Syllabus for the
trade of

TEXTILE MECHATRONICS

(SEMESTER PATTERN)

Under

CRAFTSMAN TRAINING SCHEME(CTS)

Designed in: 2013

By

Government of India
CENTRAL STAFF TRAINING AND RESEARCH INSTITUE
Directorate General of Employment & Training
Ministry of Labour & Employment
EN-81, SECTOR-V, SALT LAKE CITY
KOLKATA-700091

List of Members of Trade committee Meeting for trade **of 1) Spinning Technician, 2) Weaving Technician, 3) Textile Mechatronics and 4) Textile Wet Processing (Textile Group of Trades)** held on 18.07.2006 at CSTARI, Kolkata.

SL.NO.	NAME & DESIGNATION S/SHRI	REPRESENTING ORGANISATION	REMARKS
1	Shri G.Bhowmik Director	CSTARI, Kolkata	Chairman
2	Dr. S.M. Chatterjee Advisor	Tech. Edu., Govt. of W.B., Kalyani	Member
3	Dr.A.K.Samanta	Instt. of Jute Technology, Kolkata	Member
4	Prof. Swapan Kr. Ghosh	Instt. of Jute Technology, Kolkata	Member
5	Dr. Satyaki Bhattacharyya	Kalyani Govt. Engg. College, Kalyani	Member
6	Shri T.Sundararaj	Commissioner of Emp.&Trg., Chennai-32	Member
7	Shri S. Mondal Dy. Director	ITI Gariahat	Member
8	Shri S.S.Pal	Kalyani, Spinning Mill	Member
9	Dr. S.K.Mandal	NITTTR, Kolkata	Member
10	Shri P.Sengupta	Jaya Shree Textiles, Rishra-712249	Member
11	Shri Sunanda Mitra	Apparel Export Promotion Council	Member
12	Shri Amitabha Ray	Kalyani Spinning Mill	Member
13	Shri T.Mukhopadhyay Dy. Director Of Trg.	CSTARI, Kolkata	Member
14	Shri A.Chakraborty Asstt. Director of Trg.	CSTARI, Kolkata	Member
15	Shri R.B.Ram Asstt. Director of Trg.	CSTARI, Kolkata	Member
16	Shri S.B.Sardar Training Officer,	CSTARI, Kolkata	Member
17	Shri P.K.Kolay Training Officer	CSTARI, Kolkata	Member
18	Shri R.N.Manna Training Officer	CSTARI, Kolkata	Member

List of members attended the Workshop to finalize the syllabi of existing CTS into Semester Pattern held from 6th to 10th May'2013 at CSTARI, Kolkata.

Sl. No.	Name & Designation	Organisation	Remarks
1.	R.N. Bandyopadhyaya, Director	CSTARI, Kolkata-91	Chairman
2.	K. L. Kuli, Joint Director of Training	CSTARI, Kolkata-91	Member
3.	K. Srinivasa Rao, Joint Director of Training	CSTARI, Kolkata-91	Member
4.	L.K. Muhkerjee, Deputy Director of Training	CSTARI, Kolkata-91	Member
5.	Ashoke Rarhi, Deputy Director of Training	ATI-EPI, Dehradun	Member
6.	N. Nath, Assistant Director of Training	CSTARI, Kolkata-91	Member
7.	S. Srinivasu, Assistant Director of Training	ATI-EPI, Hyderabad-13	Member
8.	Sharanappa, Assistant Director of Training	ATI-EPI, Hyderabad-13	Member
9.	Ramakrishne Gowda, Assistant Director of Training	FTI, Bangalore	Member
10.	Goutam Das Modak, Assistant Director of Trg./Principal	RVTI, Kolkata-91	Member
11.	Venketesh. Ch. , Principal	Govt. ITI, Dollygunj, Andaman & Nicobar Island	Member
12.	A.K. Ghate, Training Officer	ATI, Mumbai	Member
13.	V.B. Zumbre, Training Officer	ATI, Mumbai	Member
14.	P.M. Radhakrishna pillai, Training Officer	CTI, Chennai-32	Member
15.	A.Jayaraman, Training officer	CTI Chennai-32,	Member
16.	S. Bandyopadhyay, Training Officer	ATI, Kanpur	Member
17.	Suriya Kumari .K , Training Officer	RVTI, Kolkata-91	Member
18.	R.K. Bhattacharyya, Training Officer	RVTI, Trivandrum	Member
19.	Vijay Kumar, Training Officer	ATI, Ludhiana	Member
20.	Anil Kumar, Training Officer	ATI, Ludhiana	Member
21.	Sunil M.K. Training Officer	ATI, Kolkata	Member
22.	Devender, Training Officer	ATI, Kolkata	Member
23.	R. N. Manna, Training Officer	CSTARI, Kolkata-91	Member
24.	Mrs. S. Das, Training Officer	CSTARI, Kolkata-91	Member
25.	Jyoti Balwani, Training Officer	RVTI, Kolkata-91	Member
26.	Pragna H. Ravat, Training Officer	RVTI, Kolkata-91	Member
27.	Sarbojit Neogi, Vocational Instructor	RVTI, Kolkata-91	Member
28.	Nilotpal Saha, Vocational Instructor	I.T.I., Berhampore, Murshidabad, (W.B.)	Member
29.	Vijay Kumar, Data Entry Operator	RVTI, Kolkata-91	Member

General Information

1.	Name of the trade	:	**TEXTILE MECHATRONICS**
2.	N C O Code No.	:	
3.	Duration	:	Two Years (Four semesters)
4.	Power Norms	:	9 KW
5.	Space Norms	:	240 sq. met.
6.	Entry Qualification	:	Passed 10th class examination under 10+2 system of education with Science and Mathematics or its equivalent.
7.	Unit Size(No. of Student)	:	20

8a. Instructor's/Trainer's Qualification: Degree/Diploma in Textile Mechatronic with 1 year and 2 years of experience respectively .

OR

NAC/NTC in the trade of Textile Mechatronic with Three years experience in the relevant field.

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

Note: At least one Instructor must have Degree/Diploma in relevant field.

TRADE : "TEXTILE MECHATRONICS"

FIRST SEMESTER

(Semester Code No. TEM-I)

Week No.	Trade Practical	Trade Theory
1.	Demonstration about artificial respiration and common defects practices for workshop	Industrial safety precautions-safety devices, safety signs. First aid- Fire Extinguishers
2.	To connect VM, AM in a simple low voltage DC circuit and measure the current & voltage.	Fundamentals of electrical terms and definitions with their units- Symbols - Effects of electricity, conductor-Insulator-Semi conductor-Type of cables.
3 & 4	Skinning the cables and different joint practice-in single & milti strand cables. To verify the characteristics of series and parallel circuit. Measurement of power and energy.	Work power and energy (P.E and K.E) Ohm's Law series and parallel circuit with simple problems.
5	Grouping of cells for required voltage and current charging of secondary cells.	Primary cells-Types of cells Defects-Applications secondary cells. Types of cells types of charging , care and maintenance.
6	Tracing of magnetic field	Magnet-its terms- Electromagnet -Their

	preparation of solenoid and vary its strength.	Applications-Electro magnetic induction Faraday's Law-Lenz's Law.
7	Identification of terminal connections, Build up the voltage.	D.C generator- Construction- Working principle-Types of generator and applications.
8	Starting, running & maintenance of different motors.	Different types of motors, AC/ D.C motor- Construction-Working principle-Types application necessity of starter-Types. Different types of Pump motors.
9	One lamp controlled by one way / two way switch, to wire up for one lamp and one socket undependably, to prepare a test board.	Wiring-Types of wiring- Application of different types of wiring-Wiring accessories- Materials-Ear thing.
10	To measure the current voltage P.F. Frequency, power of a simple A.C circuits. To verify the characteristics of RLC series and parallel circuit.	Fundamental terms in A.C circuits -types of A.C circuits-P. F-advantages of good P.F disadvantages of poor P.F- improvement of P.F
11	To verify characteristics of star delta connections. Measure the power and energy of three phase load.	Poly phase star and delta connections-line voltage-phase voltage-line current-phase current.
12	Identify the terminals of Alternator & buildup the voltage.	Alternators-Construction-working principle -voltage regulations-phase sequence

13	To start, run and reverse different types of single phase motor.	A.C motor-Single phase motor working principle-types.
14	To start, Run and reverse different types of three phase motor with different types of starters.	Three phase motor working principle -types starter and their types.
15	Identify the terminals of transformer. Measure the primary & secondary voltage and respective currents.	Transformer-principle-types & their application.
16	**DEMO:** The type of meters-measure the insulation value with megger.	Instruments-V.M, A.M, W.M, E.M-types-connections. Megger and application
17	Connect and test F.T, M.V / S.V lamps & energy efficient lamps. Norms for illumination in textile mills	Illumination -incandescent lamp-fluorescent lamp-M. V lamp- connections-applications care and maintenance.
18	Fault finding, rectification and servicing of different types of domestic and Industrial appliances.	Working and maintenance of domestic and Industrial appliances- heaters/ Furnaces/ Pump set.
19	**ELECTRONICS:** Soldering & De-soldering practice Identifying simple meters-Study the multimeter Verification of Ohm's law. Identification and testing the given	Conductor, insulator,, Semiconductor, types of solder, Types of fluxes methods of soldering Resistors, Capacitors, inductors etc. Types specification and their applications. Study of solid state device such as diodes, transistors SCR

	components-Study of the color code of Resistors.	and Ics.
20	VI characteristics of diode Half wave & Full wave rectifier.	Semiconductor theory P-type and N-Type Semiconductors. Diode-Constructions working rectifiers, filters.
21	Voltage regulator circuit-Input-Output characteristic of Transistors at common base-common collector-common emitter modes. Study of Integrated (IC) circuit , Construction of Transistors & Amplifiers. VI characteristics of SCR-speed control of D.C motor using SCR. FET amplifier Ckts. UJT relaxation oscillator.	Transistors-construction working amplifier circuits SCR, FET, UJT, DIAC & TRAIC constructions working applications circuits. Study of Integrated (IC)
22	Study of different logic gates. Testing of gates using Ics-Constructions of Timer circuits using 555 Ics.	Introduction to logic gates. Explanation of basic logic gates, OR, AND, NOT, NOR AND , EX - OR etc. Truth table using diodes, transistors, resistors. Logic gates using etc. Flip-Flops-Counters, Timer circuits.
23	Simple programming through microprocessor kit. Study of commonly	Microprocessor -working principle & block diagram. Transducers-thermocouples, thermostats, LDRS, LVTs

	used Transducers	strain gauges, magnetic pickup photo diodes, photo transistor. Over current relays, D.C Motor controllers photo electrical relays.
24	Demonstration of various controlling units. Comparisons of PLC with conventional machine control. Functions of keys on programme-Development Terminal (PDT).	Concept of PLC Block diagram comparison of PLC with conventional terminal / relay. Function of various programmes development terminal (PDT)
25	**Project work /** : **Industrial visit (optional)** **To take-up practical oriented study and innovative approach for developing new products. Submit the report in hard and soft copy.**	
26	**Examination**	

TRADE : "Textile Mechatronics"

SECOND SEMESTER

(Semester Code No. TEM-II)

Week No.	**Trade Practical**	**Trade Theory**
1	Elementary training in Basic Manufacturing Methods (welding & press shop), identification of mechanical, electrical & electronics components of the machine, setting & maintenance	INTRODUCTION Objectives of blow room-identification of components of the machine, & and its functions
2-3	.Identification of mechanical, electrical & electronics components of the machine, setting & maintenance. Elementary training in rotating machinery division, electric motor assembly section.	Objectives of carding- Working mechanism of carding- Identification and importance of components in carding.
4	Study of industrial safety, precautions and first- aid methods. Identification of mechanical, electrical & electronics components of the machine, setting & maintenance.	Objectives and working of lap formers &Comber-identification of machine components and its functions
5	Identification of mechanical, electrical & electronics components of the	Objectives and working Draw frame-identification of machine components and its functions

	machine, setting & maintenance. Elementary training in heavy engineering division, machine shop and tool room section.	
6 7-8	Elementary training in assembly section. Study of various methods for transporting materials and machines of various sizes	Objectives and working Speed frame-Simplex-spinning-working Mechanism. Ring-Spinning system Auto cone Winding-Sequence of Process-Mechanism of Cone/cheese -winding-Working principle and operation.
9-10	Study of wiring methods and perform an experiment to control one lam by one single way switch and 3 pin wall socket with switch control	Application of Mechatronics in Blow room & Carding. Electrical and electronics involved in Blow room - regulation of cotton flow-detection of foreign particles
11	Advanced wiring of a switch control board and panel	Coiler-stop motion units-Electric motors-working-principle of operation-introduction to electric drives-drives involved in textile machines and their importance
12	Demonstration of the winding and testing of an AC relay coil	Can changer mechanism, principle of auto leveler, importance and its functions, control systems involved in Auto leveler, production & monitoring system
13-14	Demonstration the winding and testing of a single phase transformer	APPLICATION OF MECHATRONICS IN COMBER, DRAW FRAME, LAP FROMERS AND SPEED FRAME:

		Working principle of Comber- starting mechanism-Electronics involved in Doffing operation- Draw frames
15-16	Experiment to connect the end connections of a 3-phase induction motor.	Working principle of Speed frames-controls system in speed frame machines-Cone drum mechanism
17-18	Study of feedback elements and control elements	Introductions to Hydraulics-application of hydraulics in textile machines. Fluid couplings-Drive tech-Waste Evacuation system
19-20 21-22	Determination of settings, speeds, production, efficiency and machinery particulars for carding Determination of settings, speeds, production, efficiency and machinery particulars for draw frame	Spinning-working principle of pneumatic speed variator-doffing sequence-electronics in doffing sequence. Importance of over head cleaners and their operation-drives, motors sensors and transducers operations in over head cleaners
23-24	Determination of settings, speeds, production, efficiency and machinery particulars for speed frame Determination of settings, speeds, production, efficiency and machinery particulars for spinning & winding .	Importance of OE Spinning-electronic controls- drives, motors and mechanism in OE Spinning Principle of Winding-electronic controls in Auto corner - Principle of conveyor operation
25	**Project work /** : **Industrial visit (optional)** **To take-up practical oriented study and innovative approach for developing new products. Submit the report in hard and soft copy.**	
26	**Examination**	

TRADE : "Textile Mechatronics"

THIRD SEMESTER

(Semester Code No. TEM-III)

Week No.	Trade Practical	Trade Theory
1-2	Determination of settings, speeds, production, efficiency and machinery particulars for yarn preparatory machine Identification of mechanical, electrical &electronics components of the machine, setting & maintenance. Determination of settings, speeds, production, efficiency and machinery particulars for yarn preparatory m/c	Principles of yarn preparatory m/c.
3-4	Determination of settings, speeds, production, efficiency and machinery particulars for knitting & weaving machine. Identification of mechanical, electrical &electronics components of the machine, setting & maintenance.	Principles of knitting & weaving machine

5-6	Handloom & Power loom Turning & setting & production & running. Identification of mechanical, electrical &electronics components of the machine, setting & maintenance.	Working principles of different types of looms.
7-8	Study of constructional features of pneumatic components, using cut-section models and demonstration KIT.	PNEUMATIC AUTOMATION IN TEXTILE MACHINES: Introduction to pneumatics-application of pneumatics in blow room
9-10	Simulation of circuits using Festo trainer kit	Pneumatic controls in carding machine- components involved and their control systems
11-12	Simulation of multiple actuator systems	Pneumatic controls comber M/C components and its functions and identification of basic components
13-14	Simulation of electro- pneumatic systems	Pneumatic controls silver lap and ribbon lap former-components involved and their control systems.
15-16	Simulation of electro- pneumatic systems employing proximity switches, optical sensors and capacitive sensors	Pneumatic controls drawing machines and ring frames components involved and their basic operations

17-18	Simple circuits using hydraulic elements	Pneumatic controls winding machines-components involved and their control systems
19-20	Identification of PLC blocks.	INTRODUCTION TO ADVANCED AUTOMATION SYSTEM: Introduction to PLC and their programming methods-block diagram of PLC-working of PLC-Input and output units.
21-22	simple experiment on PLC	----------DO----------
23-24	PLC based electronic controls	Role of PLCs in textile industries-programming examples-logic gates
25-26	**Project work /** : **Industrial visit (optional)** **To take-up practical oriented study and innovative approach for developing new products. Submit the report in hard and soft copy.** **Examination**	

TRADE : "TEXTILE MECHATRONICS"

FOURTH SEMESTER

(Semester Code No. TEM-IV)

Week No.	Trade Practical	Trade Theory	Engg. Drawing	Workshop calculation & Science
1-2	Introduction to HMI (Human m/c Interface)Software	Role of HMI panels in textile industries-hand held operating system	Sketches of M.C. Instruments	Co-efficient of regression- Related problems.
3-14	Calculation, setting of modern spinning & weaving machines. Identification of mechanical, electrical &electronics components of the machine, setting & maintenance.	Introduction to working of modern spinning & weaving machine	Diagram of relevant m/c	Do.
15-16	Calculation of speed. Production and study of different mechanisms of flat / circular machines. Identification of mechanical, electrical &electronics components of the machine, setting & maintenance.	Working of flat /circular knitting machine- control, Operations and their importance	Blue print reading to missing lines	Relative pressure - Static Pressure- Pressure Gauges.
17-18	Industrial Visit & Implant training in production & machine maintenance	Industrial Visit	Industrial Visit	Industrial Visit
19-20		Quality concept, ISO9001-2000, SA8000, ISO14001-2004, 5S system, OHSAS18001-1999	Blue print reading. Simple exercises related to missing sections	
21-24	Industrial safety & Health hazard			
25	**Revision**			
26	**Examination**			

TRADE : TEXTILE MECHATRONICS

LIST OF TOOLS AND EQUIPMENTS

A TRAINEES TOOL KIT FOR 20 TRAINEES + 1 INSTRUCTOR

Sl. No.	Name of the items	Quantity
1	Ammeter 1 MA to 500 MA	1
2	Ammeter 0 to lamp D.C	1
3	DC ammeter (0-5) A	4
4	Ammeter (0-50) mA	3
5	AC ammeter (0-10)A	4
6	DC voltmeter (0-250)V	4
7	Mill voltmeter 100-0-100 m Volt	1
8	Digital voltmeter	3
9	AC Voltmeter (0-300) V	2
10	AC voltmeter (0-600)V	1
11	AC Voltmeter M.I. 0-500V	1
12	KW meter 0 to 1 K.W. capacity 1:2	1
13	Single phase power factor meter	1
14	Frequency meter	1
15	AC Energy meter (single phase 5A 230V)	1
16	Megger 500 volts	1
17	Fan DC 220 Volt 1200 mm	1
18	Electric hot plate 150 Watt. 220V with temperature control	1
19	Electric kettle, 1000 watts. 230 V	1
20	Immersion heater 750/1000/1500W-230V	1
21	Series type ohm meter 0-2000 approximate	1
22	Shunt type ohm meter 0-25 approximate	1
23	3-point DC starter1	1
24	4-point DC starters	1
25	Cut out, reverse current over load voltage relays	1
26	Starters 3-phase, 400V, 50 cycles, 2 to 5 H.P. AC motors	1
27	Auto transformer type starter	1
28	Star delta starter with manual, semi auto & Automatic	1
29	Direct on line starter	1
30	Multimeter	1
31	Motor generator set consisting of: Motor shunt 5HP, 440 Volts with starting Compensator and switch directly coupled to generator A.C 3.5 KVA, 400/230 Volts, 3-phase, 4 wire, 0.3 PF 50 cycles with exciter and 1 switch Board mounted with regulator circuit breaker, ammeter, voltmeter frequency meter, knife blade switch and fuses etc,., set complete with cast iron bed plate, fixing blots, foundation bolts & flexible coupling	1 complete
32	Motor shunt DC, 220 volt, 2 to 3 H.P.	1

33	Motor AC Single phase, 230 volt, 1 H.P. repulsion type with starter and switch	1
34	Motor AC Single phase 230 volt, 50 cycles series type with starter/switch H.P.	1
35	Current transformer	1
36	Potential transformer	1
37	Variable auto transformer 0-250 V 5 apms	1
38	Single phase resistive load 3 KW	1
39	Three phase resistive load 10 KW	
40	Motor generator set consisting of: Motor Induction squirrel cage, 7 HP 400 volts, 50 cycle 3-phase with star delta starter and switch directly coupled to DC shunt generator, 5 KW 400 volts, switch board mounted with regulator, air circuit breaker, ammeter, voltmeter knife blade switches and fuses, set complete with cast iron and plate, fixing blots. Foundation bolts and Flexible coupling.	1 complete set
41	Motor of AC squirrel cage, 3-phase 400 volt, 50 cycles, 2 to 3 HP with star delta starter.	1
42	Motor AC phase-wound slip ring type 5 HP 400 volts, 3-phase, 50 cycles with starter and switch	1
43	Soldering Iron set with temp control	1
44	Soldering Iron	1
45	De-soldering pump	1
46	RPS	3
47	CRO	1
48	PLC trainer	1
49	AF Oscillator	1
50	Foam extinguisher	1
51	Dry extinguisher (powder)	1
52	Carbon dioxide Extinguisher	1
53	Sand bucket	1
54	Dry c ell	1

55	Lead Acid battery 12 V, 10 AH	1
56	Rheostat 50 ohms' /5A	4
57	Ceramic Resistor (10 ohms, 22 ohms, 68 ohms, 100 ohms, 47 ohms)	3 set
58	Load resistance	1 set
59	Resistor (58 k ohms, 2 ohms, 100 ohms)	1 set
60	Rheostat (750 ohms, 1.2 ohms)	1 set
61	Capacitor (60 uF)	1 set
62	Inductor(95 Mh)	1 set
63	Wiring Tool kit	3
64	Sodium vapour lamp	2
65	Mercury lamp	2
66	Megger Earth electrode (25 million to 1550 ohms)	1
67	Festo Trainer Kit	1

Sl. No.	Name of the items	Quantity
1	Combination Pliers 200 mm insulated	21
2	Screw Driver 200 mm	21
3	Screw Driver 100 mm	21
4	Terminal Screw Driver	21
5	Hammer Ball Pein (0.25 kg)	21
6	Try Square (200 mm)	21
7	File round (half) 2" cut 250 mm	21
8	File round 150 mm	21
9	Plumb Both115 gm.	21
10	Barwood Mallet 1 Kg. (75 mm X150 mm)	21
11	Knife	21
12	Wood rasp file 250 mm	**21**
13	Firmer chisel 12 mm	**21**
14	Firmer chisel 6 mm	**21**
15	Neon Tester	**21**

16	Tenon saw 250 mm	**21**
17	File flat 25 cm.2 nd cut	**21**
18	File flat25 cm. Smooth	**21**
19	Steel Rule 300 mm to read Metric	**26**
20	Test lamp	**21**
21	Circlip Opener	**21**
22	Continuity Tester	**21**
23	Glouse	**21**
24	Insulating Tape	**21**
25	Electrical soldering Iron	**21**

B. List of Shop General Outfit

Sl. No.	Name of items	Quantity
1	Pliers side cutting 200 mm	10
2	Pliers Flat nose 150 mm	5
3	Pliers round nose	5
4	Pliers long nose	10
5	Screw driver heavy duty 250 mm	10
6	Screw driver7 mm X 300 mm Square blade	10
7	Firmer Chisel 25 m	10
8	Firmer Chisel 10 mm	10
9	Marking Gauge	5
10	Combination bevel Protractor	3
11	Cold Chisel flat25x200 mm	4
12	Cold Chisel flat18 X200 mm	4
13	Hammer Ball Pein 0.5 kg.	5
14	Hammer Ball Pein 0.75 kg.	5
15	Hammer Ball Pein 1 kg.	5
16	Hammer Cross Pein 0.5 kg.	5
17	Wall jumper Octagonal 37 mmX450 mm, 37 mmX600mm	2 each
18	Centre Punch 100 mm	5
19	File flat300 mm rough	5
20	File flat300 mm 2 nd. Cut	5
21	File flat 250 mm Bastard	5
22	File flat250 mm smooth	5
23	File half round300 mm 2 nd cut	5
24	File Triangular 150 mm 2nd cut	4
25	Spanner double ended set of 6	5 sets
26	Adjustable Spanner 350 mm	2 sets
27	Foot Print grip 250 mm	2 set
28	Allen keys (Metric & Inches	20 sets
29	Steel Rule 30 cm	5
30	Steel Measuring Tape (2 m)	5
31	Steel Measuring Tape (20m)	2

32	Hacksaw frame Adjustable 200 mm t0 300mm	5
33	Spirit level 300 mm	3
34	Bench vice 150 mm	3
35	Bench vice 100 mm	2
36	Pipe Wrench (300 mm)	10
37	Spanner (up to 32 mm)	10
38	Vernier caliper	2
39	Ring spanner	3 set
40	12" grip Plier	4
41	Inner caliper	5
42	Outer caliper	5
43	Box spanner	4 set
44	Torque spanner	3
45	File Swiss type needle set	5
46	Shore hardness tester for rubber	1
47	Needle file	3 set
48	Nylon hammer	5
49	Puller 2 arm , 3 arm	3 each
50	Copper tube cutter	3
51	Ratchet brace 6 mm capacity	5
52	Ratchet bit 4 mm and 6 mm	5
53	Vernier Caliper 200 mm (ordinary)	5
54	Snips	5
55	Conduit Pipe die set	5
56	Tong Tester	2
57	Ohm meter	2
58	Grimping tool (Manual)	1
59	Blow Lamp	2
60	Multimeter	2
61	Ladle	5
62	Pipe Vice 18"	2