves =20	3 Sets.
19.	Radius Gauge up to 7.0mm & 1. 0 to 7mm.	2 sets each.

	2. 7.5mm to 15mm.	
20.	Screw pitch gauge for metric pitches (0.35 to 6mm)	1 No.
21.	Centre gauge 60 Deg.	1 No.
22.	Plug Gauge Plain (5 to 25 by 2.5mm)(Go & No Go)	1 No.
23.	Ring gauge Morse Taper No. 1,2,3,4	1 Set
24.	Drill sleeves Morse Taper 1-2, 2-3, 3-4, 4-5	1 Set
25.	Ring Gauge 5 to 25 by 2.5 mm.(Go & No Go)	1 Set
26.	Standard Wire Gauge (swg)	1 No.
27.	Dial Bore Gauge to (20-25mm) L.C.=0.01mm	2 Nos.
28.	Straight Edge 485mm to 1445mm.	1 Set

### MACHINIST TOOLS

Sl. No.	Name of Tools & Equipments	Quantity
1.	Cylindrical Milling Cutter B 63X90	1 No.
2.	Side and Face Milling Cutter B 160X10	1 No.
3.	Side and Face Cutter B 160X10 (Inserted type)	1 No.
4.	Slot Milling Cutter B 10x6	1 No.
5.	Equal angular Cutter 45 deg. /100	1 No.
6.	Equal angular Cutter 60 deg. /100	1 No.
7.	Single angle Cutter B 63X18X45 dg.(LH) and (RH)	1 Each
8.	Single Angle Cutter B 63X18X60 deg. (LH) and (RH)	1 Each
9.	End mill cutter (key seating) 3,4,5,6,8,12 mm. parallel shank.	1 Set
10.	Slitting Saw B 80X3	1 No.
11.	Slitting Saw B 100X4	1 No.
12.	T-Slot Cutter to suit T headed bolt of 10,12 mm S.S	1 Each
13.	Convex Milling Cutter 4,10,20 mm.	1 Each
14.	Concave Milling Cutter 4,10,20,mm	1 Each
15.	Corner rounding milling cutter 2.5,4,10,16 mm.	1 Each
16.	Woodruff key seating cutter A 13.5X3,A 16X4,A 19.5X5,A 19.5X6	1 Each
17.	End Mill Cutter SS 3,6,10,12,16,18,22, mm.	1 Each
18.	Milling gear Cutter (In volute) ( 1,2,3,5-3 module of 8 cutter)	1 Set each
19.	Fly Cutter Holder	1 No.
20.	Engineers Parallel	1 Set
21.	Scribing block universal 300mm.	4 Nos.
22.	V-Block 100/7-80-A	1 Pair

23.	Table Chuck 3 Jaw with tightening arrangement and graduated in degrees.	1 No.
24.	Machine Vice 200mm Swivel Base	1 No.
25.	Machine Vice Swivel Base 160 mm.	1 No.
26.	Angle plate size 4 with slots.	1 No.
27.	Angle plate adjustable 250X150X175 mm.	1 No.
28.	Twist drill 3 to 13mm. (SS)	1 Set
29.	Twist drill 13 to 25mm by 1mm step. (TS)	1 Set
30.	Grinding wheel dresser (Diamond) 1.5 carret.	1 Set
31.	“C” clamp 150mm. and 200mm.	1 Pair each
32.	Hand reamer 6to 25 mm. by 1mm.	1 Set
33.	Engraving / Etching machine	1 No
34.	Mandrel 120 mm. long different sizes.	1 No.
35.	Wheel balancing stand with its accessories.	1 Set
36.	Pin punch 3 to 10 mm by 1 mm step.	1 Set
37.	Deep cutting hacksaw frame 300mm.	4 Nos.
38.	Machine reamer 6to 25 mm. by 1 mm step.	1 Set

## LATHE TOOLS

Sl. No.	Name of Tools & Equipments	Quantity
1.	Drill Chuck 13 mm.	1 No.
2.	Reduction Sleeve and Extension Sockets	1 Each
3.	Centre Drill 1-5	1 Set
4.	Revolving Centres with Arbor	2 Nos.
5.	Knurling Tool with holder (straight, & diamond)	1 Set each.
6.	Lathe Carriers up to 7 mm (10 to 75mm)	1 Set
7.	Oil Stone 150X50X25 mm.	4 Nos.
8.	Oil can 250 ml.	2 Nos.
9.	Hand grease gun	2 Nos.
10.	Boring Tool Holder (Armstrong ) L.H 8 and 10 sq. Bit Size X Length 200mm.	2 each.
11.	Tool Holder 8 and 10 sq. bit 2 straight	2 Nos.

## GENERAL MACHINERY

Sl. No.	Name of Tools & Equipments	Quantity
1.	SS and SC centre lathe (all geared) with minimum specification as: centre height 150 mm and centre distance 1000 mm along with 4 jaw chuck, auto feed system, safety guard, motorized coolant system and lighting arrangement.	2 Nos.
2.	<p>Universal Milling machine with minimum specification as:</p> <p>Table Length x width 1200 x 300 mm having motorized up &amp; down movement along with auto feed arrangement and with following attachments such as:</p> <ul style="list-style-type: none"> <li>a. Vertical head</li> <li>b. Slotting attachment</li> <li>c. Rack cutting attachment</li> <li>d. Rotary table</li> <li>e. Dividing head</li> <li>f. Adaptors, arbors and collects etc. for holding straight shank drills and cutters from 3 mm to 25 mm.</li> </ul>	1 No.
3.	Surface Grinding Machine Wheel dia 180 mm. reciprocating table longitudinal table traverse 200mm full motorized supplied with magnet chuck 250 x 120mm and necessary accessories.	1 No.
4.	<p>Grinding machine hydraulic external cylindrical, universal type with internal grinding attachment fully motorized and standard accessories.</p> <p>Centre height - 150mm            Distance between centers- 800 mm            Least in-feed - 0.0025 mm            Accessories:            3 jaw self-centering chuck, 4-jaw independent chuck, tailstock.</p>	1 No.
5.	Pillar Drilling Machine: 20 mm capacity with drill chuck & key.	1 No.
6.	Pedestal grinder 250 mm wheel Diameter.	1 No.
7.	Flexible Hand Grinder 100 mm. dia.	1 No.
8.	Portable Drilling Machine 10 mm. capacity	1 No.
9.	Shaping machine 450 mm stroke (motorized)with all attachments	1 No.
10.	Pipe bending machine (Hydraulic)	1 No.
11.	Equipment for conducting BLS (Basic Life Saving) training.	1 set



## **MACHINE FOR REPAIR AND RECONDITIONING**

<b>Sl. No.</b>	<b>Name of Tools &amp; Equipments</b>	<b>Quantity</b>
1.	Old centre Lathe	2 Nos.
2.	Old Milling Machine (Universal)	1 No.
3.	Old Grinding Machine (Universal)	1 No.
4.	Old Shaping Machine	1 No.
5.	Old Press (power)	1 No.
6.	Old Turret & capstan Lathe	1 No.
7.	Universal Indexing head	1 No.
8.	Revolving Centre	1 No.
9.	Tail stock	4 Nos.
10.	Gear Box (old)	4 Nos.

## **WELDING WORK (GAS WELDING)**

<b>Sl. No.</b>	<b>Name of Tools &amp; Equipments</b>	<b>Quantity</b>
1.	Oxy-Acetylene Welding Cylinder Trolley	1 No.
2.	Welding Hose of P.V.C. flexible I.D=6mm Blue & Red	5 mtr. each
3.	Hose Coupling Nipples	2 Nos.
4.	Hose protractor	2 Nos.
5.	Double stage pressure regulator (oxygen.) and double stage pressure Regular (acety).	1 Each
6.	High PR. Blow pipe with Tips.	1 No.
7.	Gas Cutting Torch with cutting tips	1 No.
8.	Welding gloves pair (Leather)	4 Pairs
9.	Goggles (4 A ) for Gas welding	4 Nos.
10.	Spark Lighter	4 Nos.
11.	Spindle key	1 No.
12.	Gas welding table with fire bricks	1 No.

### **(ARC WELDING)**

<b>Sl. No.</b>	<b>Name of Tools &amp; Equipments</b>	<b>Quantity</b>
1.	DC Welding Generator 150-300 amps. Capacity with all accessories.	1 No.

### **SHEET METAL WORK**

<b>Sl. No.</b>	<b>Name of Tools &amp; Equipments</b>	<b>Quantity</b>
1.	Forge Power Operated 45 mm. dia.150 mm blower	1 No.
2.	Soldering Copper Bit 450 gm, hatchet Type & straight type.	1 Each
3.	Metal Cutting Shears 350mm.	2 Nos.
4.	Mallet (plastic or rose wood ) rod. and rectangular 75*75*100 mm.	2 each.
5.	Conical Mallet	1 No.
6.	Half Moon Stake	1 No.
7.	Bebk Iron	1 No.
8.	Funnel Stake	1 No.
9.	Hatchet Stake	1 No.
10.	Snap Rivet set A-3, B-4.	1 No.

### **ERECTION TOOLS & EQUIPMENT**

<b>Sl. No.</b>	<b>Name of Tools &amp; Equipments</b>	<b>Quantity</b>
1.	Plum bob	1 No.
2.	Square box wrenches	1 No.
3.	Square Tee wrenches	1 No.
4.	Engineers square 700 mm.	1 No.
5.	Threaded fastener type-B	1 No.
6.	Threaded fastener type-C	1 No.
7.	Threaded fastener type-F	1 No.

### **Computer & its accessories:**

<b>Sl. No.</b>	<b>Name of Tools &amp; Equipments</b>	<b>Quantity</b>
1.	Computer with UPS, Printer and Necessary Software (Latest Version)	1 no.
2.	LCD Projector with screen	1 no.

**FURNITURE:-**

<b>Sl. No.</b>	<b>Name of Tools &amp; Equipments</b>	<b>Quantity</b>
1.	Metal lockers 8 lockers type with individual locks 1980X910X480 mm.	2 Nos.
2.	Metal office chair with arm, cane sit and back.	1 No.
3.	Metal office table with 3 drawers.	3 Nos.
4.	Work bench: <u>Wooden – 10ft x 4ft X 3ft with 6 cupboards.</u>	4 Nos.
5.	Metal shelving rack open type 1800X900X500 with adjustable shelves.	4 Nos.
6.	Drawing Desk	1 No.
7.	Stool	8 Nos.
8.	Black Board with easel Milky Glass with Graph Line	1 No.
9.	Portable fire extinguisher	2 Nos.
10.	Galvanized mild steel fire bucket 4 liters	4 Nos.
11.	Table for computer, printer and LCD projector	1 each.
12.	Computer Chair	2 Nos.
13.	Almirah 1800 X 900 X 450 mm or nearest size	1 No.

Syllabus for the subject

of

**TRADE THEORY-II  
&  
TRADE PRACTICAL-II**

Under

**CRAFT INSTRUCTOR TRAINING SCHEME (CITS)**

**Trade: MECHANIC MACHINE TOOL MAINTENANCE**

Re-Designed in

- 2014 -

By

**Government of India  
Ministry of Labour & Employment  
Directorate General of Employment & Training**

## **G. GENERAL INFORMATION**

- 1. Name of the Course** : Craft Instructor Training
- 2. Duration of Instructor Training** : 1 Year (Two semesters each of six months duration).
- 3. Subjects covered in the Semesters** : Detailed in Section - C
- 4. Name of the Subject** : **TRADE THEORY –II & TRADE PRACTICAL-II**
- 5. Applicability** : **MECHANIC MACHINE TOOL MAINTENANCE**
- 6. Examination** : AITT to be held at the end of each semester.
- 7. Space Norms** :
  - (a) One class room of minimum 30sq.m. area having Minimum width of 5 m. and with 6000 lumen
  - (b) Workshop : 360 sq. meter having minimum width of 8 m. and with 150000 lumen
  - The electrical equipments of Class room should conform to minimum 3 star Building energy rating as per Bureau of Energy Efficiency (B.E.E.)**
  - (c) Computer lab: 30 sq. m area \*
- 8. Power Norms** :
  - (a) Class Room :1kw
  - (b) Workshop : 13kw
- 9. Unit strength(Batch Size)** : 20
- 10. Entry qualification** : Candidate passed semester-I under CITS or completed Semester-I.
- 11. Trainers' Qualification** : Diploma or Degree in Mechanical / Production Engineering from AICTE recognized Board / University with five / two years experience respectively.
- 12. Desirable** : Passed National Craft Instructor Training course in Mechanic Machine Tool Maintenance trade.

In case of two units, one trainer must be Degree in Engineering.

**Note:** \*Not required if existing computer lab is available.



**I. DETAIL SYLLABUS FOR THE TRADE: Mechanic Machine Tool Maintenance**  
**UNDER CRAFT INSTRUCTOR TRAINING SCHEME**  
**SEMESTER-I**

Note: During the discussion of any machine tools, related precautions and safety measures should be discussed.

Tentative Week no.	THEORY	PRACTICAL
1.	Concept of KAIZEN, Just-in-Time (JIT), Total Productive Maintenance (TPM) and Small Group Activity (SGA).	Sample case studies to be discussed based on theory.  Practice on total cleaning of machine tool.
2,3.	<p>Concept of routine, preventive and breakdown maintenance.</p> <p>Inspection, diagnosing &amp; repairing procedure.</p> <p>Schedule and planning for preventive maintenance work. Maintenance of records, log book and history sheet.</p> <p>Functions involving preventive maintenance. Advantage of preventive maintenance. Frequency of preventive maintenance, preparing preventive maintenance schedule - points to be considered.</p> <p>Method of repairing damage parts, Major overhauling, Method of reconditioning of machine tools using – special tools, test mandrel, template- patterns, gauges,</p>	<p><b><u>Planning of overhauling:</u></b></p> <p>Method of dismantling, precaution to be taken while dismantling.</p> <p>Sequence of operations, marking of the parts, methods of cleaning of parts.</p> <p>Proper method of removal and remounting of bearings. Dismantling &amp; Re-assembling of machine-sub assemblies in correct sequence, testing of correct functioning of machines (shaping, milling, lathe and drilling machines), coolant and lubrication pumps.</p> <p>Solvent and cleaning materials - their names and specification.</p>

	<p>bridges.</p> <p>Testing of m/c after repair. Concept of test chart.</p>	<p>Preparation of test chart.</p>
4,5.	<p>Methods employed for installation and erection of precision and heavy duty machines.</p> <p>Location and excavation of foundation.</p> <p><u>Different types of foundation:</u></p> <p>Structural, reinforced, wooden and isolated.</p> <p>Requirement of good foundation, different types of foundation &amp; foundation bolts.</p> <p>Foundation for heavy duty machine and precision machine. Special process involving in erection of heavy duty machines. Layout of machines – Consideration of power, space, weight, ventilation and moving parts.</p> <p>Types of vibrations, causes and prevention of vibrations. Method of insulation of machine against vibration. Anti-vibration devices and their locations. Different types of instruments used for checking the vibrations.</p>	<p>Introduction to leveling of Machines.</p> <p>Practice on leveling – use of spirit level, camel back, straight edge, bridge, parallel block.</p> <p>Leveling of surface plates. Marking table. Milling machine. Lathe machine – preparation of test report indicating degree of flatness.</p> <p>Use of leveling bolts. Taper wedges for leveling of the horizontal and vertical surfaces.</p> <p>Preparing of foundation.</p>
6,7.	<p>Different type of appliances and tackles for lifting, shifting, loading and unloading of machines and equipments.</p> <p>Screw jack – their use and working principles. Chain pulley block and hook – their uses and working principles. Concept of lifting, crane and hoist – working principles and main constructional features. Working principles and use of other tackles like crabs, winches, slings (wire rope &amp; elastic), roller and bars, levers, lashing and packing. Importance of testing of lifting</p>	<p>Use of different type of lifting tackles both mechanical and hydraulics – such as screw jacks, chain pulley block, crabs and winches, rollers, bars and levers. Use of inclined plane. Hydraulic trolleys. Maintenance of lifting equipments. Method of lifting jobs of various shape, size and weight. Use of appropriate length of chains. Inspection of chain links and lifting tackles.</p> <p>Practice on the shop floor.</p>



	<p>tackles.</p> <p>Use of inclined plain. Special precaution in handling heavy equipments, removal and replacement of heavy parts. Safety in transportation.</p>	
8,9.	<p>Machine Alignment – different types – procedure.</p> <p>Equipment for aligning machines – use of test mandrel, master cylinder, straight edge, slip gauges and dial indicators.</p> <p>Precaution to be observed in the use of equipments while aligning.</p> <p>Special precautions necessary for erection, leveling and aligning precision machines.</p> <p>Testing for correct functioning of machine parts and commissioning of machine.</p> <p>Geometrical testing of machine tools.</p>	<p>Demonstration and practice of various spindle drive mechanism used on pedestal grinder, drilling, milling, shaper, lathe and grinding machines.</p> <p>Checking for spindle run-out, axial and radial play. Setting of play as per standard chart.</p> <p>Checking of bearing performance – repairs and replacement as needed.</p> <p>Demonstration and practice of Shafts, Axles, Couplings and Clutches used on various machines.</p>
10,11.	<p>Need of Machine Tool Testing, Advantages of testing. Acceptance Test. Geometrical check. Measuring equipments use, checking methods.</p>	<p>Alignment – Types, alignment of axes. Different position of misalignment, alignment of reference planes, alignment of surfaces.</p> <p>Checking straightness, flatness, parallelisms, equidistance, squareness, checking methods for rotary elements.</p> <p>Practice on exercises involving making of Simple Machine parts which have certain functional relationship to other parts such as driving mechanism, dovetail, assembling parts using bolts, dowel pin, locking devices. Precision fittings - involving sliding, scraping and alignment.</p>

<p>12,13.</p>	<p>Constructional features, working principles and uses of fluid moving machineries.</p> <p>Non-positive and Positive displacement pumps viz. centrifugal and propeller pumps, gear pump, vane pump, piston pump.</p> <p><b>Valve:</b> Constructional features and working principles, types viz. directional control, pressure control, flow control and non-return valve.</p> <p>Actuators: types &amp; constructional features and principles of hydraulic Actuator.</p> <p>Fluid power symbols.</p> <p>Hydraulic and pneumatic power source and circuits.</p> <p>Study of different hydraulic and pneumatic circuits.</p> <p>Study of hydraulic oil, air preparation system, hydraulic accessories.</p> <p>Types of hydraulic oils, preservation, analysis contaminations and minimization of contaminations.</p> <p>Performance testing of hydraulic pumps.</p>	<p>Application of different types of valves in Hydraulic and Pneumatics circuits. Demonstration and practice on machine tool application of the hydraulic drives for rotary, reciprocating, speed changing, clamping, unclamping and feed motions.</p> <p>Setting of various hydraulic elements for proper functioning. Repairs of hydraulic presses and various hydraulically operated equipment, fault finding by simulation.</p> <p>Setting of pneumatic circuit elements for proper functioning – adjusting, cushioning of the cylinders flow and pressure.</p> <p>Practice on simple hydraulic &amp; pneumatic circuits.</p> <p>Maintenance of hydraulic power pack. Maintenance of air preparation unit, FRL (Filter-regulator-lubricator) unit.</p>
<p>14,15.</p>	<p>Electrical Safety rules and precautions.</p> <p>Starters – Concept of DOL, star-delta and auto transformer.</p> <p>Concept of variable voltage - variable frequency drive.</p> <p>Basic electronics, concept of PCB, conductors, semi conductors, resistance, condenser, diodes, transistors, SCR, UJT.</p> <p>Different types of rectifiers, regulated power supply,</p>	<p>Familiarisation with common tools and testing equipments.</p> <p>Selection and replacement of switches, fuses, preventers etc.</p> <p>Testing of single &amp; three phase supply.</p> <p>Testing and overhauling of induction motor and starter.</p> <p>Common faults and remedies of motor and starter.</p> <p>Testing of components like resistors, capacitors, diodes and</p>

<p>SMPS.</p> <p>Use of a transistor as a switch &amp; its simple applications.</p> <p>Use of thyristor, diode and IGBT (insulated gate bipolar transistor).</p> <p>Concept of power electronics, Concept of IC, Concept of micro processor.</p> <p>Concept of AC-DC and DC-AC converter.</p> <p>CNC machine drives, difference between servo motor, stepper motor - DC and AC.</p> <p><b><u>Logic gates:</u></b> AND, OR, INVERTER, NAND, NOR, EX-OR etc.-</p> <p>Combination of series &amp; parallel switches. Related application. CPU.</p> <p>Memory – RAM, ROM, PROM, EPROM.</p> <p><b><u>PLC:</u></b></p> <p>Introduction, main components and types.</p> <p>PLC programming – Ladder diagram and Statement List(STL), symbols use in PLC programming, application of PLC in automation industry.</p>	<p>transistors.</p> <p>Verification of Logic Gates.</p> <p>Practice on Bridge rectifier and simple inverter circuit.</p> <p>Measurement of voltage &amp; current at different test points.</p> <p>Demonstration of PLC program using ladder diagram and statement list.</p>
---	---

16,17.	<p><b><u>Gear:</u></b></p> <p>Types and terminology of different types of gears, worm &amp; worm wheel and rack &amp; pinion.</p> <p>Method of repairing gear teeth by binding up and dovetail insert method.</p> <p>Method of fixing gear, wheels for various drives.</p> <p>General causes of the wear and tear of the toothed wheels and their remedies.</p>	<p>Study of various machines tools such as Lathe, Milling, Radial drilling, Grinding shaping, and slotting machine with special attention to transmission mechanism.</p> <p>Study of machine accessories, their function in operation.</p> <p>Repairs of gear teeth by binding up and dovetail insert method.</p> <p>Method of fixing gear, wheels for various drives.</p>
18, 19.	<p>Concept of Auto CAD software. Elementary commands of CAD software. Details of different menu &amp; plotting.</p>	<p>AutoCAD software commands and using different menu of AutoCAD. Drafting of simple machine parts with the help of different menu. Practice on plotting.</p>
20, 21.	<p>Introduction to CNC Machines. Difference between CNC and SPM.</p> <p>Importance of CNC machines over other mass production processes.</p> <p>Concepts of architecture and Working principles of CNC Machines – Machine beds – ball screw mechanism – servo drives – feedback Mechanism.</p> <p>LM guides mechanism.</p> <p>Concept of ATC &amp; APC.</p> <p>Axes designation.</p>	<p>Demonstration of CNC machine. Practice on operational features with reference to driving mechanism, centralized lubrication system.</p> <p>Familiarization with co-ordinate system, use of CNC codes (G &amp; M codes) and programming, simulation, dry run &amp; cutting for simple test jobs.</p> <p>Practice on basic features of CAM software.</p>

	<p>Introduction to G and M codes,  CNC tooling and fixtures  Simple manual part programming commands.  Introduction to CAM software.</p>	
22.	<p><b><u>Preventive maintenance:</u></b>  Advantages of preventive maintenance, Aim – Basic Activity, Planning, Schedule Basic aspects.  Periodical Inspection –  Frequency- Schedule-Types of schedule, Checklist, Preparation of Checklist.  Record Maintenance-  Record Register, Form, Instruction, Chart for Abbreviation, History sheet, General Maintenance Register.  Inventory management of sectional stores.  Layout of Maintenance Section:-  Fault Finding Method.</p>	<p>Trouble shooting, fault finding and rectification of machine tools.</p>
23	<b>Industrial visit &amp; Submission of Report</b>	
24-26	<b>Revision &amp; Trade Test</b>	

**NOTE: - Exposure to Industry/Institute for CNC, EDM, ECM etc.**

**J. List of Tools & Equipment**  
**Trade: - MECHANIC MACHINE TOOL MAINTENANCE**  
**Under Craft Instructors Training Scheme**  
**For a batch of 20 Trainees**  
**Semester-II**

**TOOLS & INSTRUMENTS FOR MAINTENANCE SHOP**

Sl. No.	Name of Tools & Equipments	Quantity
1.	Master Bar 45 Degree, scraping Bar 600 x 75 x 25 mm., all sides to an accuracy of 0.02 mm seasoned.	1 No.
2.	Vane pump fixed and variable delivery	1 each
3.	Hydro motor	1 No.
4.	Accumulator (gas)	1 No.
5.	Pneumatic tools ( Portable nut spanner /Runner, chisel, grinder sander and hammer )	1 each
6.	Hydraulic trainer with necessary aggregates for different machine circuit.	1 set
7.	Pneumatic trainer with necessary aggregates for different machine circuit.	1 set
8.	Hydraulic valves (Relief, Sequence, Unloading, Pressure-reducing, Check, flow control, Directional Control Valves etc).	1 each
9.	Transparent Hydraulic cylinder	1 No.
10.	Cut model of pneumatic valve	1 No.
11.	Flow detector (Magnetic crack detector)	1 No.
12.	Engineering Stethoscope	1 No.
13.	Tool picker collets type	1 No.
14.	Tool picker magnetic type	1 No.
15.	Granite surface plate 1600X1000 with stand and cover	1 No.
16.	Bearing and gear tester	1 each.
17.	Pneumatic scraper with adjustable stroke	2 Nos.
18.	Torch (3Cells)	2 Nos.
19.	Sledge Hammer 5 kgs.	1 No.

**Note:-** Any items available within the institute may be used instead of buying new items.

**MACHINIST TOOLS**

Sl. No.	Name of Tools & Equipments	Quantity
1	Straight edge(steel) 1000 mm.	1 No.
2	Spirit level 2 V 250.05	1 No.
3	Spanner D.E. G.P. Series 2	2 Sets

## **GENERAL MACHINE**

<b>Sl. No.</b>	<b>Name of Tools &amp; Equipments</b>	<b>Quantity</b>
1	CNC turn Centre with minimum specification as: Chuck size:135mm Between centre distance: 250mm Travel in X: 100mm Travel in Z: 200mm No. of tool stations: 8 station turret Spindle power: 3.7kW (continuous rating) preferably with popular control system like Fanuc/Sinumeric along with motorized coolant system.	1 no.

## **FOR HEAT TREATMENT**

<b>Sl. No.</b>	<b>Name of Tools &amp; Equipments</b>	<b>Quantity</b>
1.	Blacksmith's Anvil, 100 kg.	1 No.
2.	Smiths tongs hollow bit, smiths Tongs flat (30 mm)	1 Each
3.	Water tank (450 x 300 x 250 mm).	1 No.
4.	Brass Rule 300 mm.	1 No.
5.	Furnace for Heat treatment	1 No.
6.	Oil Bath (for quenching) 45 x 45 x 45 cm, 6 mm thick plate	1 No.

## **HOISTING EQUIPMENTS:**

<b>Sl. No.</b>	<b>Name of Tools &amp; Equipments</b>	<b>Quantity</b>
1	Fork lift max. capacity 1 Ton	1 No.
2	Manila ropes dia.12, 20, 30 mm (5 mtr. Length)	1 Each
3	Crow Bar	4 Nos.
4	Rollers (steel tubes) from dia. 40, 50 & 60 mm (500 mm length)	5 Nos each.
5	Block of Timber (various sizes)	10 Nos.
6	Portable jack	1 No.
7	Cargo Winches 3, 5 Ton.	1 each.
8	Wall Hoist	1 No.
9	Shear Legs (tripod)	1 No.
10	Hand Operated Chain Pulley block.	1 No.
11	Conveyor	1 No.
12	Ratchet chain Pulley block	1 No.

## **ERECTION TOOLS & EQUIPMENT**

<b>Sl. No.</b>	<b>Name of Tools &amp; Equipments</b>	<b>Quantity</b>
1.	Foundation Bolt (different Types)	4 Nos each.

**ELECTRICAL TECHNOLOGY & ELECTRONICS**

<b>Sl. No.</b>	<b>Name of Tools &amp; Equipments</b>	<b>Quantity</b>
1.	Screw Driver (electrician ) 150 mm with Tester detachable (flat two nos. & star head two nos.).	04 Nos.
2.	Screw Driver Philips Nos.860, 861 & 862	02 Sets
3.	Long Nose Pliers 150 mm Insulated	04 Nos.
4.	Combination pliers 150 mm	04 Nos.
5.	Diagonal Cutter 150 mm	04 Nos.
6.	Tweezers	04 Nos.
7.	Knife 100 mm	04 Nos.
8.	Neon Tester A/C 230V	04 Nos.
9.	Scissors 150 mm	02 Nos.
10.	Soldering Iron 25 W	02 Nos.
11.	Soldering Iron 65 W	02 Nos.
12.	Digital Multi meter	02 Nos.
13.	Ammeter 0 to 500 ma = (10 amps) A/C	01 No.
14.	Ammeter 0-Ia DC (0-5 amp)	01 No.
15.	Voltmeter 0-300-600 V AC	01 No.
16.	Discrete component Trainer	1 No.
17.	P.F.Meter	1 No.
18.	Frequency meter	1 No.
19.	Megger 500 V	1 No.
20.	A.C. Squirrel Cage induction motor 3 phase with D.O.L. Starter	1 No.
21.	Star Delta 3 phase starter	1 No.
22.	C.T. Single Phase	2 Nos.
23.	P.T. Single Phase	2 Nos.
24.	Auto Transformer 0-300 V 8 Amp	2 Nos.
25.	C.R.O. 50 MHZ	1 No.
26.	Digital I.C. Tester	1 No.
27.	Digital I.C. Trainer Kit	1 No.
28.	Audio single Generator with Sine wave, Square wave and Triangular wave.	1 No.
29.	DUAL D.C. Power supply 0-30 V, 2 Amp and 0-5V, 5 Am, $\pm$ 15V, 2 Amp with indicator.	2 Nos.
30.	Demonstration model for Thyristorised D.C. Motor Drive (1 H.P.) Set up	1 No.
31.	Demonstration model for Thyristorised A.C. Motor drive (1 H.P.) Set up	1 No.
32.	Linear I.C. Trainer Kit	1 No.



33.	Digital Millimeter 2.5 Amps/5 Amps	2 Nos.
34.	Transducer	2 Nos.
35.	Thermocouples Kit	2 Nos.
36.	L.D.R.S Kit	2 Nos.
37.	Thermostat Kit	2 Nos.
38.	L.V.D.T Kit	2 Nos.
39.	Strain gauge	2 Nos.
40.	Photo Diode (component)	2 Nos.
41.	Photo Transistor Kit	2 Nos.
42.	A.C Timer Kit	2 Nos.
43.	D.C. Timer Kit	2 Nos.
44.	Decimal count Kit	2 Nos.
45.	D.C. Motor control Kit	2 Nos.
46.	Hand Tachometer	1 No.
47.	Ammeter portable type 0-15 Amps. A.C	1 No.
48.	Insulated Screw Driver 200 mm.	4 Nos.
49.	Insulated combination side cutting pliers 200 mm.	4 Nos.
50.	Tang Tester (0-15 amps)	1 No.
51.	Cutter cum stripper	4 Nos.

### Computer and Software:

Sl. No.	Name of Tools & Equipments	Quantity
1*	Multimedia teach ware/ courseware for CNC technology and interactive CNC part programming software for turning & milling with virtual machine operation and simulation using popular operation control system such as Fanuc, Sinumeric, etc. (Web-based or licensed based) (10 trainees + 1 faculty)	11 users.
2*	PCs with MS-Windows-7 or latest version to run above simulation software, networked on LAN.	11 nos.
3*	Computer Table & chairs	11 nos. & 20 nos.
4*	Equipment for conducting BLS (Basic Life Support) training. (Optional)	1 set
5*	AutoCAD latest version (10 + 1 users )	1 set
6*	PLC Trainer Kit. PLC with minimum 8 Inputs, 8 Outputs, 4 analog inputs, 2 analog outputs. Ladder programming software.	1 Set.

\* Note: Existing facility may be used if already available.

**K. FURNITURE, ACCESSORIES AND AUDIO VISUAL AIDS FOR THE SEMESTER-I & II (COMMON FOR ALL ENGG. TRADES)**

<b>Sl. No.</b>	<b>Items</b>	<b>Qty.</b>
1.	Class Room Chairs (armless) / Dual desk may also be allowed	20 /10 nos.
2.	Class Room Tables ( 3ft X 2ft) / Dual desk may also be allowed	20 /10 nos.
3.	Chair for Trainer (armed) movable	01 no.
4.	Table for Trainer (4 ½ ft X 2 ½ ft) with Drawer and cupboard	01 no.
5.	LCD / LED Projector	01 no.
6.	Multimedia Computer System with all accessories with UPS (500VA)	01 set
7.	Computer Table	01 no.
8.	White Board (6ft X 4 ft.)	01 no.
9.	LCD Projector Screen	01 no.
10.	Air Conditioner 1.5Ton (OPTIONAL)	02Nos.
11.	Wall Clock	01 no.
12.	Wall charts, Transparencies and DVDs related to the trade	As required
13.	Laser Printer with scanner	01 no.
14.	Steel Cupboard with 8 pigeon lockers	3 Nos.
15.	Work bench for fitters with two vices of 100mm	2 Nos.
16.	Steel cupboard 180 x 90 x 45cm	2 Nos.
17.	Steel cupboard 120 x 60 x 45cm	2 Nos.
18.	Multi drawer tool rack trolley with minimum 4 drawers and 20 tool capacity	04 Nos.
19.	First aid box.	1 no.

## L.LIST OF TRADE COMMITTEE MEMBERS

Sl. No.	Name & Designation Sh/Mr/Ms.	Organization	Mentor Council Designation
<b>Members of Sector Mentor council</b>			
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
<b>Mentor</b>			
21.	Sunil Kumar Gupta (Director)	DGET HQ, New Delhi.	Mentor
<b>Members of Core Group</b>			

22.	N. Nath. (ADT)	CSTARI, Kolkata	Co-ordinator
23.	H.Charles (TO)	NIMI, Chennai.	Member
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.Venkaatesh 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
<b>Other industry representatives</b>			
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