

**LIST OF INSTRUMENT MECHANIC EQUIPMENTS FOR UPGRADATION OF EXISTING TRADES  
ITI, Cuttack (Package No.11)**

Sl. No.	Name of the Item	Instrument Mech
1	<p>AC moving iron type ammeter(various ranges)Portable AC moving iron voltmeter laboratory type for horizontal use. Analog for measuring AC voltage for continuous use. Housed in laminated wooden cabinet size 235 * 200 * 130 mm with detachable lid black bakelite panel fitted with anti – parallax mirror scale knife edge pointer, rubber footings, locking arrangement and carrying handle. The movement should be strongly constructed spring loaded sapphire jewel bearings which protect the bearing system from shock and reduce friction to a minimum. Hardened and precisely ground pivots and chemically treated sturdy coiled phosphor bronze springs should be used. Zero adjuster is to be accessible from the front. The movement should be light weight and quick acting and extremely robust. Scale length 150 mm, class of accuracy +1% of FSD. All the terminals are to be insulated and brought out for easy connection. Ranges: 0 – 15 V 0 - 30 V 0 - 250 V</p>	8

Sl. No.	Name of the Item	Instrument Mech
2	<p>Ac moving iron type v.meter(various ranges)Portable AC moving iron ammeter laboratory type for horizontal use.  Analog for measuring AC current for continuous use.  Housed in laminated wooden cabinet size 235 * 200 * 130 mm with detachable lid black bakelite panel fitted with anti – parallax mirror scale knife edge pointer, rubber footings, locking arrangement and carrying handle.  The movement should be strongly constructed spring loaded sapphire jewel bearings which protect the bearing system from shock and reduce friction to a minimum.  Hardened and precisely ground pivots and chemically treated sturdy coiled phosphor bronze springs should be used.  Zero adjuster is to be accessible from the front.  The movement should be light weight and quick acting and extremely robust. Scale length 150 mm, class of accuracy +1% of FSD.  All the terminals are to be insulated and brought out for easy connection.  Ranges:  0 – 1 AMP  0 - 3 AMP  0 - 5 AMP  0 - 10 AMP  0 - 30 AMP</p>	8
3	Accenerometer	4

Sl. No.	Name of the Item	Instrument Mech
4	ADC LT2252 And DAC Card 310mWTRAFFICE CONTROLLER STUDY CARD : <ul style="list-style-type: none"> <li>• Distinct coloured LED indicators provided for every possible signal of the peripheral.</li> <li>• User links and lugs are provided for inputs.</li> <li>• Legends for every LED indicator/lug.</li> <li>• Selection of I/O address through jumper.</li> <li>• RST5.5, RST6.5, RST7.5 are provided on-board for interrupt driven modes.</li> </ul> DC MOTOR CONTROLLER STUDY CARD : <ul style="list-style-type: none"> <li>• Distinct coloured LED indicators provided for every required signal of the peripheral.</li> <li>• User links and lugs are provided for inputs.</li> <li>• Legends for every LED indicator / lug.</li> <li>• Selection of I/O address through jumper.</li> <li>• RST5.5, RST6.5, RST7.5 are provided on-board for interrupt driven modes.</li> </ul> 8 CHANNEL A TO D CONVERTER STUDY CARD : Channels : 8 channel. <ul style="list-style-type: none"> <li>• ADC - 0809 : Monolithic CMOS 8-bit successive approximation type.</li> <li>• Conversion speed : 100_s.</li> <li>• Resolution : 8 - bit.</li> <li>• Trigger mode : Software trigger.</li> </ul> D TO A CONVERTER STUDY CARD : Based on DAC-0800 monolithic 8 bit high speed current output DAC.	8
5	Air Hydrometer	4
6	Ampere hourmeter,	4
7	Analog multi metreVoltage. Scales, 0.1, 0.3, 1.0, 3.0, 10, 30, 100, 300, 1000 V. Resistance. (low 4 scales), 100 k-Ohms 316 k-Ohms	6
8	Anjeroid barometers100 mm dial mounted vertically inside the transparent plastic case. In addition to the atmospheric pressure, pressure within the dome should be changed by means of a rubber ball to show how the machine works	3
9	Below &liquid sill drum type flow meter	4
10	Binocular 7*50mm	3
11	Blow lamps 1 pt parafin	4

Sl. No.	Name of the Item	Instrument Mech
12	Bonded and unbonded type microphone.25*0.12tca+SPEOD: 2.5+80*0.12CCA+OD: 5.8 2	4
13	Bourdon tube type gauges of various ranges 50, 63 and 100 mmDial Size : 150 mm Range : 0 – 3.5 kg/ cm2 0 - 7 kg/ cm2 0 - 10 kg/ cm2 0 - 30 kg/ cm2 Accuracy : ± 1 % Bourdon Socket : SS 316 Movement Case : SS 304 Mounting : ½”/ 3/8” BSP (M), Bottom	10
14	Buffing Machine,900mm Spindle3HP, 3 phase, 2800 RPM complete with suitable fabricated heavy duty angle stand with two emery wheel	1
15	Calibrator for PID controller (Pneumatic)Output : 3 – 15 Psig Range : 0 to 10 Psi Proportional : Gain is adjustable from 0.2 to 35 Calibrated Accuracy : Typically<+1.0%,+ 2.0% max. Max.air supply : 30 Psi Reset (Integral) : 0.05 to 200 repeats per minute Action : reverse (Field Reversible) Pneumatic connections : ¼” NPT Bottom connections only Electrical connection : ½” NPT alarm connection Mounting : Panel Ambient Temp. : -29 to 82 C Environmental Protection : IP 54	2
16	Cam and follower mechanism 1" and 1 1/8"	3
17	Camera (SLR) D700	2
18	Camera ,single lens with view finder	2

Sl. No.	Name of the Item	Instrument Mech
19	Capsule type pressure gauges Dial Size : 150 mm Range : 0-200 mm WC 0 – 400 mm WC 0 – 600 mm WC 0 – 1500 mm WC Accuracy : $\pm$ 1 % Sensing Element : Expanding Capsule Case : Cast Aluminum or SS 316 Mounting : $\frac{1}{2}$ " / 3/8" BSP(M), Bottom	6
20	centre zero galvanometer Galvanometer moving coil DC rectangular shape with desk shaped mounting. Sensitivity : 30 – 0 - 30G	8
21	Centrifugal type tachometer.	2
22	Channel 8 analog demultiplexor trainer The 8 channel analog de-multiplexer / decoder trainer should be able to demonstrate the process of de-multiplexing / decoding for 2 channel, 4 channel, 8 channel and 16 channel. The unit should be housed in a powder coated metal cabinet / enclosure with provision for safe keeping of mains cord, patch cords and top lid for protection during storage. A well spread circuit / block layout are provided on the front panel of size 200 mm x 250 mm. All the necessary component / circuits required for the experiments are provided on the panels. The trainer covers all the circuits by solderless inter connections through use of 2 mm brass terminations & patch cords. Various necessary DC regulated power supplies are in built. The unit works on 230 V AC mains.	4

Sl. No.	Name of the Item	Instrument Mech
23	<p>Channel analog multi plexor trainor The 8 channel analog multiplexer trainer should be able to demonstrate the process of multiplexing for 2 channel, 4 channel, 8 channel and 16 channel. The unit should be housed in a powder coated metal cabinet / enclosure with provision for safe keeping of mains cord, patch cords and top lid for protection during storage. A well spread circuit / block layout are provided on the front panel of size 200 mm x 250 mm. All the necessary component / circuits required for the experiments are provided on the panels. The trainer covers all the circuits by solderless inter connections through use of 2 mm brass terminations &amp; patch cords. Various necessary DC regulated power supplies are in built. The unit works on 230 V AC mains.</p> <p>The following experiments should be performed on the unit :</p> <ol style="list-style-type: none"> <li>1. 2 channel multiplexer using TTL / CMOS devices</li> <li>2. 4 Channel multiplexer using TTL / CMOS devices.</li> <li>3. 8 Channel multiplexer using TTL / CMOS devices.</li> <li>4. 16 Channel multiplexer using TTL / CMOS devices.</li> </ol> <p>The unit should also provide the necessary circuits to observe the outputs</p>	4
24	Chronometrice type techometer.	4
25	Comparators.	2
26	Compound microscopoe	2
27	<p>Conductivity Meter</p> <p>Conductivity Range : 0 to 200 m MHO or m S</p> <p>Measuring Accuracy : + or - 1 % of F.S. in all the ranges, + or - 1 count.</p> <p>Display : 2 ½ digit Digital Panel Meter.</p> <p>Conductivity cell : Approx 1.0 cell constant</p> <p>Cell constant : 0.9 to 1.1 compensation</p> <p>Power Requirement : 230 volt + or - 10 %,50 Hz</p>	2

Sl. No.	Name of the Item	Instrument Mech
28	<p>Coriolis mas flow meterMaterial : Stainless Steel            Process Connection : ½” flange/Screw type connection            Calibration Mass flow; Density : 0.5%, 0.01g/cc            Approval : Non-hazardous area            Housing :Compact IP67/ NEMA4X,            Cable Entry : Thread NPT ½            Power Supply : 85-260VAC;            Display : Digital            Out put : 4-20ma            Sump Tank:            Capacity : 100 liter            MOC : SS-304            With ½” drain valve.            Measuring Tank:            Capacity : 50 liter            MOC : SS-304 with self graduated glass tube level Indicator with suitable Cover.            With 1” drain valve and piping leading the water to the sump tank.            Pump:            Type : Monoblock            MOC : SS body            Motor:            MOC : CI/Al/SS Casting            Power : 0.5 HP, Single Phase            With protection cover of MS &amp; bypass, supply valve.            Necessary piping and valves should be provided to supply water to flow meter. The total assembly should be mounted in suitable MS</p>	2
29	<p>D.C regulated power supplies (a) Low tension ser ies (single) (b) Low tension ser ies(dual )            (c )High tension series (d) Multi output series (e)Fixed output series</p>	4

Sl. No.	Name of the Item	Instrument Mech
30	<p>DASThe system should consist of three acrylic tanks connected in series with each other by 1/2" piping. First two tanks should be equipped with level transmitters and the last one should be equipped with a level switch. A SS sump tank of about 100 liters capacity should be provided to store and supply water to the tanks. A ½ HP SS body pump should be provided to pump water from the sump tank to the first tank via a ½" motorized control valve. The motorized control valve is provided with a signal from level transmitter fitted in the second tank. A stand alone PID controller should be included in scope of supply to control level of water in the second tank. The level switch fitted in the third tank shuts off the pump according to the set point. The third tank should drain directly in the sump tank.</p> <p>Tanks:  Nos. : 3  MOC : Acrylic  Diameter : 150 mm  Height : 500 mm  with discharge valve arrangement and ½" interconnecting piping.</p> <p>Electronic Level Transmitter:  Service : Water  Measuring Principle : Capacitance type</p>	2

Sl. No.	Name of the Item	Instrument Mech
31	<p>DC moving coil ammeters ( various ranges )Portable DC moving coil Ammeter laboratory type for horizontal use.            Analog permanent Magnet for measuring DC current for continuous use.            Housed in laminated wooden cabinet size 235 * 200 * 130 mm with detachable lid black bakelite panel fitted with anti – parallax mirror scale, knife edge pointer, rubber footings, locking arrangement and carrying handle.            The movement should be strongly constructed spring loaded sapphire jewel bearings which protect the bearing system from shock and reduce friction to a minimum.            Hardened and precisely ground pivots and chemically treated sturdy coiled phosphor bronze springs should be used.            Zero adjuster is to be accessible from the front.            The movement should be light weight and quick acting and extremely robust. Scale length 150 mm, class of accuracy +1% of FSD.            All the terminals are to be insulated and brought out for easy connection.</p> <p>Ranges:            0 – 1 Amp,            0 – 2 Amp,            0 – 5 Amp,            0 – 10 Amp,            0 – 30Amp</p>	5
32	DC moving coil milli ammeters(various ranges	5

Sl. No.	Name of the Item	Instrument Mech
33	<p>DC moving coil voltmeters( various ranges )Portable DC moving coil Millimeters laboratory type for horizontal use.            Analog permanent Magnet for measuring DC mill ampere current for continuous use.            Housed in laminated wooden cabinet size 235 * 200 * 130 mm with detachable lid black bakelite panel fitted with anti – parallax mirror scale, knife edge pointer, rubber footings, locking arrangement and carrying handle.            The movement should be strongly constructed spring loaded sapphire jewel bearings which protect the bearing system from shock and reduce friction to a minimum.            Hardened and precisely ground pivots and chemically treated sturdy coiled phosphor bronze springs should be used.            Zero adjuster is to be accessible from the front.            The movement should be light weight and quick acting and extremely robust. Scale length 150 mm, class of accuracy +1% of FSD.            All the terminals are to be insulated and brought out for easy connection.</p> <p>Ranges:            0 – 1 m Amp,            0 – 5 m Amp,            0 – 10 m Amp,            0 – 20 m Amp,            0 – 30 m Amp</p>	5
34	DC power supply 0-100 volt, 5 amp	8

Sl. No.	Name of the Item	Instrument Mech
35	Dead weight tester It should consist of frictionless piston (ram) mounted on a rugged base. Effortless screw type operating system. Rotation of the screw should produce the pressure which is to be balanced by precision weights. Range: 0.5 – 30 kg/ cm <sup>2</sup> Step Size: 0.1 kg/ cm <sup>2</sup> Accuracy: 0.2 to 0.1 % Standard Accessories: <ul style="list-style-type: none"> <li>• Accurately Calibrated Weights to cover the entire range with a carrying case</li> <li>• Gauge connection adapters for 1/8", 1/4", 3/8", 1/2" BSPF; 1/2" NPTF, 20 * 1.5 mm on 1/2" BSPF Fitment, Pointer Puller and Pointer Punch, Gauge Opener, Spirit Level, A set of spanners in a tool box, 500 ml SAE 30/ 40 Oil in bottle</li> </ul> One set of spare seals and O ring	1
36	Decade attenuators	4
37	Decade capacitance boxes	4
38	Decade resistance boxes	4
39	Decade voltage dividers	4
40	Deflecting & rotating vane flow meter	4
41	Diaphragm type pressure gauge	4
42	Diaphragm type pressure gauge of various ranges Dial Size : 150 mm Range : 0 kg/ cm <sup>2</sup> to 7 kg/ cm <sup>2</sup> , Dual scale Accuracy : ± 1 % Sensing Element : SS 316 Top & Bottom Chamber : SS 316 Movement Case : SS 304 Mounting : 1/2" BSP(M), Bottom	8
43	Different types of control valves such as gate valves, globe valves, ball valves, diaphragm valves, butterfly valves etc. Electrically actuated, pneumatic actuated & hydraulic actuated	2

Sl. No.	Name of the Item	Instrument Mech
44	<p>Differential pressure transmitter (electronic)</p> <p>a) Diff. Pressure transmitter :</p> <p>Range : 0-20 inch WC equivalent to 500 mm WC</p> <p>Type : Diaphragm</p> <p>Media : Air only</p> <p>Accuracy : <math>\pm 1\%</math> FS</p> <p>Power : 24VDC</p> <p>Output : 4-20 mA</p> <p>Zero &amp; Span Adj : Pot Zero &amp; Span</p> <p>Connection : Barbed, 1/8", 3/16" for flexible tube.</p> <p>(b) Digital indicator</p> <p>Input : 4-20 mA</p> <p>Display Range (O/P) : 0-500 mm WC</p> <p>Resolution : 1 mm WC</p> <p>Accuracy : Better than <math>\pm 0.5\%</math> FSD</p> <p>Supply : 230 VAC</p> <p>(c ) Digital indicator</p> <p>Input : 4-20 mA</p> <p>Output : 4-20 mA</p> <p>Resolution : 0.2 mA</p> <p>(d) Screw Piston type pressure pump</p> <p>Range : 0-1000 mm WC</p> <p>Pressure Adjustment : Coarse &amp; Fine knobs</p> <p>MOC : M.S. painted</p> <p>Whole set-up is mounted on single table stand with working condition</p>	4

Sl. No.	Name of the Item	Instrument Mech
45	Differential pressure transmitter (pneumatic)Pneumatic Flow Transmitter: Measuring Principle : Pneumatic Air Supply : 1.4 Kg/cm <sup>2</sup> Output : 0.2 – 1.0 Kg/cm <sup>2</sup> Diaphragm Material : Stainless Steel Operating : As per System Orifice Plate Assembly: Service : water Max. Temp. : 45 °C Orifice Plate Material : SS 304 Orifice Plate Body : Stainless Steel Orifice Plate Type : Flange Type Pneumatic PID Controller: Input : 0.2 – 1.0 Kg/cm <sup>2</sup> Output : 0.2 – 1.0 Kg/cm <sup>2</sup> Range : 0 – 100 % Scale : For Set Point & Process Control Mode : P + I + D Control Action : Direct / Reverse ( Field Selectable ) Accuracy : Better than 3% Repeatability : Better than 0.6% Max Air Supply : 30 PSi Process Connection : ¼" NPT Air Connection : ¼" NPT Control Valve: Body Type : Globe Valve Nominal Size : 15 mm	4

Sl. No.	Name of the Item	Instrument Mech
46	Digital I/O-CardHMI with Input Output Communication Module Specs: Display Type: 5.7" STN LCD 8 sheds of Blue Resolution: 240 X 320 Pixels Display Size: 115.17 X 86.37mm Operating System: Windows base real time os MCU: 32 bit RISC SD RAM: 16 mb USB for data storage: 1 usb client ver1 Function Key: User Defined key 4 + system key 1 Operating voltage: 24V DC +/- 10~15% Output Communication module with Rs485 /Rs232 Connectivity MODBUS RTU/ASCII Digital Input Card: Isolated Input 8 nos Input Voltage 5 to 30v dc Isolation: 2KV Input Output Isolation Output: Open collector TTL Output Output Switching: Max 36v dc Digital Output Card: Relay Isolated Output 8 nos Signal Voltage 24 vdc +- 15% Isolation: 1KV Signal Output Isolation Output: 1 c/o @230vAC 5A, @120VAC 10A, @24v dc 10A Protection: For reverse voltage serge @ signal Different module working with digital I/O cards (1) Toggle switch with lamp/LED. (2) Level control system Level tank:-	8
47	Drag cup type tachometer.	4
48	Earth insulation tester(megger)	2
49	Electric actuators 60 Hz	2

Sl. No.	Name of the Item	Instrument Mech
50	Electrical techometer.	4
51	<p>Electronic calibrator Display :5 digits, 0.56" LED</p> <p>Measuring &amp; Simulations mode :0 to 20/60 mA, 0 to 20/ 200 m V and 0 to 2/10 VDC</p> <p>Thermocouples : Measuring &amp; Simulations B, E, J, K, R, S &amp; T Type.</p> <p>RTD :Measuring RTD Pt – 100, CU-53 &amp; 2K Ohm and Simulation of RTD Pt-100 by external resistance module</p> <p>Input Impedance :Greater than 10 M Ohm for mV, V, T/C</p> <p>Adjustment :10 turn coarse and fine potentiometer</p> <p>Power Supply :230/110 VAC</p> <p>Battery :Built in 7.2 V, 2 AH Power Pack.</p> <p>Battery Operation :Approximately 6 hours in measurement mode or 4 hours with 20mA output.</p> <p>Accuracy :0.03% FS + 1 count for mV, mA and VDC, 0.5 Deg.C+1 count for E,J,K,T,PT-100, CU-53</p> <p>Resolution :0.1 Deg. C for RTD and T/C, 1 mV for 10 VDC, 1 <math>\mu</math>A for 20 mA.</p> <p>Over Range :25% over range for mV, V and 20 mA.</p> <p>Cold Junction Compensation :Automatic from 0 to 50 Deg. C in both measure and simulation mode. CJC switch off with 0 Deg. C reference provided.</p> <p>Temperature Coefficient :+ 0.002% R dg/oC</p> <p>Sampling Time :400 m sec</p> <p>Accessories :Carrying case, 2 sets test leads, 2 shorting links, RTD simulator module and instruction manual.</p>	2
52	Electronic pressure controller(PID)	2
53	Electronic soldereing iron 6watt	8
54	Eye glass 3" focus watch cmakerv	4
55	Feeler gauge leaf type , 26 blades eng. & metric	2

Sl. No.	Name of the Item	Instrument Mech
56	Float Type Level Indicator Measuring Tape SS 316 Float SS 304 Measuring Range 1 meter minimum Indication scale with 2 – pointer dial Min. reading 1 mm Float Dia. 400 mm Gauge Head 1½” Connection, weather proof IP 55, Aluminum alloy cased housing. Gauge should be mounted on separate panel. Level Tank : 1200 mm height, 700 x 700 mm Area with feed and drain valves. MS Framework to support the assembly.	2
57	Flow nozzle It should have a flange on its upstream face which is to be installed between pipe flanges to hold the nozzle concentric with inside of the pipe. The nozzle flanges should be furnished in raised type of facing. Type : flange MOC : SS-304 Pipe Bore : 50 mm	2
58	Gas Analyser, Any Suitable Type Gas Analyzers measure a specific gas in air or gas mixtures. Gas / range options are available for Oxygen, Carbon Monoxide, Hydrogen Sulphide, Sulphur Dioxide, Nitric Oxide, Nitrogen Dioxide, Chlorine, Hydrogen, Hydrogen Cyanide, Ammonia, Ozone, Ethylene Oxide, Carbon Dioxide, Methane, Hydrocarbon, VOC and other gases on request.	4
59	Gear train mechanism.	3

Sl. No.	Name of the Item	Instrument Mech
60	<p>GLCSThe Gas Chromatograph shall be Microcontroller based system with Modular design with independent Chromatography oven, independent pneumatic module, independent Microcontroller based temperature controller cum programmer module, independent FID Module, independent PC based Data station and also remote display unit for displaying concentration of one key component of the sample via RS 485 port up to distance of 100 meter. Thus, the system shall be like process On-Line Gas Chromatograph. Provision shall also be provided for PTV, Auto GSV, Timer module and cryogenic bath to the make the system truly advanced. It shall be a microcontroller based 24 bit super digital temperature controller cum programmer with control up to 6 independent heated zones.</p> <ul style="list-style-type: none"> <li>• Shall have very large memory for storage in built in the Microcontroller.</li> <li>• Shall give <math>\pm 0.1^{\circ}\text{C}</math> control.</li> <li>• Shall have 100 segment Programming</li> <li>• Shall be able to store up to 100 Method Files.</li> <li>• It shall have a 32 Key Membrane Keypad with large LCD Display of 20 characters x 4 lines.</li> <li>• User settable alarm set points from the keypad.</li> </ul>	4

Sl. No.	Name of the Item	Instrument Mech
61	<p>Helical and turbine flow meter Flow meter type:Turbine Flow range : M3/hr : 0.22 to 2.2 Max temp : 1200C Materials : Body S.S Flanges : ss316 Rotor : ss 316 Bearing : Tungsten Carbide Linearity : +/- 1% Installation : Horizontal Field Electronics: Mounting--- Directly of flowmeter Output— 4-20 mA linear Power supply--- 12 to 28 V DC Storage Tank: Capacity: 80 liter MOC: SS-304 With ½” drain valve of SS. Collection Tank: Capacity: 50 liter MOC: SS-304 with self graduated glass tube level indicator with suitable cover With 1” drain valve and piping leading the water to the sump tank. Pump: Type : Monoblock MOC : SS body Motor: MOC : CI/Al/SS Casting Power : 0.5 HP, Single Phase</p>	4

Sl. No.	Name of the Item	Instrument Mech
62	<p>Hook Type Level Indicator Range : 300 mm</p> <p>Accuracy : ± 0.5 mm</p> <p>Movement : Rack &amp; Pinion</p> <p>Scale : 0-300 mm</p> <p>Hook MOC : Stainless Steel</p> <p>Scale &amp; Body : Chromium Plated Brass</p> <p>Mounting Arrangement: Top</p> <p>Sump Tank:</p> <p>Capacity : 80 liter</p> <p>MOC : SS-304</p> <p>With ½" drain valve of SS.</p> <p>Measurement Tank:</p> <p>Capacity : 50 liter</p> <p>MOC : Acrylic</p> <p>With ½" drain valve and piping leading the water to the sump tank.</p> <p>Pump:</p> <p>Type : Monoblock</p> <p>MOC : SS body</p> <p>Motor:</p> <p>MOC : CI/Al/SS Casting</p> <p>Power : 0.5 HP, Single Phase</p> <p>With protection cover of MS</p> <p>Necessary piping and valves should be provided.</p> <p>Control Panel should consist of MCB for the pump.</p> <p>The total assembly should be mounted in suitable MS framework painted with good quality paint.</p>	4

Sl. No.	Name of the Item	Instrument Mech
63	<p>Hydraulic Trainer The trainer will be made out of fabricated mild steel. Trolley type easy to mobile to the place of demonstration. It will be self – contained to perform various practical and exercises during the training. The trainer will be consisting of power unit, mounted at the bottom side of the trainer unit, hydraulic components with sub plates for easy mounting on the trainer and suitable hydraulic hoses with quick change type of couplings for fast and easy to connect with the components. Suitable electrical cable will be supplied with connections to connect the solenoid of the components. The trainer will be supplied with 2 sets of detailed comprehensive instruction manuals.</p> <p>PLC Specification:            Digital Input: 18            Digital Output: 12            Interface cable RS 232            Memory: inbuilt            Computer : one general purpose computer for interfacing with PLC            Power unit ± operating pressure minimum 30 bars.</p> <p>2. Hydraulic pump ± gear type, 3 to 4 LPM capacities with maximum pressure 140 Bar coupled with motor by suitable coupling.            3. Electric motor – 1 HP, 3<math>\phi</math> 440 V AC, synchronous, 1440 RPM, E – Class,            4. Electrical Control Panel :</p>	4
64	Hydraulic Training Kit	2
65	Hydrometer (LAB & STRONG battery Testing Type	4
66	Impeller type flow meter	8

Sl. No.	Name of the Item	Instrument Mech
67	Inclined limb manometers Casing : MS Casing from three sides and Aluminum cover with transparent Acrylic Front. Metering Tube : Special Uniform bore thick walled Borosilicate Glass Tube Finishing : Body Painted with Industrial Grade Paint/ Powder Coated Packing : Teflon/ Neoprene Scale : Plastic or of SS with marking. Wetted Parts : SS 304 End Connection : ¼" BSP/ NPT (F) or Nozzle Type Mounting : mounting stand having leveling & attached spirit level bulb Arrangement : Drain Plug, Filling Plug, Zero Adjustment Knob, different adjustable Inclination Arrangement Accuracy : + 0.5 % Range : 0-500 mm Fluid : Red Color liquid Accessories : Liquid Filling Funnel, 1 meter long Rubber tubing	3
68	Instrumentation amplifier trainer.	2
69	Instrument Testing Of Cupboards	8
70	Kelvin's bridge trainer Principle of Bridge : Kelvin's Bridge Excitation Signal : 1. DC - +5V 2. AC – 1KHz Sine wave Detector : 1. DC – 31/2 Digit Digital Ammeter 2. AC amplifier and headphone Arms of the bridge : 1. Two arms with Ten turns variable pots with dials for direct reading. 2. One arm with fixed resistances in decades from 1E to 1M. Experiments : 1. Measurement of unknown resistances using DC excitation. 2. DC excitation. 3. Measurement of unknown resistances using AC excitation. Accessories : 1. Jumper links 2. Headphone A e-manual should be supplied along with the kit	2

Sl. No.	Name of the Item	Instrument Mech
71	<p>Level control set-up with level transmitter, level recorder, controller, control valve, complete experimental set-up or level simulator</p> <p>Service : Water</p> <p>Measuring Principle : Capacitance type</p> <p>Range : 0 – 500 mm WC</p> <p>Accuracy : 3%</p> <p>Output : 4-20 mA DC</p> <p>PID Controller:</p> <p>Input : 4 – 20 mA</p> <p>Output : 4 – 20 mA</p> <p>Communication : RS 485 ASCII/ modbus, communication</p> <p>Features : Autotuning, Auto/ Manual Mode Facility</p> <p>Range : Field Settable</p> <p>Display : digital</p> <p>Front Keypad : Membrane Type</p> <p>Accuracy : <math>\pm 1\%</math> Full Scale</p> <p>Power Supply : 230 V AC, 5 amp.</p> <p>Control Valve:</p> <p>Body Type : Globe Valve</p> <p>Nominal Size : 15 mm</p> <p>Stem Diameter : 10 mm</p> <p>Packing : PTFE</p> <p>Body Material : A216 WCB</p> <p>Leakage Rate : IV</p> <p>Bonnet : Standard</p> <p>Actuator:</p> <p>Fail Safe Action : extends</p> <p>Bench Range : 0.2-1.0 bar</p>	2
72	<p>Level measurement equipment by electrical method i.e. conductivity, capacitance probes, sonic level detectors, radar level detectors &amp; point level detectors.</p>	2

Sl. No.	Name of the Item	Instrument Mech
73	<p>Level measurement equipments for solid, Sonic solid level, Microwave, Capacitance probes, Diaphragm switches, Nuclear gauges, Sonic and microwave solid level detectors. The device should combine sensor and electronics in a single package along with desired mounting on tank.</p> <p>Application : Water            Container : MOC : Acrylic                Diameter : 200 mm                Height : 500 mm                With discharge valve arrangement.            Measurement Range : 150 to 450 mm            Accuracy ( in Air) : Better than 0.5 % of target range            Temp. Compensation : Built in            Echo Processing : Sonic Intelligence            Supply Voltage : 18 to 30 V DC, 0.2 Amp max.            Output : 4 to 20 mA Proportional to Level            The system should have separate level indicator on panel.</p> <p>2. CONDUCTIVITY TYPE LEVEL CONTROLLER:</p> <p>Application : Water            Container : MOC : Acrylic                Diameter : 150 mm                Height : 500 mm                With discharge valve arrangement.            Level Switching : At 300 mm            Sensor : Part insulated rod-probe with reference probe connected to controller            Controller : Electronic PCB            Mounting : Control Panel</p>	2

Sl. No.	Name of the Item	Instrument Mech
74	Level transmitter Input : 4 – 20 mA Output : 4 – 20 mA Communication : RS 485 ASCII/ modbus, communication Features : Autotuning, Auto/ Manual Mode Facility Range : Field Settable Display : digital Front Keypad : Membrane Type Accuracy : ± 1% Full Scale Power Supply : 230 V AC, 5 amp	2
75	Lever and linkage mechanism.	3
76	Low pressure measuring gauges such as thermal conductivity gauges ,pirani gauge &melojd gauge	2
77	Magnetic compass	2
78	Magnetic flow meter Flow meter: Measuring Range :5 – 40 LPM Nominal Bore Size: : ½”, ASA 150# Metering Pipe: : SS – 304 Electrode: : SS – 316 Power Supply: : 230 V AC, 50 Hz Accuracy : ± 1.0% of Flow rate Lining : PTFE Electrodes : SS 316 Display : Built in 16 character x 2 lines Alphanumeric display for Flow Rate in : CuM/Hr, LPM, LPS. Size : ½” flanged (MS) It should have µp based Converter and facility to programme flow ranges by magnetic probe. Also the unit of the flow rate should be selectable having flow totalizer, Diagnostic Messages Display & Range Programme selectable Sump Tank: Capacity : 100 liter MOC : SS-304 With ½” drain valve	2
79	Magnifying glass 75 mm	3

Sl. No.	Name of the Item	Instrument Mech
80	Measurement of average voltage trainer	4
81	Measuring microscope& travelling microscope.	2
82	Mercury in steel remote indicating thermometersType : Rigid Stem & Distance (Capillary) Dial Size : 150 mm Accuracy : + 2% of range span Ambient Compensation : with Bi-metal Bulb Stem & Connection : SS 316 Bourdon Material : SS 316 Case & Bezel : Cast Aluminium stove enamelled black/ SS Bulb Dia. : 16 mm Stem Dia. : 9 mm Capillary : Copper / SS 304 / PVC Capillary Immersion Length : Adjustable upto 250 mm Connection : 3/4" BSP (M), Range : 0 – 100 oC	4
83	Monochromatic light source.	2
84	Monocular	4
85	Motorized control valveProduct : Motorized Control valve (servo regulation) Control valve (Linear) : Type: globe valve; Size: 1/2", Input:4 -20 mA, Characteristics: Linear Actuator : AC servo motor, 230 V , 50 Hz AC	2
86	Optical plate.	2

Sl. No.	Name of the Item	Instrument Mech
87	Optical pyrometer with all accessories Type : Rigid Stem & Distance (Capillary) Dial Size : 150 mm Accuracy : + 2% of range span Ambient Compensation : with Bi-metal Bulb Stem & Connection : SS 316 Bourdon Material : SS 316 Case & Bezel : Cast Aluminium stove enamelled black/ SS Bulb Dia. : 16 mm Stem Dia. : 9 mm Capillary : Copper / SS 304 / PVC Capillary Immersion Length : Adjustable upto 250 mm Connection : 3/4" BSP (M), Range : 0 – 100 oC	2

Sl. No.	Name of the Item	Instrument Mech
88	<p>Orifice type flow meter Sump Tank: Capacity : 80 liter MOC : SS-304 With ½" drain valve of SS.</p> <p>Measuring Tank: Capacity : 50 liter MOC : SS-304 with self graduated glass tube level indicator with suitable cover With 1" drain valve and piping leading the water to the sump tank.</p> <p>Pump: Type : Monoblock MOC : SS body Motor: MOC : CI/Al/SS Casting Power : 0.5 HP, Single Phase With protection cover of MS</p> <p>Orifice Meter: Size : Suitable for 1" GI pipeline Dia. Ratio : 0.6-0.64 MOC : SS Body(Rust Proof and Nonmagnetic) With suitable pressure tapings Necessary piping and valves shall be provided to supply water to flow meter. Control Panel shall consist of MCB for the pump. A 750 mm U-tube manometer filled with mercury (200 mm in each limb). The manometer shall be equipped with wooden scale (500 mm) and shall be mounted on wooden board with metal protective cage and necessary air venting system to drive out the air initially present in it. The total assembly shall be mounted in suitable MS framework painted with good quality paint</p>	3
89	Out side micrometer,0-25 mm.,L.E.D./L.C.D. display	3

Sl. No.	Name of the Item	Instrument Mech
90	<p>P to I &amp; I to P Converters The trainer will consist of P to I and I to P transducers. The output of I to P transducer will be given as input of P to I transducer. A pressure gauge (of suitable range) will indicate the output of I to P transducer. Two separate analog current meters (0 - 25 mA) will monitor current of both the transducers. A self-drain type air filter regulator will be provided to supply moisture free air to the trainer at suitable operating pressure required. A variable DC current signal (4 - 20 mA) will be provided to the I to P transducer using an external current source.</p> <p>I to P Transducer :</p> <p>Principle : Force Balancing</p> <p>Input : 4 - 20 mA.</p> <p>Output : 3 - 15 psig</p> <p>Air Supply : 25 psig</p> <p>Connection : ¼" NPT (Pneumatic), ½" NPT</p> <p>P to I Transducer :</p> <p>Principle : Piezo Resistive Measurement</p> <p>Range : 0 -15 psig / 0 - 1.0 kg / cm<sup>2</sup></p> <p>Zero and Span Adjustments Process</p> <p>Connection : ¼" BSP (M) thread</p> <p>Output : 4 - 20 mA, 2 wire operation</p> <p>Power Supply : 0 - 36 V DC</p> <p>Current Source :</p> <p>Type : Digital</p>	2

Sl. No.	Name of the Item	Instrument Mech
91	<p>PH Indicator pH Range : 0 – 14 pH            Millivolt Range : 0 - + 1999 mV            Standardization Range : + 2 pH approx.            Temp. Compensation : 0 to 100 oC (manual) Display : 4 – digit LED with automatic polarity &amp; decimal point; mode annunciation by LED lamps            Slope Correction : 80 % to 105 %            Repeatability : + 0.01 % pH + 1 digit; + 1 mV + 1 digit            Resolution : 0.01 pH; 1 mV            Polarizing Current : 10 microampere            Power : 230 V + 10 % , 50 Hz.            Accessories : A pair of electrodes or combined (glass and calomel) with stand and manual</p>	2
92	<p>Pitot tube flow meter The equipment shall comprises Perspex, long smooth walled pipe (100 mm Dia.) connected to the suction of an electrically driven blower (1 H.P.). The blower discharge pipe terminates in a flow control damper for closed conduit work. Boundary layer growth shall be able to determine by the measurement of the velocity profile at different stations along the pipe using a traversing Pitot tube.            Pressure measurements shall be done on an inclined cum vertical manometer mounted on the support frame. Pitot tube with static pressure tap and dynamic pressure tap shall be placed in the pipe with a flexibility to travel across the cross section of the tube. The impact and static end of the tube are to be connected to a manometer.            Pitot Tube:            MOC : Stainless Steel 304            Range : 300 mm            Pressure Connection : ¼” BSP (M)            End Connection : 1/8” BSP (F) with suitable nozzle for rubber tubing            Manometer:            Type : Inclined cum Vertical            Scale : Engraved on milky white PVC with black figures.</p>	2
93	Pneumatic and electronic recorders(single point and multi poin both circular and strip chart types)	6
94	Pneumatic realy calibrator	2

Sl. No.	Name of the Item	Instrument Mech
95	Pneumatic & hydraulic actuators Travel : 20 mm Type : Diaphragm (Nylon impregnated Neoprene Rubber)/( 75 X 100 mm) Air Pressure : 3-15 PSI Input air pressure : 20PSI  Transducer : Input : 4-20 mA. Output : 3-15 PSI External mA source : Size 96 x 96 Display : Digital	2

Sl. No.	Name of the Item	Instrument Mech
96	Pneumatic calibrator Type : microprocessor based with 8K memory Pressure range : 0 – 150 psig Display : simultaneous pressure and electrical on a two – line a pneumatic LCD display Resolution : 100000 counts Accuracy : Pressure Accuracy 15 PSI to 3000 PSI $\pm$ 0.025% FS 5, 5000 and 10000 PSI $\pm$ 0.035% FS DC Measurement Accuracy mA $\pm$ 0.015% of rdg $\pm$ 0.002mA Volts $\pm$ 0.015% of rdg $\pm$ 0.002V Temperature(RTD) Accuracy RTD $\pm$ 0.015% of rdg $\pm$ 0.02 ohms or $\pm$ 0.1°C at 0°C for Pt100 Electrical ranges : 24 mA OR 30 VDC Operating temp. range : -10 to 50 Deg C, effect on accuracy: None, over operating range Pressure connection : 1 / 8'' (F) NPT 316 SS Battery : NiCad (four AA cells)>35 hours nominal, rechargeable Battery check : Low battery indication above 60 minutes before the battery voltage get too low. Zero offset : through key pad to eliminate zero offset % error display : Calibrator should have ability to display input versus output as a % error Trip detect : Calibrator should be monitor a significant change of state and will freeze the last pressure measurement on the	2
97	Pneumatic indicating controller(PID)	4
98	Pneumatic regulator with filter & input & output gauges	4

Sl. No.	Name of the Item	Instrument Mech
99	<p>Pneumatic Trainer The trainer should be made out of Trolley type easy to mobile to the place of demonstration. It should self-contained to perform various practical and exercises during the training. The trainer should supply with reciprocating type air compressor Unit, pneumatic components with for easy mounting on the trainer and suitable flexible pipe of polyurethane material with push to fit type of connectors for fast and easy to connect with the components. The trainer should supply with 2 sets of comprehensive instruction manuals. Air compressor unit operating pressure should minimum 4 bar. All pneumatic components should mounted on aluminum profile plate having size of 900*540 mm approx.. All pneumatic components should have push type base plate for easy to mount &amp; remove on profile plate. Whole assembly should mount on M.S. table type stand with small compartment for putting of all pneumatic components.</p> <p>1. Compressor: Reciprocating type, max, pressure 7 bar driven by electric motor by suitable V belt. Suitable suction filter will be provided at the Inlet manifold.</p>	4
100	Potentio meter thermo couple test set	2
101	<p>Precision air filter regulator with input &amp; output gauges Fluid Application : Air</p> <p>Size : ¼ “</p> <p>Input Pressure : 0 – 10 Kg/Cm2</p> <p>Output Pressure : 0 -7 Kg/Cm2</p> <p>Filter : 25 micron</p> <p>Input Pressure Gauge : 0-10 Kg/Cm2 bourdon tube type</p> <p>Output Pressure Gauge : 0 -7 Kg/cm2 bourdon tube type</p>	2
102	Pressure regulators with filter and input&output gauges	2
103	Pressure switches of various ranges	8
104	Pressure Transducers training kits(a)Potentiometer,(b)Capacitive,(c)Reluctive,(d)Strain gauge ,(e)LVDT,(f)Lad cell,(g)Piezoelectric type ,(h)Servo type	2
105	Prismatic compass	3

Sl. No.	Name of the Item	Instrument Mech
106	Pump for flow ,sustion 1.5m& discharge 3mType :Centrifugal Pump No. of Stages :One Power :Connected to 1.0 H.P Motor Size :25 mm Max. Head :8 meter Max. Flow :100 LPM Material of Construction for Pump: Pump Casing :Close Grained Cast iron Impellers :Cast iron Shaft : Carbon Steel	2
107	Radius gauge leaf type 1 to 15mm	1
108	Real PID controller-training kitThe setup should consist of a insulated heating tank (5 liter, SS 304 , insulated) heated with the help of thyristorized heater (1.0 kW capacity) and the flow rate of the water can be measured with the help of a Rotameter (10-100 LPH capacity). Temperature of the heated water is to be sensed by temperature sensor (RTD PT-100 type) Sensed temperature is transmitted to the PID temperature controller. The heating tank should also consists of stirrer with gear motor with variable speed. Pump: Type : Monoblock MOC : SS body	2
109	Reciprocating piston type flow meter	8
110	Resistance bulb wheatstone bridge typeResistance Bulb Thermometer : Pt – 100 Accuracy : Class A Insulation : Mineral insulated Terminal Block : 4 wire termination in ceramic terminal block provided in cast Aluminium Block Length : 200 mm	4
111	Ring balanced flow meter	2
112	Ring balanced type manometer	4
113	Ring gauge.	2

Sl. No.	Name of the Item	Instrument Mech
114	RotameterRange : 3 - 30 LPM Wetted Parts : SS 304 Float: SS 304 Flange: SS 304 Metering tube: Borosilicaye tapered glass tube Gland Packing: Teflon Scale: PVC engraved on scale Casing: MS Powder coated with front & back covered with transperant acrylic/ glass End connection: 1" Inlet: Bottom Outlet: Top Valve: Integral Type	2
115	Rotational/Velocity Instruments	2
116	Screw pitch gauge B.A & metric each	2
117	Sector-pinion mechanism.	3
118	Sight Glass Level IndicatorHousing: Metal Cover for glass protection Gauge Glass: Heavy Walled Borosilicate 10 mm Size: 0 – 400 mm Scale: marked linearly for level values in mm Isolating Valve, Drain Valve ½" Size, SS 304	4
119	Simple tank type quantity meter	4
120	Sine bar 125mm plate	2
121	Sling Psychrometer Hygrometer	4
122	Speedometers(at last four different popular make )with adoptersof various sizes.	8
123	Spirit level metal 100mm	4
124	Sttem and dial type bimetallic thermometer (various ranges)	6
125	Sychron scope	2

Sl. No.	Name of the Item	Instrument Mech
126	<p>Tapered tube flow meter Sump Tank: Capacity : 80 liter MOC : SS-304 With ½” drain valve of SS. Measuring Tank: Capacity : 50 liter MOC : SS-304 with self graduated glass tube level indicator with suitable Cover. With 1” drain valve and piping leading the water to the sump tank. Pump: Type : Monoblock MOC : SS body Motor: MOC : CI/Al/SS Casting Power : 0.5 HP, Single Phase With protection cover of MS Rotameter: Range : 3 – 30 LPM Wetted Parts : SS 304 Float : SS 304 Flange : SS 304 Metering tube : Borosilicaye tapered glass tube Gland Packing : Teflon Scale : PVC engraved on scale Casing : MS Powder coated with front &amp; back covered with transparent acrylic/ glass End connection : 1” Inlet : Bottom Outlet : Top Control Panel should consist of MCB for the pump.</p>	1
127	Telescope (astronomical)	2
128	Telescope (gallellian)	2
129	Temperature Transmitter Card	8

Sl. No.	Name of the Item	Instrument Mech
130	<p>Temperature transmitter electronicPT100 IS THE COMMON ABBREVIATION FOR THE MOST COMMON TYPE OF RESISTANCE TEMPERATURE SENSOR USED IN INDUSTRY. IT HAS A SPECIFIED RESISTANCE OF 100.00 OHMS AT 0°C AND IS MADE OF PLATINUM WHICH HAS AN ACCURATELY DEFINED.</p> <p>TECHNICAL SPECIFICATION:</p> <p>Type : RTD PT 100</p> <p>Range : 0-200°C with</p> <p>Steam diameter : 8 mm</p> <p>Length : 200 mm with head mounted transmitter.</p> <p>I/P : RTD</p> <p>Transmitter o/p : 4-20 mA, panel mounted</p>	4

Sl. No.	Name of the Item	Instrument Mech
131	<p>Temperature transmitter, pneumatic(input RTD, Tcor bulb)The setup should consist of insulated jacketed tank (5 liter, SS 304) heated with the help of steam and the flow rate of the water can be measured with the help of a Rota meter. The temperature of the heated water should be sensed by temperature bulb and steam should be controlled using pneumatic control valve to maintain the temperature in the tank. The pneumatic temperature controller should act to vary the flow of steam for controlling purpose. The heating tank should also consists of stirrer and motor for uniform distribution of temperature in the tank.</p> <p>Pneumatic PID Controller:  Range : 0 1000C  Output : 0.2 1.0 Kg/cm<sup>2</sup>  Type of thermal systems : Mercury Filled  Ambient temperature compensation: Required  Max. Air Supply : 30 psi  Action : Direct / Reverse (Field Selectable)  Process Connection : 3/4" NPT  Thermo well : Required  Air Connection : 1/4" NPT  Control Valve:  Service : Steam  Nominal Size : 15 mm  Stem Diameter : 10 mm  Packing : PTFE  Actuator:</p>	4
132	<p>Thermocouple type pyrometer with milivolt potentiometer for testing pyrometerIt should consists of portable potentiometer for calibrating thermocouple type Pyrometer with in-built battery (dry cell) and galvanometer with resolution of 10 <math>\mu</math>V. A mercury filled glass thermometer for measuring room temperature for reference junction compensation to be supplied with the unit. It should also consists of Programmable Digital Indicator (Pyrometer), having Front Size 96 * 96 mm with + 0.5 % Accuracy. It should have facility to select mV range &amp; thermocouple type (J, K, E &amp; N) ranges, oC/ oF Unit, with in – built automatic reference junction compensation (for thermocouple inputs). The unit should supplied with instruction manual for Portable Potentiometer, Digital Indicator and calibration of thermocouple Pyrometer with different thermocouples inputs using mV source of portable Potentiometer.</p>	2

Sl. No.	Name of the Item	Instrument Mech
133	<p>Thermocouple type pyrometer with milivoltmeter (with different types of thermocouples, thermowells with compensating cables) It should consist of a 5-liter SS water bath with 1 kw Heater and full three term Digital PID Controller to control the temperature of the bath with necessary thyristor drive. A 1/10 HP gear motor with agitator also mounted on the same unit for the stirring of the water inside bath for uniform temperature distribution. Different thermocouple type J, K, E &amp; N with its construction drawing, mV Vs Temperature Table and its calibration procedure are also included in scope of supply. It should also consist of Programmable Digital Indicator (Pyrometer), having Front Size 96 * 96 mm with + 0.5 % Accuracy. It should have facility to select mV range &amp; thermocouple type (J, K, E &amp; N) ranges, oC/ oF Unit, with in – built automatic reference junction compensation (for thermocouple inputs). The unit should be supplied with instruction manual for Digital Indicator and calibration of different types of thermocouples using Digital Indicator (Pyrometer)</p>	2

Sl. No.	Name of the Item	Instrument Mech
134	<p>Trainer on C.R.O. Bandwidth : DC-10 MHz (-3dB)</p> <p>Risetime : 35 ns (approx.)</p> <p>Deflection coefficients : 12 calibrated steps 5mV/div-20V/div(1-2-5 sequence)</p> <p>Accuracy : <math>\pm 3\%</math></p> <p>Input Impedance : 1 M    25 pF (approx.)</p> <p>Input coupling : DC-AC-GND</p> <p>Input voltage : Max. 500 V (DC + Peak AC)</p> <p>Timebase</p> <p>Time coefficients : 18 calibrated steps, 0.5 s/div - 0.2s/div (1-2-5sequence) with variable control to 0.2 s/div</p> <p>Accuracy : <math>\pm 3\%</math> (in cal position)</p> <p>Trigger System</p> <p>Modes : Automatic or variable trigger level</p> <p>Slope : Positive or Negative</p> <p>Coupling : AC, line</p> <p>Trigger Bandwidth : 2 Hz - 30 MHz</p> <p>Trigger Sensitivity : int. 5 mm.</p> <p>Horizontal Deflection (X)</p> <p>Bandwidth : 1 Hz to 1 MHz (-3 dB)</p> <p>Deflection Sensitivity : Approx. 0.6 V/div.</p> <p>Input Impedance : 1 M    25 pF</p> <p>Component Tester</p> <p>Test Voltage : Max 8.6 V rms (Open)</p> <p>Test Current : Max 28 mA rms</p> <p>Test Frequency : (Shorted) 50 Hz.</p> <p>Test Connections : 2 banana jacks 4mm. One test lead is grounded (Safety Earth)</p> <p>General Information</p> <p>Cathode Ray Tube : 70 mm medium short persistence</p>	4

Sl. No.	Name of the Item	Instrument Mech
135	<p>Trainers on basic digital electronics , i.e. logice gates , boolean expression , adder, subtractor, flip-flop, counter , register , coverter etc.The Digital IC Trainer is intended for elementary as well as advance training of digital electronics. The trainer should cover regular digital circuits by solder less inter connections through use of 2 mm brass terminations &amp; patch cords. Various clock generators, logic level input / output indicators &amp; DC regulated power supply should be in built. The unit should be housed in a powder coated metal enclosure with provision for safe keeping of mains cord, patch cords and top lid for protection during storage.</p> <p>Also CAT software with animations should be provided. The software should cover digital electronic concepts from gates to design issues and should be able to be used as a reference and should contain designs of common electronic circuits and K maps. It should have over 350 animations with an in built dictionary of over 250 words and also have down loading and printing options with voice / sound overlay. The software should cover :</p> <p>1. Basic concepts of digital electronics.</p>	4
136	<p>Trainers on linear ckt i.e. operational amplifiersThe OP-AMP Trainer should be a modular, comprehensive and self-contained system suitable for students to perform experiments on operational amplifier. All necessary equipments for electronic circuit experiments such as power supply, function generator, analog and digital meters should be provided on the main unit. All the necessary components / circuits required for the experiments should be provided on the panels of various modules. The trainer should cover all the circuits by solder less interconnections though use of 2mm brass terminations and patch cords. All experiments provided should include theory, aim apparatus required, procedure, observation table, formulas and graph. 8 bit DIP switch should be provided for fault insertion in the experiments module. The trainer should be housed in an elegant powder coated metal cabinet. The complete trainer modules should be able to actually perform the following experiments on :</p> <p>* Study and verify the Transistor Differential Amplification Circuit, Characteristics of Operational Amplifiers such as Input Impedance Measurement, Output Impedance Measurement, Bandwidth Measurement, Slew Rate Measurement, Offset Voltage Measurement (</p>	4

Sl. No.	Name of the Item	Instrument Mech
137	<p>Trainers on microphone The microphone trainer should be completely self - contained stand - alone unit. It should be designed for educational &amp; experimenting purpose. It should demonstrate the principle &amp; working of various microphones, including Cordless Microphone and should have self monitoring &amp; recording facility. The facility should consist of A to D conversion, LCD display, keyboard, printer port, PC serial interfacing, storage of data and polar plot drawing facility. 4 mm brass terminals of 20 mm length as test points &amp; connectors is provided at various stages in the circuit to observe and record the waveforms and voltages. It should be housed in an elegant metal cabinet with a well spread intelligently designed layout on the front panel. An exhaustive and skill oriented comprehensive instructing manual complete with theory and operating details should be provided. Complete set up to plot the polar diagram of the various microphone should be provided.</p> <p>The complete system should consist of :</p> <ol style="list-style-type: none"> <li>1. Three different Microphones including cordless mic.</li> <li>2. One loudspeaker.</li> </ol>	3
138	<p>Trainers on oscillators &amp; multi vibrators &amp; generators , integatros , trigors &amp; other wave shping ckts .The Oscillators &amp; generators Trainer should be a modular, comprehensive and self-contained system suitable for students to perform experiments on various discrete devices such as BJT, DIAC, FET, UJT, MOSFET, SCR, TRIAC etc.. All necessary equipments for electronic circuit experiments such as power supply, function generator, analog and digital meters should be provided on the main unit. All the necessary components / circuits required for the experiments should be provided on the panels of various modules. The trainer should cover all the circuits by solderless interconnections though use of 2mm brass terminations and patch cords. All experiments provided should include theory, aim apparatus required, procedure, observation table, formulas and graph. 8 bit DIP switch should be provided for fault insertion in the experiments module. The trainer should be housed in an elegant powder coated metal cabinet. An analog software featuring Interactive laboratories, Complete Circuit simulation based on SPICE 3F4, Full audio commentary, Supervisors' notes and worksheets included, links to Electronics Workbench circuits included, works with both ANSI and DIN symbols</p> <p>The complete trainer modules should be able to actually perform the following experiments on :</p>	6

Sl. No.	Name of the Item	Instrument Mech
139	<p>Trainers on transistor amplifier ckt at least one each for all types of amplifiers. The Transistorised Amplifier Trainer should be a modular, comprehensive and self-contained system suitable for students to perform experiments on amplifiers using transistors. All necessary equipments for electronic circuit experiments such as power supply function generator, analog and digital meters should be provided on the main unit. All the necessary components / circuits required for the experiments should be provided on the panels of various modules. The trainer should cover all the circuits by solder less interconnection through use of 2mm brass terminations and patch cords. All experiments provided should include theory, aim apparatus required, procedure, observation table, formulas and graph. 8 bit DIP switch should be provided for fault insertion in the experiments module. The trainer should be housed in an elegant powder coated metal cabinet.</p> <p>An analog software featuring Interactive laboratories, Complete Circuit simulation based on SPICE 3F4, Full audio commentary, Supervisors' notes and worksheets included, links to Electronics Workbench circuits included, works with both ANSI and DIN symbols</p>	6
140	<p>Trainers on transistor of all types The Trainer on Transistor should be modular system. The module should be housed in a powder coated metal cabinet / enclosure with provision for safe keeping of mains cord, patch cords and top lid for protection during storage. A well spread circuit / block layout should be provided on the front panel of size 200 mm x 250 mm of module. All the necessary component / circuits required for the experiments should be provided on the panels of module. The trainer should cover all the circuits by solderless inter connections through use of 2 mm brass terminations &amp; patch cords. Various necessary AC, DC regulated power supplies are in built. Each module works on 230 V AC mains.</p> <p>A simulation software featuring Interactive laboratories should be provided. Complete Circuit simulation based on SPICE 3F4 should be provided that allows students to experiment and simulate over 50 pre designed circuits. Full audio commentary should be provided. Links to Electronics Workbench circuits should be provided. It should work with both ANSI and DIN symbol systems. The software should work on Win 98/ME/2K/NT/XP with only HTML Browser required. (Internet Explorer 5.0 or later recommended). The</p>	3
141	Training Kit on how microprocessors function	2
142	Training kits for thermal transducers	2
143	Training kits or trainers as available on microprocessors applicable to process control and Instrumentation	2
144	Transistor curve tracer	2
145	Transistor testor	1
146	Tube bender	1
147	Tube cutter	1

Sl. No.	Name of the Item	Instrument Mech
148	U TUBE Manometers Casing : MS Casing from three side and Aluminum cover with transparent Acrylic Front. Metering Tube : Special Uniform bore thick walled Borosilicate Glass Tube Finishing : Body Painted with Industrial Grade Paint/ Powder Coated Packing : Teflon/ Neoprene Scale : Plastic or of SS with marking. End Connection : ¼" BSP/ NPT (F) or Nozzle Type Mounting : wall mounting Arrangement : Zero Adjustment Knob for Scale Accuracy : + 0.5 % Range : 250-0-250 mm Fluid : Mercury – filled equally in each limb Accessories : Liquid Filling Funnel, 1 meter long Rubber tubing	3
149	Universal scribing block 250mm pillar	2
150	Vaccum gauge ,100mm,dial bourdon tube type	4
151	Vacuum tester with pump	2
152	Valve positioners,booster relays,gland packings etc	2
153	Vapour pressure thermometerType : Rigid Stem and Distance (Capillary) Dial Size : 150 mm Accuracy : + 3 % of range span between30 –100% Bulb Steam & Connection: Stainless Steel 304/316. Case & Bezel : Cast Aluminium stove enamelled black weather proof case/ SS Bulb Dia. : 12 mm Stem Dia. : 8 mm Immersion Length : Adjustable upto 250mm Connection : ½" BSP (M) Range : 0 – 100Deg. C Capillary : Copper/SS 304/ PVC Capillary.	3

Sl. No.	Name of the Item	Instrument Mech
154	Various types of thermocouples with lead wires Type : Rigid Stem & Distance (Capillary) Dial Size : 150 mm Accuracy : + 2% of range span Ambient Compensation : with Bi-metal Bulb Stem & Connection : SS 316 Bourdon Material : SS 316 Case & Bezel : Cast Aluminium stove enamelled black/ SS Bulb Dia. : 16 mm Stem Dia. : 9 mm Capillary : Copper / SS 304 / PVC Capillary Immersion Length : Adjustable upto 250 mm Connection : 3/4" BSP (M), Range : 0 – 100 oC	14

Sl. No.	Name of the Item	Instrument Mech
155	<p>Ventury tube flow meter</p> <p>Sump Tank: Capacity: 80 liter MOC: SS-304 With ½” drain valve of SS.</p> <p>Measuring Tank: Capacity: 50 liter MOC: SS-304 with self graduated glass tube level indicator with suitable cover With 1” drain valve and piping leading the water to the sump tank.</p> <p>Pump: Type : Monoblock MOC : SS body Motor: MOC : CI/Al/SS Casting Power : 0.5 HP, Single Phase With protection cover of MS</p> <p>Venturimeter: Size: Suitable for 1” GI pipeline Dia. Ratio: 0.6-0.64 MOC: Brass With suitable Pressure tapplings</p> <p>Necessary piping and valves should be provided to supply water to flow meter. Control Panel should consist of MCB for the pump. A 750 mm U-tube manometer filled with mercury (200 mm in each limb). The manometer should be equipped with wooden scale (500 mm) and should be mounted on wooden board with metal protective cage and necessary air venting system to drive out the air initially present in it. The total assembly should be mounted in suitable MS framework painted with good quality paint</p>	1

Sl. No.	Name of the Item	Instrument Mech
156	Vibrating reed freq. meter Vibrating Reed Frequency Meter 96 mm square flush mounting type or 144 mm square flush mounting type. Operating voltage 240 volts or 415 volts Range 45 – 50 – 55 Hz 13 reeds Mode of indicator should be by vibration reeds	4
157	Vibrometer sensing elements.	6
158	Volt meter dynamo meter type ac/dc Portable electro-dynamometer type voltmeter for measuring AC as well as DC voltages laboratory typed for horizontal use, housed in laminated wooden cabinet size 235 * 200 * 180 mm with detachable lid black bakelite panel fitted with anti – parallax mirror scale knife edge pointer, rubber footings, locking arrangement and carrying handle. The movement should be strongly constructed spring loaded sapphire jewel bearings which protect the bearing system from shock and reduce friction to a minimum. Hardened and precisely ground pivots and chemically treated sturdy coiled phosphor bronze springs should be used. A very efficient system of damping should be employed. Zero adjuster is to be accessible from the front. Scale length 150 mm, class of accuracy +1% of FSD. All the terminals are to be insulated and brought out for easy connection. Ranges: 0 – 500 V AC, DC	6
159	Volt meter induction type	6

Sl. No.	Name of the Item	Instrument Mech
160	<p>Voltage controlled oscillator trainer The Voltage Controlled Oscillator trainer should demonstrate the principle of working of a VCO using Transistor, opamp and dedicated IC. It should be able to provide a comparative study of voltage controlled oscillator parameters like input dc voltage range, output frequency range, for the above mentioned different circuits. A digital LCD display should be provided to measure the both the input DC voltage and VCO output frequency. The required dc input should be provided. The trainer covers all the circuits by solder less inter connections through use of 2 mm brass terminations &amp; patch cords. The module should be housed in a powder coated metal cabinet / enclosure with provision for safe keeping of mains cord, patch cords and top lid for protection during storage. A well spread circuit / block layout should be provided on the front panel of size 200 mm x 250 mm of module.</p> <p>The module should be able to actually perform the following experiments on :</p> <ul style="list-style-type: none"> <li>* Study of Voltage controlled oscillator using transistor circuit and plot the graph of input DC voltage v/s output frequency.</li> <li>* Study of Voltage controlled oscillator using opamp circuit and plot the graph of input DC voltage v/s output frequency.</li> </ul>	2
161	<p>Watt meter ,dynamometer type It should work on the principle of electro - dynamometer type for wattmeters.</p> <p>Portable dynamometer single phase, single element wattmeter housed in laminated wooden cabinet size 235 * 200 * 180 mm with detachable lid black bakelite panel fitted with anti – parallax mirror scale knife edge pointer, rubber footings, locking arrangement and carrying handle.</p> <p>The movement should be strongly constructed spring loaded sapphire jewel bearings which protect the bearing system from shock and reduce friction to a minimum.</p> <p>Hardened and precisely ground pivots and chemically treated sturdy coiled phosphor bronze springs should be used.</p> <p>A very efficient system of damping should be employed.</p> <p>Zero adjuster is to be accessible from the front.</p> <p>Scale length 150 mm, class of accuracy +1% of FSD.</p> <p>All the terminals are to be insulated and brought out for easy connection.</p> <p>Range: 10 Amp &amp; 250 V</p>	6
162	<p>Well type manometer Range : 0-500 mm Fluid : Mercury End Connection :Grooved for easy attachment</p> <p>Single glass tube should be housed in a MS powder coated cabinet with draining, charging and zero adjustment facility. One side of the cabinet should be Perspex and scale should be provided in side the cabinet.</p>	4
163	Wet & DRY BULB THERMOMETER Hygromerer	4

Sl. No.	Name of the Item	Instrument Mech
164	<p>Wheatstone's bridge trainer The Wheat Stone's Bridge Trainer should be able to measure the unknown resistance using both AC as well as DC Excitation source. The Wheat Stone's Bridge Trainer should be modularly designed and should be a self - contained system. The trainer should have builtin AC and DC Excitation sources. The required detector should also be builtin. All the terminations should be provided on 4 mm sturdy brass terminals, fitted on front panel with powder coated metal enclosure for longer life.</p> <p>Technical Specifications Principle of Bridge : Wheat stone's Bridge Excitation Signal : 1. DC - +5V 2. AC – 1KHz Sine wave Detector : 1. DC – 31/2 Digit Digital Ammeter 2. AC amplifier and headphone Arms of the bridge : 1. Two arms with Ten turns variable pots with dials for direct reading. 2. One arm with fixed resistances in decades from 1E to 1M. Experiments : 1. Measurement of unknown resistances using DC excitation. 2. Measurement of unknown resistances using AC excitation. Accessories : 1. Jumper links 2. Headphone</p>	2
165	Wire type strain gauge.(bonded &unbonded).	8
	<b>TOTAL =</b>	<b>592</b>

**LIST OF SPECIAL ACESSORIES FOR EXISTING & NEW TRADES  
ITI, Rourkela (Package No.12)**

Sl. No.	Name of the Item	AOCB	LACP	Total Qty.
1	Apparatus for distilling or deminearlising water		1	1
2	Asbestos wire gauge		30	30
3	Bar type torque wrench max, reading 100 ft. lbs.	1		1
4	Beakers 100 ml		48	48
5	Beakers 1000 ml		12	12
6	Beakers 2000 ml		3	3
7	Beakers 250 ml		48	48
8	Beakers 600 ml		24	24
9	Beakers400 ml		48	48
10	Boiling flasks with round bottom 100 ml		24	24
11	Boiling flasks with round bottom 250 ml		24	24
12	Boiling flasks with round bottom 500 ml each destilling flasks 50 ml, 100ml, 250 ml.		12	12
13	Boiling flasks with round bottom 500 ml each destilling flasks 50 ml, 100ml, 250 ml.wirtz and others		24	24
14	Bottles for solids 100 ml		36	36
15	Bottles for solids 50 ml		6	6
16	Bottles for solutions 100 ml.		200	200
17	Bottles solutions 1000 ml.		24	24
18	bottles solutions 2000 ml.		24	24
19	Bottles solutions 250 ml.		72	72
20	Bottles solutions 3000 ml.		12	12
21	Bottles solutions 5000 ml.		6	6
22	Bottles solutions 5000 ml.		6	6
23	Bottles with droppers for indicator solutions and semi-micro qualitative annlysis 30 ml.		72	72
24	Bottles with droppers for indicator solutions and semi-micro qualitative annlysis 50 ml.		72	72
25	Burretes 100 ml		6	6
26	Burretes 25 ml		24	24
27	Burretes automatic 25 ml		10	10

Sl. No.	Name of the Item	AACP	LACP	Total Qty.
28	Burretes Micro 2 ml		15	15
29	Burretes Micro 5 ml		15	15
30	Burretes50 ml		12	12
31	Cast iron came back straight edges 3 ft. and 5 ft.	1		1
32	Co2 determination apparatus (Schrotter)		6	6
33	Cold set rotted	2		2
34	Condensore speral type 20 cm long		6	6
35	Condensors bolb types 30 cm long		6	6
36	Condensors liebong 30 mm long		24	24
37	Condensors liebong 50 cm long		12	12
38	Connecting tubes for kjeldahl distillation		24	24
39	Core hardness tester		1	1
40	Cork rings 1.25"		24	24
41	Crucible nickel $\varnothing$ 30 mm , height 40 mm, rables brushes liquid soap, acid cleaning mixture for glassware, glass wool etc.		6	6
42	Crucibles porcelain $\varnothing$ cm, height 4 cm, indigenous		60	60
43	Crucibles quarts $\varnothing$ cm height 4 cm indigenous		24	24
44	Dishes evaporating $\varnothing$ 10 cm flate bottom		24	24
45	Dishes evaporating $\varnothing$ 15 cm		12	12
46	Dishes evaporating $\varnothing$ 20 cm		6	6
47	Dishes evaporating $\varnothing$ 5 cm Porcelain, glass		12	12
48	Dishes evaporating $\varnothing$ 7.5 cm		24	24
49	Distillation columns 20-30 cm long		12	12
50	Drying tubes with one bulb		12	12
51	Each Pippetes automatic 1,2,5,10 ml		3	3
52	Edge Smoother	1		1
53	Equal angle cutter 45 deg.. 60deg., 90deg.	2		2
54	Erlenmeyer flasks 500 ml.		24	24
55	Erlenmeyer flasks 250 ml.		48	48
56	Filtering 0,1,2,3 glass		6	6

Sl. No.	Name of the Item	AACP	LACP	Total Qty.
57	Filtering flasks 1000 ml.		24	24
58	Filtering flasks 250 ml.		24	24
59	Filtering flasks 500 ml.		24	24
60	Flask for distilled water 500 ml		30	30
61	Flasks khe Jel dahal 250 ml.		48	48
62	Flasks soxleth with condensors		12	12
63	Flat rammer 75 mm x 25 mm hight	1		1
64	Funnels Buchher different sizes Ø 10-25 cm		6	6
65	Funnels Ø 4 cm		24	24
66	Funnels Ø 9 cm		24	24
67	Funnels for filter crucible and Gooch crucibles with rubber rings		24	24
68	Funnels Hirsch		6	6
69	Funnels Separatory 100 ml		12	12
70	Funnels Separatory 250 ml		12	12
71	Funnels Separatory 50 ml		12	12
72	Funnels Separatory 500 ml		6	6
73	Funnels with reguler and long stem Ø 7 cm		24	24
74	Gas generator (Kipp) 500 ml.		5	5
75	Gas siampling tubes		12	12
76	Gas Washing bottles (Dreshsler)		24	24
77	Glass tubes and rods of different diameter		100	100
78	Gloves pairs (for welders)	4		4
79	Goggles pairs welders 4"/10 cm	4		4
80	Gooch porcelain or glass		48	48
81	Measuring cylinders 100 ml		24	24
82	Measuring cylinders 1000 ml		16	16
83	Measuring cylinders 250 ml		24	24
84	Measuring cylinders 50 ml		24	24
85	Measuring cylinders 500 ml		12	12
86	Mixer-settler type extractor	1		1

Sl. No.	Name of the Item	AACP	LACP	Total Qty.
87	Mould Green Hardness Tester-dial type-Risdale diels st.	1		1
88	Multi Mate	2		2
89	Paiers nessler tubes		24	24
90	Pippetes 10 ml		48	48
91	Pippetes 11 ml		12	12
92	Pippetes 25 ml		48	48
93	Pippetes measuring 0-1 ml.		6	6
94	Pippetes measuring 0-10 ml.		10	10
95	Pippetes measuring 0-5 ml.		6	6
96	Pippetes Micro 0-0.2 ml		6	6
97	Prick punch 6"/15 cm	34		34
98	Prick punch 6"/15 cm	2		2
99	Rubber tubes for water, gas and vacuum, stoppers, rubber each glass, plastic and cork of different sizes		20	20
100	Rings with clamps for filtering and heating		48	48
101	Test tube (160 mm to 15 mm)		500	500
102	Test tube 10mm		400	400
103	Test tube holders		24	24
104	Test tubes support for 10-12 test tubes		24	24
105	Thermometers 0-100C		24	24
106	Thermometers 0-250C		12	12
107	Thermometers 0-300C		12	12
108	Thermometers for drying oven		3	3
109	Trainees Kit Caliper outside spring 6"/15 cm	34		34
110	Triangles clay		48	48
111	Tripods		40	40
112	Tubes for centri fuge		500	500
113	Tubes for gerber centrifuge		44	44
114	Vacumm 1000 ml.		6	6
115	Vacuum 250 ml.		12	12
116	Vacuum 500 ml.		12	12

Sl. No.	Name of the Item	AACP	LACP	Total Qty.
117	Vacuum pippetes		4	4
118	Ventiles for volumetric analysis		24	24
119	Volumetric flask 100 ml		24	24
120	Volumetric flask 1000 ml		12	12
121	Volumetric flask 250 ml		24	24
122	Volumetric flask 500 ml		24	24
123	Watch glasses Ø 5 cm		24	24
124	Watch glasses Ø 7.5 cm		48	48
125	Watch glasses Ø10cm		48	48
126	Watch glasses Ø15cm		24	24
127	Water pumps of vacuum		6	6
128	Weighing bottles polythylene or glass 100 ml.		12	12
129	Weighing bottles polythylene or glass 50 ml.		24	24
	<b>TOTAL=</b>	<b>90</b>	<b>4074</b>	<b>4164</b>

**LIST OF ELECTRICAL EQUIPMENTS FOR EXISTING & NEW TRADES**  
**ITI, Cuttack & Rourkela (Package No.13)**

Sl. No.	Name of the Item	ITI, CUTTACK			ITI, ROURKELA		Total Qty.
		Electrician	Instrument Mech.	MMV	ELECTRICIAN	Foundryman	
1	Contactora 3 phase, 440 volt, 16 amp. 2 NO & 2NC auxiliary contacts.	5					5
2	Contactora 3 phase, 440V, 16amp, 2 NO & 2NC auxiliary contacts.	8					8
3	Copper bit soldering iron 0.25 kg.	16					16
4	Cut out, reverse current, over load voltage relays 24 volts 5 amp	4					4
5	D.C starters 3-point	4					4
6	D.C starters 4-point	4					4
7	Gimlet 6mm				34		34
8	Frequency meter 37-53 Hz	1					1
9	Flux meter	4				1	4
10	Hygrometer	10		1		2	11
11	Iron, soldering 25W,65W& 125 W	9					9
12	Knife switch DPDT fitted with fuse terminals 16 amp	48					48
13	Knife double bladed electrician				34		34
14	Knife switch TPDT fitted with fuse terminals 16amp	48					48
15	Load Bank-5KW(Lamp/heater type)	7					7
16	M.C.B 16amp	2					2
17	Melting pot	3					3
18	Potential Transformer 230-650 volts	8					8
19	Rasp, half round 200 mm bastard	13					13

Sl. No.	Name of the Item	ITI, CUTTACK			ITI, ROURKELA		Total Qty.
		Electricain	Instrument Mech.	MMV	ELECTRICIAN	Foundryman	
20	Relays-Over current, under voltage etc. 3 volt, 100amp.	8					8
21	Stepper motor with digital controller	2					2
22	Transformer single phase, 1 KVA, 230/115-50-24-12 volts, 50 cycles core type, air cooled with tapings for scd Connection.	6					6
23	Transformer three phase, 5 KVA, 440/230 volts, 50 cycles delta and star, shell type oil cooled ..	4					4
24	Variable auto transformer 0-250 V, 8 amps	3					3
25	Wheat stone bride complete with galvanometer and battery	3					3
26	Watt hour meter induction type 1 ph.		5				5
	<b>TOTAL=</b>	<b>220</b>	<b>5</b>	<b>1</b>	<b>68</b>	<b>3</b>	<b>294</b>

**LIST OF EQUIPMENTS (MMV & DIESEL MECH) FOR UPGRADATION OF EXISTING TRADES  
ITI, Rourkela (Package No.14)**

Sl. No.	Name of the Item	MMV	Diesel Mech	Total Qty.
1	Carburator repair tool kit	1		1
2	Carburetor ( Two different types)		2	2
3	Cell tester ( high rate discharge tester)		1	1
4	Centre Punch 10mm Diax100	16		16
5	Circlip plier(Ext. and Int)150mm.And 200(Two each)	8		8
6	Coil spring compressor for suspension spring unit(easy type)	1		1
7	Continuity meter AC & DC	1		1
8	Diesel Engine(running condition) stationary type		4	4
9	Fule injection pump(diesel)rotary	1		1
10	Grease gun	4		4
11	Hand File 29 blades(Metric)	16		16
12	Hydrolic press 5 ton		1	1
13	Impact screw driver	1		1
14	Injector testing set ( Hand operated)		1	1
15	Lifter, valve spring		1	1
16	Petrol nozzle	2		2
17	Puller set steering wheel universal	1		1
18	Smoke tester		1	1
19	spark plug cleaning and testing equipment	1		1
20	Steering assembly-Power steering	1		1
21	Tester Sparking plug(Nion) type)	1		1
22	Timing Lighter		1	1
23	Trally type portable air compressor 1 single cylinder with 45 ltr. Capacity air tank, all accessories and with working pressor 6.5 kg/sq .cm		2	2
24	Turbo Charger or super charger		2	2
25	Valve seat cutting tools complete with guides & pilot bar ( all angles) in a box		1	1
26	Valve spring compressor suitable for LMV	1		1
27	Water pump and oil pump suitable for LMV		1	1
	<b>TOTAL</b>	<b>56</b>	<b>18</b>	<b>74</b>

**LIST OF EQUIPMENTS (REF & AC) FOR UPGRADATION OF EXISTING TRADES  
ITI, Cuttack (Package No.15)**

Sl. No.	Name of the Item	Ref & AC
1	Fin straightener/Fin comb	4
2	Flaring tool set,single for tube 4.7 to 16mm OD	4
3	Gas leak detector for halogen gas	2
4	Portable Air-LPG brazing kit with 2 kg.LPG cylinder,torches,hoses,standard make a)With straight flame b)with cyclone/swirl jet flame	1
5	Reverse cycle AC/HEAT pump 3000 kcal/hr .or 4500 kcal/hr.	1
6	Shell and tube,DX chillers (small)	1
7	Socket set,reversible ratchet ,12.7 mm square drive with extension,3/16" to 1 1/4" BSW &SR	2
8	Swaging tool,screw type,with adapter set of size for tube 4.7 to 16 mm OD	2
	<b>TOTAL =</b>	<b>17</b>

**LIST OF ELECTRONIC EQUIPMENTS FOR UPGRADATION OF EXISTING TRADES  
ITI, Cuttack & Rourkela (Package No.16)**

Sl. No.	Name of the Item	ITI, CUTTACK							ITI, ROURKELA			Total Qty.	
		Electrician	Fitter	Turner	D/M Civil	Diesel Mech	Instrument Mech	Electronics Mech.	MMV	Electrician	AOCP		LACP
1	Analog multimeter(AVO)Voltage, AC-Voltage 10-1000V DC-Voltage 2.5 V to 1000 V, Resistance-10 Ohm to 20 Mega Ohm, DC Current 2.5 mA to 10 A & having continuity test, meter sensitivity more than 20 Kohms/ Volts						5		1				6
2	Battery charger with variable output 1KW 6Vx4 Battery 12v-x2 Battery Input Volt-230A.C., 50 Cycle Output volt-24 D.C.Rotary switch to select volt & Amp. Input & output Fuse, pilot light, Ampere Meter, Main Switch, +- Nob, Diode circuit Dimension 23 cm x w 28cm x D 23.5cm (approx) Weight: 6.800 kg (approx) Manual will be provided.	2				1							3
3	Blue Ray DVD, CCD, DVD & BD Compatible Aspect ratio: 16:9, 4:3•Picture enhancement: Progressive scan, Video upscaling, High Def (720p, 1080i, 1080p) •D/A converter: 12 bit/150 MHz Playback Media: BD Video, BD-ROM, BD-R/RE 2.0, DVD, DVD-Video, DVD+R/+RW, DVD-R/-RW, DivX, Video CD, CD, CD-R/CD-RW, USB flash drive •Compression formats: H.264, VC-1, MPEG2, DivX Ultra, AVCHD, WMV, XviD•Disc Playback Modes: Standard Play, Pause, Search forward/reverse, Slow Forward, Resume Playback from Stop, Skip, Disc Menu, Repeat, A-B Repeat, Zoom, Angle•Video Enhancement: Deep Color, x.v. Colour, Video Upscaling, Progressive Scan•BD Region Code: B •DVD Region.: 2						2						2
4	Calculator(Made in Japan) 156.0 x 156.0 x 31.3mm/165.0g						4						4
5	Cassette Taperecorder 8mm						1						1
6	Cellular telephone set (GSM, CDMA)							1					1

Sl. No.	Name of the Item	ITI, CUTTACK							ITI, ROURKELA			Total Qty.	
		Electrician	Fitter	Turner	D/M Civil	Diesel Mech	Instrument Mech	Electronics Mech.	MMV	Electrician	AACP		LACP
7	Colour TV receiver 24" LCD Built-in Devices: Stereo Speakers, USB Hub, TV tuner Dimensions (WxDxH): 58.2 cm x 19.7 cm x 44.8 cm - with stand Weight: 5.8 kg Diagonal Size: 24" - widescreen Max Resolution: 1920 x 1080 Video Format: 1080p (FullHD) Display Positions Adjustments: Tilt Colour Support: 16.7 million colours Response Time: 5 ms Image Brightness: 300 cd/m <sup>2</sup> Image Contrast Ratio: 1000:1 / 70000:1 (dynamic) Digital Video Standard: Digital Visual Interface (DVI), High-Definition Multimedia Interface (HDMI) Audio Output: Speaker(s) - stereo Signal Input: 2xHDMI, VGA Digital TV Tuner: DVB-C, DVB-T							2					2
8	Cord less tele phone set 2.4 GHz Digital with caller ID, Speaker Phone, Intercom & autore-dial						1						1
9	Crimping Tool(RJ 11 & RJ45)						6						6
10	Depth Gauge Micrometer 0 to 150mm reading 0.01mm			6									6
11	Depth micrometer 0-100 mm 0.01 mm		1										1
12	Desoldering gun 230 volt 35-65 watt	16							2				18
13	Digital Multi meter(3-1/2 digits) DCV Range: 200mV/2V/20V/200V/1000V,ACV Range: 750V/1000v DCA Range: 200µA/2mA/200mA/20A,ACVA: 200mA/20A Resistance: 20V Ω/2K Ω/20K/200K/2m/200m Capacitance: 2F/2µF/200µF,Buzzer Mode,diodemode,direct transistor testing: Frequency 20KHz/200KHz	7					7						14
14	Digital calibrator,mV/mA injector and measuring unit						4						4

Sl. No.	Name of the Item	ITI, CUTTACK						ITI, ROURKELA			Total Qnty.		
		Electrician	Fitter	Turner	D/M Civil	Diesel Mech	Instrument Mech	Electronics Mech.	MMV	Electrician		AACP	LACP
15	Digital frequency counter (2Hz – 50MHz)8 digit, 0.5" red LED display, Range Selection 2step Switch setting to select 2Hz to 1MHz or 1MHz to 50MHz, Power Cord, BNC to BNC to Cable 50Ω Termination & Operating Manual.						2						2
16	Digital function generator(0.1HZ to 20MHZ)with digital display (DC, Sine, Square, Triangle) Output Voltage , 0.1mv to 20Vpp with operation manual						2						2
17	Digital I. C testor for all 74&40 series with digital display & power supply						2						2
18	Digital I.C. Trainer built in DC supply, discreate comonet mounted on board to perform various experiment on combinational & sequential logics including built in power supply and complete set along with catlog.						2						2
19	Digital instulation testor						2						2
20	Digital L..C.R bridge						2						2

Sl. No.	Name of the Item	ITI, CUTTACK							ITI, ROURKELA			Total Qty.	
		Electrician	Fitter	Turner	D/M Civil	Diesel Mech	Instrument Mech	Electronics Mech.	MMV	Electrician	AACP		LACP
21	Digital ph metre Range pH 0 to 14.00 pH Temp $\phi$ C 0 to 100.0 $\phi$ C mV -1999 to 1999 mV ATC pH 0 to 14.00 pH Input impedance: Greater than 10 to the 12th Ohms Temp. compensation Manual/Auto 1 to 100 $\phi$ C Temperature sensor Pt-100 (Alpha=0.00385) Karl fischer output 10 uA Display 0.5 inch high LCD display Power source 6 type "AA" batteries or AC line adaptor Dimensions 28 cm x 20 cm x 12 cm Weight 1.45 kgs						2						2
22	Digital sine /square generator (1 mhz) with variable frequency						2						2
23	Digital storage oscilloscope (Dual Channel Storage) DC – 200MHZ Channel:2+Extarnal						2						2

Sl. No.	Name of the Item	ITI, CUTTACK							ITI, ROURKELA			Total Qty.	
		Electrician	Fitter	Turner	D/M Civil	Diesel Mech	Instrument Mech	Electronics Mech.	MMV	Electrician	AACP		LACP
24	Digital type tachometer.External TTL Input High > 4.5V (HHT-1501) Display 5 digits 99999 counts Sampling Rate 0.7 second (> 60 rpm) > 1 second (10 to 60 rpm) Measuring Distance 50 to 300 mm (2 to 12") Time Base 4.0 MHz Quartz Crystal Range Selection Automatic Battery Four 1.5 V "AA" (included) Auto Power-Off 30 minutes Operating Temp 0 to 50°C (32 to 122°F) Size 72 L x 63 W x 36 mm D (6.8 x 2.5 x 1.5") Weight 190 g (6.7 oz.) (including battery)						4						4
25	Digital line frequency indicator Frequency : 30.00 Hz To 70.00 Hz,Display : 4 Digit, 7 Segment, Bright, Led 12.5mm High.Resolution : 0.01 Hz. Accuracy : ± 0.1% ± 1 Digit.						4						4
26	Discrete component trainer.The Trainer should have Provision of mounting of various active & passive components , voltmeter,ampermeter,speaker, with built in variable & tracking power supply & signal source ,high watt resistors, different high watt pot, electronic load. perform various experiments .The Trainer should have test points with test Leads with manual and assignment to perform various experiments.	2											2
27	FET volt metre trainer]						4						4

Sl. No.	Name of the Item	ITI, CUTTACK						ITI, ROURKELA			Total Qty.	
		Electrician	Fitter	Turner	D/M Civil	Diesel Mech	Instrument Mech	Electronics Mech.	MMV	Electrician		AACP
28	Function Generator with Frequency Sine, Square, Triangle Built in 5digit counter Frequency 2Hz – 2MHz Display 6digit LED Display Frequency Counter (0.5Hz-30MHz )Accuracy 0.1hz/1hz Max. input Voltage 50VPP Sensitivity: 200MV RMS	8										8
29	Inverter 1 KVA Input 12V DC, Output 220V AC with 12 battery	2										2
30	Linear I.C. Trainer. Trainer round have complete setup to perform various experiments with built in Power Supply, function generator, various Discrete components manual on this Trainer. Test points 2 test leads with manual With all accessories in complete along with manual to perform various experiment.	2										2
31	Oscilloscope-Dual Trace, 30MHZ Function Generation & Frequency counter 10Hz to 100KHz in 4 stages Output voltage : 10VppFrequency Counter Freq.20Hz-30MHz, Sensitivity 0.5v				2						1	3
32	Overhead Projector With All AcessoriesProjection Lens : One Element 254mm 2. Condenser System : Frensnel Condenser 3. Projection Lamp : 24V-250Watt 4. Stage Aperture : 250mmx250mm						2					2
33	Regulated+15v&-15v dual channel variable, DC Power Supply 0-30V DC 2Amp variable. with digital display						2					2



Sl. No.	Name of the Item	ITI, CUTTACK							ITI, ROURKELA			Total Qnty.	
		Electrician	Fitter	Turner	D/M Civil	Diesel Mech	Instrument Mech	Electronics Mech.	MMV	Electrician	AACP		LACP
42	<p>Wheat stone bridge complete with galvanometer and battery. This set should be designed to provide an accurate and sensitive instrument of resistance and locating faults in cables by adopting the varley Loop Circuit for tests. This set should be entirely self-contained with a dry battery and a Galvanometer. The instrument should be equipped with another switch controlling the sensitivity or short-circuiting the galvanometer. Arrangement should be provided to use the extra galvanometer or high source voltage for increasing the sensitivity of the bridge.</p> <p>Range : 0.001 ohm to 11.11 mega ohms.</p> <p>Series Arm : Four decades in steps of thousands, tens and units ohms using manganian coil which can be used as a series resistance box also with + 0.1% accuracy</p> <p>Ratio Arms : The ratio arm of bridge are to be capable of selecting multiplying factors of 0.001, 0.01, 1, 10, 100 and 1000 for conductive resistance measurements and for varley loop test</p> <p>Null Detector Galvanometer : Ri 20 ohms, 1mm/ <math>\mu</math>A sensitivity</p> <p>Battery : 3 cell of 1.5 V, R 20 size</p>	1								2		3	
	<b>TOTAL=</b>	<b>41</b>	<b>1</b>	<b>7</b>	<b>2</b>	<b>1</b>	<b>67</b>	<b>17</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>142</b>

**LIST OF EQUIPMENTS (FOUNDRYMAN) FOR UPGRADATION OF NEW TRADES  
ITI, Rourkela (Package No.17)**

Sl. No.	Name of the Item	Foundryman
1	Auto Sand riddle with 3 tons/hrs. ridding capacity	1
2	Bench vice 12 cm Jaw	1
3	Blow lamp (Kerosene)	2
4	Cleaner 9 x 300 m	34
5	Cleaner flange	34
6	Co <sub>2</sub> cylinder with Co <sub>2</sub> probe and Rubber Houses with nozzle 12 mm wheel valve.	1
7	Core oven 180 x 90 x 90 cm electric hot air circulated with maximum temperature 35 <sup>0</sup> C adjustable.	1
8	Cylinder trolley suitable to Co <sub>2</sub> cylinder and Indane Gas Cylinder	1
9	Degasing bale 10 cm perforated hood	4
10	L.P.G Cylinder with heating torch	1
11	Legging pad	34
12	Moulding boxes 30 x 40 x 15 cm RSDL	16
13	Moulding boxes 75 x 75 x 25 cm RSDL	1
14	Plane grooving 6 mm cutter	2
15	Rapping spike forged and hardened	34
16	Sand Erator	1
17	Sand Sampller	1
18	Shovel	4
19	Snap Flast 30 x 30 x 10 cm RSDL	4
20	Spirit level	2
21	Tool Tray Steel 145 x 145 x 5 cm	34
22	Vent wire 3 mm	34
23	Wheel Barrows	2
	<b>TOTAL =</b>	<b>249</b>

**LIST OF EQUIPMENTS (AACP & LACP) FOR UPGRADATION OF EXISTING TRADES  
ITI, Rourkela (Package No.18)**

Sl. No.	Name of the Item	AACP	LACP	Total Qty.
1	Abbe refractometer The Refractometer should consist of two Abbe prisms, placed together. The two prisms should be mounted together, with the upper one fixed and the lower one hinged at one end. A snap action faster is provided to close the prism together. For determination of indices of refraction of solids, the lower prism can be removed by taking out the hinge rod between the prisms. The instrument should be designed to measure refractive index in the range of 1.300 to 1.700 by direct reading. Accuracy of the instrument should be 0.001 by direct reading and 0.0001 by estimation	2		2
2	Altimeter	1		1
3	Analytical balances of different makes (with rider, optical reading, one pan analytical balance) d= .1 mg max		2	2
4	Apparatus for measurement of thermal conductivity of good and bad conductors	2		2
5	Apparatus for determination of flash point		1	1
6	Apparatus for measurement of coefficient of expansion (thermal) of solid and liquid	2		2
7	Apparatus for measurement specific heat of solid and liquid (Renaults Apparatus)	2		2
8	Apparatus for surface tension		1	1
9	Arbor press	1		1
10	Auto-clave electrically heated		1	1
11	Balance (Tech) 1 Kg. (d= .1 g max)		1	1
12	Bar straightening press	1		1
13	Barometer	1		1
14	base chucks for slower	1		1
15	Belt lacer	2		2
16	Blow Lamp	1		1
17	Borer for stoppers with sharpener		1	1
18	Box drawing instruments	34		34
19	Bunsen burners		30	30
20	Calorimetre for determining 'soul' s'	4		4
21	Centrifugal pumps-2 Nos	2		2
22	Centrifuges electrical		2	2

Sl. No.	Name of the Item	AACP	LACP	Total Qty.
23	Chain hoist 2 to cap	1		1
24	Charger for battery accumulator	1		1
25	Chemical Balance (with weight box)	3		3
26	Chromatography equipment (Paper, column, thin layer)		1	1
27	Conductometer		1	1
28	Cork press		1	1
29	Cs Wale Viscometer	3		3
30	DC Ampere meter 0 to 1Amp.	2		2
31	Desicators Ø 150 mm dia		20	20
32	Desicators vaccum		2	2
33	Dial test indicator	2		2
34	Different types of levers	1		1
35	Diode valve	4		4
36	Distillation Tower	3		3
37	Drill chuck 0" to 1 1/2" Morse taper	1		1
38	Each inch clamps with spring or screw		24	24
39	Electric drying ovens (200 <sup>0</sup> C)		2	2
40	Electric heating plates (for soxleth)		2	2
41	Equipment to study kerchief' s law and Elector chemical equivalent	1		1
42	Extraction thimbles		60	60
43	Falter (rotted) 2 1/2" square	2		2
44	Falter top and bottom/" , 3/8" (pairs)	1		1
45	Fisher apparatus for moisture determination if available indigenously		1	1
46	Floor crane 35 cwt. Cap	1		1
47	Forge with chimney and trough fitted with blower	1		1
48	Framing square 24" x 2" x 16" x 1 1/2"	2		2
49	Fry press	1		1
50	furnaces (Muffle ovens) ((1100 <sup>0</sup> )		2	2
51	Gear pump	1		1
52	Glass blower lamps for gas and oxygen		10	10

Sl. No.	Name of the Item	AACP	LACP	Total Qty.
53	Grease pressure gun (Hand)	1		1
54	Grinder with two 7" wheels rough and smooth (motorized)	2		2
55	Hand 12 volt operated Dynamo, Leclanche cell, Daniel cell, Weston cell, Acidic cell, Head Accumulator, Alkali cell with variable resistances	2		2
56	Hand centri fuge for determination of fat in milk (Gerber)		2	2
57	Heating mantles (Universal)		6	6
58	Heating plates (Electric) 1000 watt		1	1
59	Hot set rotted	2		2
60	Hot water funnel		10	10
61	Inclinid plane with pulley, pan, weights etc.	2		2
62	Instrument for determining 'g'(simple pendulum)	2		2
63	Jaw 10 chuck independent	2		2
64	kjeld-ahl apparatus for digestion and distillation		4	4
65	Machine vice swiveling base 6' jaw	1		1
66	Magnetic indicator and base	2		2
67	Magnetic stirrers (with heating plate) 2 ltr. Capacity		2	2
68	Mater precision level 15" long (Each division to read 0005" per foot)	1		1
69	Mechanic Equivalent of heat and specific heat	1		1
70	Mechanical board for testing triangle and paraallelogram of forces including all accessories	6		6
71	Lobe blower for filter press	1		1
72	Melting point apparatus		1	1
73	Microscope x 1000 (Metallurgical)		1	1
74	Microscope x 1000 (Monocular)		3	3
75	Milli Voita Meter 0 to 500 mv.	2		2
76	Mortar 150 mm steel /cast iron		1	1
77	Mortar, 100 mm, porcelain with pestle		6	6
78	Nicolson' Hydrometer with glass jar	2		2
79	One pan analytical balances (Metler type)- If available indigenously 0.1 mg. sensibility		1	1
80	Orificemeter	1		1
81	Orsat's apparatus		4	4
82	PH Meters	1	1	2

Sl. No.	Name of the Item	AACP	LACP	Total Qty.
83	Physical Balance (with weight box)	1		1
84	Plumb bob	2		2
85	Polarimeter with monochromatic light	2		2
86	Polarimeters		2	2
87	Potentiometer	2		2
88	Potentiometric titration apparatus		2	2
89	Projector for slider and filmstrips with screed	1		1
90	Protractor celluloid 6"	34		34
91	Pyknometer	6		6
92	R.P.M. Indicator	1		1
93	Redwood Viscometer	6		6
94	Refractometers (Abbe type with refractive index)		2	2
95	Refrigerator (4,5 cu. Ft.)		1	1
96	Reynolds experiments equipment	1		1
97	Rivets tools set consisting of rivet snaps, pricking punch and holding up dolly	1		1
98	Samsung laser Printer(4x1)		1	1
99	Sand Testing Equipments permeability meter, Universal Strength tester, Sieve shaker, standard sand rammer, Shatter Index Tester, Clay content Tester, Speedy Moisture teller	1		1
100	Sand bath 9To be fabricated)		1	1
101	Scissors		2	2
102	Screw pitch gauge 55 and 60	1		1
103	Scribing block Universal 12"/30cm	2		2
104	Seattle's Apparatus for young's Modulus	2		2
105	Self centering chuck 5"/125 mm	2		2
106	Semi analytical balances (d= .1 mg )max		2	2
107	Set glass blower tools		10	10
108	Set of models, geometrical and samples of machinery parts as necessary of metal, wood and plastic	1		1
109	Set of more sockets (0-1, 1-2, 2-3)	1		1
110	Set of tools for lathe	2		2
111	Set sieves 20-200		1	1
112	Set square celluloid 45"-8 inch	34		34

Sl. No.	Name of the Item	AACP	LACP	Total Qty.
113	Set square celluloid 60"-10 inch	34		34
114	Shaking machines for sieves and bottles		1	1
115	Shaper indexing center	1		1
116	Shaper tool holder turret type	6		6
117	Shovel	2		2
118	Simple Machines(wheel and axel).Screw jack inclined plane with roller or trolley, pulleys or pulley blocks for first, second and third system of pulleys	1		1
119	Sine bar-200 mm	2		2
120	Single angle cutter 45deg., 60deg;, 70 deg;, 80 deg both R.H., L.H., milling slot cutter 6 mm, 10 mm, 20 mm thick	2		2
121	Soldering iron copper but 10 ozs	2		2
122	Spary extraction tower	1		1
123	Special burners for glass blowing		4	4
124	Specific Gravity bottle	6		6
125	Spoons plastic		24	24
126	Stalagnometer	6		6
127	Steam generator (Copper) for steam distillation		10	10
128	Steel tape 10 ft. in case	1		1
129	Stirrers with motors, 230 V, AC, capacity 5-7 litres		8	8
130	Stone oil 6"*2"1"/15 cm x 5cm x2.5 cm	2		2
131	Swages top and bottom 1/2", 3/4", "(pair)	1		1
132	Thermometer 0 to 11C	2		2
133	Thermometer 0 to 36C	1		1
134	Thermometer 0to 250	1		1
135	Thermostatic batch	2		2
136	Tools knurling	2		2
137	Top-driven centrifuge	1		1
138	Travelling microscope	2		2
139	Tray drier	2		2
140	Triode valve	4		4
141	Two pan analytical balance with rider		5	5

Sl. No.	Name of the Item	AACP	LACP	Total Qty.
142	Vacuum pump (Central, for 20 places)		1	1
143	Vacuum pumps mounted on moving tables		2	2
144	V-Blocks 3" x 1½(pair) with clamps	2		2
145	ViscometerRED WOOD, VISCOMETER APPARATUS should be widely used in Petroleum laboratories, Industries, oil Refineries Educational, Institutions for study of the Red Wood Viscosity of petroleum Products. Two Forms of viscometer should be available. No.1 up to 2000 seconds Viscosity. When flow time with No.1 Instrument exceeds 2000 seconds the No. II Instrument should be used.	7		7
146	Viscometer - two different kinds		2	2
147	Weighing machine	1		1
148	Welding helmet	1		1
149	Welding plant oxy-acetylene complete (either high or low pressure) and electric	1		1
150	Wet and dry bulb thermometer	2		2
	<b>TOTAL =</b>	<b>319</b>	<b>289</b>	<b>608</b>

**LIST OF ELECTRIC EQUIPMENTS FOR UPGRADATION OF EXISTING TRADES  
ITI, Cuttack & Rourkela (Package No.19)**

Sl. No.	Name of the Item	ITI, CUTTACK	ITI, ROURKELA		Total Qty.
		Electricain	ELECTRICIAN	AOCP	
1	A.C Ammeter M.I 0.5 A	1			1
2	A.C Ammeter M.I 0-15-25 A	3			3
3	A.C Energy meter (single phase 15 amp 230 V)	4			4
4	A.C.B.5 KVA		1		1
5	Ammeter MC 0-15-25A	4			4
6	Ammeter MC 0-5A	4			4
7	Contactora 3 phase, 440V, 16amp, 2 NO & 2NC auxiliary contacts.		3		3
8	Current Transformer 230 volts	7			7
9	D.C starters 20 Amp 3-point.		4		4
10	D.C starters 20 Amp 4-point.		4		4
11	DC Ammeter MC-0-1A	2			2
12	DC Milliammeter 0-500ma	4			4
13	KW Meter 0-1-3KW	8			8
14	Laboratory type induction coil 6 volt to 800-10,000 VOLT	4			4
15	Megger 500 with	4			4
16	Mill voltmeter center zero 100-0-100m V	4			4
17	Multi meter 0 to 1000 M ohms, 2.5 to 500V	1			1
18	0 to 1 volt (DC) Volt meter			2	2
19	0 to 10 Amp.(AC,DC) Ampire meter			2	2
20	0 to 250 volt (DC/AC) Volt meter			2	2
21	0 to 3 Amp.(DC) Ampire meter			2	2
22	0 to 30 Amp.(AC,DC) Ampire meter			2	2
23	0 to 4 volt (DC) Volt meter			2	2

Sl. No.	Name of the Item	ITI, CUTTACK	ITI, ROURKELA		Total Qty.
		Electrician	ELECTRICIAN	AACP	
24	0 to 5 mv. Milli Volta Meter			2	2
25	0 to 5 volt (DC) Volt meter			2	2
26	0 to 50 volt (DC) Volt meter			2	2
27	0 to 10 volt (DC) Volt meter			2	2
28	Oil testing Kit Type: It should be portable and compact with sturdy carrying handle with motor operated to uniformly increase the output voltage 0-60 KV with the help of continuously variable auto transformer at the rate of 2KV/ sec approx. It should have resolution of 0.01 KV, accuracy class 1.5 and voltage scope: 20% -100%, Input supply 230V/240V AC, 50Hz, Single phase AC supply through 3 core x of 3 m length cable, 5A capacity 3 pin plug for input supply. Output 0-60 KV; It should give smooth variable output voltage for testing the dielectric strength of insulating oil with Max Generated test Voltage: a. Between Transformer Terminals: 60 KV RMS, b. Between Transformer Terminals & Earth: 30 KV RMS		1		1
29	Resistance box			1	1
30	Resistance box 0 to 100 ohms			2	2
31	Resistance box 0 to 500 ohms			2	2
32	Resistance coils (2 ohms, 5 ohms, 10 ohms, 100 ohms)			2	2
33	Resistances Center Zero Galvanometer			4	4
34	Rheostat			1	1
35	Rheostat 100 ohm's			2	2
36	Rheostat 25 ohms			2	2
37	Rheostat 500 ohms			2	2
38	Single phase power factor meter 1-0-1	2			2
39	Stepper motor with digital controller		1		1
40	Tacho meter with stop watch	6			6
41	Thermometer 0 to 100 deg. centigrade	4			4
42	Thyrister/IGBT controlled DC motor drive 1 HP with tachogenerator feedback arrangement.	2			2

Sl. No.	Name of the Item	ITI, CUTTACK	ITI, ROURKELA		Total Qty.
		Electrician	ELECTRICIAN	AOCP	
43	Thyrister/IGBT controlled DC motor drive 1 HP with techogenerator feedback arrangement.		1		1
44	Tong tester/clamp meter 0-100AmpAC	1			1
	<b>TOTAL=</b>	<b>65</b>	<b>15</b>	<b>38</b>	<b>118</b>

**LIST OF EQUIPMENTS (MULTIMEDIA HARDWARE & SOFTWARE) FOR UPGRADATION OF EXISTING TRADES  
ITI, Cuttack & Rourkela (Package No.20)**

Sl. No.	Name of the Item		ITI, CUTTACK	ITI, ROURKELA	Total Qty.
		D/M Civil	ELECTRICIAN	AOCP	
1	After Effect		1		1
2	Audio Studio Suite(Education License), Latest Verson		1		1
3	Colour leser Printer, Up to 17 ppm USB Interface		1		1
4	Digital Plaint Tablet, 6" x 4"		5		5
5	Digital Still SLR Camera, Latest feature		1		1
6	Digital Video Camera,Latest features & flash memory		1		1
7	DLP Projector, Resolution 1600x1200 Multimedia support		2		2
8	Non Linerar Edditing Set up		1		1
9	Plotter Civil Engg. Drawing	1			1
10	Projector for 16 mm films			1	1
11	Soft ware (3) Photo shop		1		1
12	Soft ware Illustrtor, Latest Verson		1		1
13	Soft ware- Maya/3ds MAX, Latest Verson		1		1
14	Soft ware Sound Forge		1		1
15	Soft Ware-(2).Flash & Advanced Scripling		1		1
16	Training Material on DVDs		1		1
17	Tripod, Green Screen & Basic Lighting equipment, etc		1		1
18	White Screen		1		1
	<b>TOTAL =</b>	<b>1</b>	<b>21</b>	<b>1</b>	<b>23</b>



Sl. No.	ITEM Name	Fitter	Turner	Machinist	Instrument Mech.	Plumber	FITTER	TURNER	AACP	Foundryman	Total Qty
5	D.E. Pedestal grinder with 2 wheels 175 rough and smooth					1					1
6	Grinding machine (General purpose)D.E. pedestal with 2cm dia wheels rough and smooth with twist drill grinding – attachment.	2					1		1	1	5
7	Grinding machine pedestal type D.E. 150 mm Dia. Wheel with wheel and vision guard. • C.I. casting of high grade quality. <ul style="list-style-type: none"> <li>• Use of best quality stamping and cast rotor.</li> <li>• Motor winding are specially insulated and ensure smooth running.</li> <li>• Each machine provided with rotary switch.</li> <li>• Construction of the machines are made sturdy and robust to offer vibration free performance.</li> </ul> Pedestal heavy fabricated suitable stand for D.E. Grinder ½ HP & 3 phase, 2800 RPM with 150 mm x 20 mm x 25.4 mm		1								1
8	Heating and pumping unit to suit to oil fired tilting type crucible furnace with Heating pressure gauge etc. Wesman model S.P.M. Simplex model motorised Rotary gear oil pump pre-heater									1	1
9	Hydraulic Pressure machine For testing leakage in GI Pipe Fitting etc.					1					1
10	Lathe all geared head stock S.S and S.C height of center over bed 15 cm gap head complete with accessories e.g. pump, all fittings and splash guard driving plate with drives, face plate 3 jaw and 4 jaw chucks fixed and traveling steady compound turret tool post, taper turning attachment, fixed and running centers, driving dogs straight and bent tails.	2		3			2		1		8
11	Lathe doge 1/2" to 1 1/2"								2		2
12	Lathe Mandrels (Diff.types)						1	1			2
13	Lathe tools H.S.S tipped set						2				2
14	Lathe-30" between center x 6" centers height with standard accessories								2		2

Sl. No.	ITEM Name	Fitter	Turner	Machinist	Instrument Mech.	Plumber	FITTER	TURNER	AACP	Foundryman	Total Qty
15	Milling machine plain type horizontal                      Surface of table : 750x175mm Distance between T –solt : 50 mm Longitudinal travel of table : 400mm Cross Travel of table : 140mm Vertical Adjustment of Table : 225mm Distance Between center line of spindle to lower surface of overarm: 135mm Taper in Spindle : ISO 30 Quill : Head Swiveling to both side: Diameter of Milling arbor: 25.4 Range of Spindle Speeds : 80,160,250,320,500,1000 RPM Numbers of feeds : 2 Feeds. Motor : 1H.P. 1440 RPM Floor Space : 650x380mm Height : 1200mm								1		1

Sl. No.	ITEM Name	Fitter	Turner	Machinist	Instrument Mech.	Plumber	FITTER	TURNER	AACP	Foundryman	Total Qty
16	Milling machine universal motorized Surface of table : 900x225mm Distance between T –solt : 55 mm Longitudinal travel of table : 485mm Cross Travel of table : 150mm Vertical Adjustment of Table : 275mm Distance Between center line of spindle to lower surface of overarm: 140mm Taper in Spindle : ISO 40 Quill : Head Swiveling to both side: Diameter of Milling arbor: 25.4 Range of Spindle Speeds : 80,160,250,320,500,1000 RPM Numbers of feeds : 3 Feeds. Motor : 1.5 H.P. 1440 RPM Floor Space : 790x460mm Height : 1425mm								1		1
17	Pipe bender (Hydraulic type)					1					1
18	Pipe bender manually operated					1					1
19	Pipe bender spool type up to 25mm with stand manually operated.	2									2
20	Pneumatic Chisel (with suitable chisel)									1	1
21	Pneumatic Rammer with Rubber Rammer head									1	1
22	Portable Forges 450mm with hand blower					1					1
23	pvc Welding Plant					1					1
24	Rachet Pipedie 15mm-32mm					1					1
25	Ratchet brack with post and clamp Flat drill 6 to 25mm by 0.2 mm.					1					1
26	Surface grinding machine wheel dia 180 mm (or near) reciprocating table,longitudinal table traverse 200 mm (or near) fitted with adjustable traverse stop.Full motorised dupplied with magnetic chuck 250 mm x 120 mm diamond tool holder set of spanner, grease gun etc.			1							1

Sl. No.	ITEM Name	Fitter	Turner	Machinist	Instrument Mech.	Plumber	FITTER	TURNER	AACP	Foundryman	Total Qty
27	Tool & cutter grinder 250 mm to admit 450 mm between centre-fully motorised work head supplied with tool rest of different types table clamps and other attachments			1							1
	<b>TOTAL =</b>	6	2	5	4	8	6	1	8	6	46

**LIST OF INSTRUMENT MECHANIC MACHINERIES FOR UPGRADATION OF EXISTING TRADES  
ITI, Cuttack (Package No.22)**

Sl. No.	ITEM Name	Qty.
1	<p>Experimental set-up for measuring and controlling of temperature-consisting of measuring,controlling,indicating,recording and final control elements, complete closed loop systemThe setup shall consists of 1-1 Shell and Tube Heat Exchanger with a cold-water tank fitted with Pump, Rota meter and a hot water tank with thyristorized heater to heat the water. The temperature of the heated water will be sensed by the thermocouple (RTD Pt-100 type). The leaving temperature of hot water and entry and exit temperatures of Cold water will also measured with the help of Thermocouple.</p> <p>Temperature Sensor: Type : RTD Pt-100 ; Mounting : Head Mounting ; Wire : 2 wire            Temperature Transmitter: Type : RTD Pt-100 ; PID Controller: Input : RTD Output : 4 - 20 mA            Communication : RS 485 ASCII/ modbus communication            Features : Autotuning, Auto/ Manual Mode Facility            Range : Field Settable ; Display : Digital            Front Keypad : Membrane Type ; Power Supply : 230 V AC, 5 amp.            Control Valve: Body Type : Globe Valve ; Nominal Size : 15 mm ; Stem Diameter : 10 mm            I/P Converter:            Input : 4 - 20 mA ; Output : 3 -15 psig ; Air Supply : 1.4 bar ; Connection : ¼” NPT(F)            Rotameter: Service : Water ; Range : Suitable ; Connection : ½” ; Metering Tube : Borosilicate Glass            Float : SS ; Valve : Needle type, integrated            Heat Exchanger: Construction : Shell &amp; Tube type ; Material : SS 304 ; Service : Water ; Shell Dia. : 100 mm            Exchanger Length : 500 mm ; Tubes : 10 - 14 nos. seam less minimum Cold Water Sump Tank:            Service : Water ; Capacity : 100 liters ; MOC : SS-304 ; Nos. : 2            Hot Water Tank: Service : Water ; MOC : SS-304 ; Heaters : 2 kW, immersion type mounted on tanks of            Pump: Type : Monoblock ; MOC : SS body            Air Regulator: Service : Air ; Max. Input Pressure : 10 kg/ cm<sup>2</sup> ; Hose Connection : ¼”            Current Meter: 1. to indicate &amp; measure Temperature Transmitter Output (0 - 20 mA) ; 2. to indicate &amp; measure I/P Converter Input (0 - 20 mA)            Pressure Gauge: 1. to indicate &amp; measure supply air pressure to I/P Converter.            Thyristor Drive: Rating : 2000 W ; Operating Voltage : 230 V AC ; Input Signal : 4-20 mA ; Output : to Heater of Hot water tank            Heater Controller: Type : PID ; Input : RTD/ TC ; Output : 4 - 20 mA ; Display : Digital ; Power Supply : 230 V AC, 5 amp.            Temperature Indicator: Input : Thermocouple of Shell and Tube Heat Exchanger ; No. of Channel : minimum 6 ; Power : 220 V AC,            50 Hz With selectable switch.The unit should also consist of necessary piping, fittings. Standard pneumatic lines and connections wherever necessary should be provided. 3 meter long braided type flexible pipe should be provided to connect air compressor with the control trainer. A 2.5 meter long insulated cable should be provided with necessary plug ready to connect control panel to the power supply board</p>	2
2	<p>Experimental set up for pressure measurement consisting of air compressor, pressure vessel ,pressure transmitter ,controller,recorder,and final control element,closed loop system or full scope system ,pressure instrumentation trainer/simulatorPrinciple : Piezo Resistive Measurement ; Range : 0 - 1 bar ; Output : 4-20 mA, 2 wire ; Power Supply : 24 V DC ; Diaphragm : SS ; Process Connection : ½” or ¼” BSP(M) ; Temp. Limit : Up to 80 oC ; Degree of Protection : IP65 ; PID Controller: Input : 4 - 20 mA ; Output : 4 - 20 mA ; Communication : RS 485 ASCII/Modbus communication with computer ; Features : Auto tuning, Auto/ Manual Mode Facility ; Range : Field Settable ; Display : Digital ; Front Keypad : Membrane Type ; Power Supply : 230 V AC, 5 amp. Control Valve: Body Type : Globe Valve ; Nominal Size : 15 mm ; Stem Diameter : 10 mm ; Sealing : Metal Actuator: Fail Safe Action : extends ; Bench Range : 0.2-1.0 bar ; Valve Positioner (pneumatic type): I/P Converter: Input : 4 - 20 mA ; Output : 3 -15 psig ; Air Supply : 1.4 bar ; Connection : ¼” NPT(F) Pressure Vessel: Housing : SS ; Service : Air ; Max. Pressure : Upto 3 kg/cm<sup>2</sup> ; With Safety valve, Pressure Gauge mounted. Air Regulator: Service : Air ; Max. Input Pressure : 10 kg/ cm<sup>2</sup> ;</p> <p>Hose Connection : ¼” ; Nos. : 2 Current Meter: 1. to indicate &amp; measure Pressure Transmitter Output (0 - 20 mA) ; 2. to indicate &amp; measure control valve Input (0- 20 mA) Pressure Gauge: 1.to indicate &amp; measure supply air pressure to Valve Positioner ; 2.to indicate &amp; measure control air pressure from Valve Positioner Air compressor : Electric motor : 1 H.P. ; Supply : 440 Volt With storage tank, safety valve, pressure relief valve, pressure gauge and pressure switch. RS 485 RS 232 Converter: Input : RS 485, 2 wire ; Output : RS 232 (Female DB-9) ; Power Supply : 230 V AC ; Cable : 9 pin male/ female for RS 232 &amp; 2 meter long wire for RS 485 with Suitable Connector if necessary. The unit should also consist of necessary piping, fittings. Standard pneumatic lines and connections wherever necessary should be provided.3 meter long braided type flexible pipe should be provided to connect air compressor with the control trainer. A 2.5 meter long insulated cable should be provided with necessary plug ready to connect control panel to the power supply board.</p>	2

Sl. No.	ITEM Name	Qty.
	<p>Control trainer software:- The software package offered contains necessary hardware and software required to interface the setup to a personal computer thus creating full software controlled experimental and instructional environment. The package will enable students to investigate and understand the principles of process control in a laboratory environment with the minimum technical support. Windows compatible software package has been developed using SCADA software. This provides direct control of the processes (control trainer) used, including open and closed loop control, plus multi loop configurations associated with remote set point control (as appropriate). Comprehensive laboratory sheets for all the experiments are included in the manual with setting up information, background theory, operational procedures and all other relevant information.</p> <p>Features:</p> <ul style="list-style-type: none"> <li>☑ Industrial SCADA software. ; ☑ User friendly Windows interface. ; ☑ ☑Two way communication for control and data acquisition. ; ☑ ☑Auto-configuration with multi-port selection option. ; ☑ ☑Manual (Open Loop) and automatic control (Closed Loop). ; ☑ ☑Selectable P, P+I, P+D and P+I+D mode. ; ☑ ☑Bump less transfer between open and closed loop operation. ; ☑ Live mimic diagrams of the process including set point, process variable and. output. ; ☑ ☑Dynamic multi-colour Simulation Studies of Pressure Control Trainer</li> </ul> <p>This teaching and training system provides a comprehensive experimental introduction to the fundamentals of process control using an example of Pressure Control Trainer.</p> <ul style="list-style-type: none"> <li>- Introduction to the fundamentals of process control</li> <li>- Operation and parameter setting of the local industrial controller</li> <li>- Freely selectable parameters: P, I, D and all combinations</li> <li>- Optimization of control behavior</li> <li>- Process diagrams including online display of all process data</li> <li>- Facility to monitor behavior of the PID output and process variable on the PC Screen</li> <li>- Set point and Disturbance response</li> <li>- Investigation of the properties of the open and closed control loops</li> </ul> <p>Computer &amp; peripherals : Computer: one general purpose computer</p>	
3	<p>Frequency to voltage converter The Frequency to Voltage Converter trainer should demonstrate the principle of working of a F to V converter using four different circuits. It should be able to provide a comparative study of Frequency to Voltage parameters like input Frequency range, output Voltage range, for the above mentioned different circuits. A digital LCD display should be provided to measure the both the input Frequency and F/V converter output voltage. The required frequency input signal should be provided. The trainer covers all the circuits by solderless inter connections through use of 2 mm brass terminations &amp; patch cords. The module should be housed in a powder coated metal cabinet / enclosure with provision for safe keeping of mains cord, patch cords and top lid for protection during storage. A well spread circuit / block layout should be provided on the front panel of size 200 mm x 250 mm of module. All necessary components / circuits to perform the above experiments are in - built and a detailed instruction manual is provided.</p> <p>IC based DC Reg. Power Supplies a. b. + 12 V / 250 mA ( fixed ). - 12 V / 250 mA ( fixed ). Input Signal 100Hz - 10 KHz frequency generator F / V Converter Using four different circuits. LCD display 1 Nos, to measure the input frequency and the output DC voltage. Power ON Power ON switch with indicator for mains on indication and fuse for protection. Patch Cords ( Stackable ) Set of 15 assorted coloured multi-stand wires with 2mm stackable plug termination at both ends Power Requirement 230V + 10% single phase AC. Instruction Manual One detailed instruction manual with well thought out experiments covering the above topics is provided.</p>	3
4	Flow controll loop set with flow controller recorder ,DP Transmitter, receiver ,unit controll valve & impulse line,complet experimental set-up for flow measur ment& controlled flow simulator	2
5	Grinder, Double Anded,Bench, High Revolution Motorised,	1

Sl. No.	ITEM Name	Qty.
6	<p>Measurement of RMS voltage trainerThe Measurement of RMS voltage trainer should demonstrate the principle of working of a RMS measurement voltmeter. It should be able to provide scope for measurement of RMS voltage of an input signal in the range of 20mV to 10V. An analog meter should be provided. A 0 – 10V Variable AC source should be provided in steps of 1V, 2.5V, 5V and 10V as input to the RMS Voltmeter. The trainer covers all the circuits by solderless inter connections through use of 2 mm brass terminations &amp; patch cords. The module should be housed in a powder coated metal cabinet / enclosure with provision for safe keeping of mains cord, patch cords and top lid for protection during storage. A well spread circuit / block layout should be provided on the front panel of size 200 mm x 250 mm of module.</p> <p>All necessary components / circuits to perform the above experiments are in - built and a detailed instruction manual is provided.</p> <p>IC based DC Reg. Power Supplies a. b. + 12 V / 500 mA ( fixed and with facility to vary from 0 to +12 V ). + 12 V / 500 mA ( fixed and with facility to vary from 0 to +12 V ). Input Signal 0 – 10V AC in steps of 1V, 2.5V, 5V, and 10V DC. RMS Voltmeter circuit Using opamp. Analog meter Moving coil meter calibrated to read rms voltage. Power ON Power ON switch with indicator for mains on indication and fuse for protection. Patch Cords ( Stackable ) Set of 15 assorted coloured multi-stand wires with 2mm stackable plug termination at both ends Power Requirement 230V + 10% single phase AC. Instruction Manual One detailed instruction manual with well thought out experiments is provided.</p>	2
7	<p>PID controller trainer consisting of instrument pannel,digital computer and interface systemPrinciple : Piezo Resistive Measurement Range : 0 - 1 bar ; Output : 4-20 mA, 2 wire ; Power Supply : 24 V DC ; Diaphragm : SS ; Process Connection : ½” or ¾” BSP(M) ; Temp. Limit : Up to 80 oC ; Degree of Protection : IP65 PID Controller: Input : 4 - 20 mA ; Output : 4 - 20 mA ; Communication : RS 485 ASCII/Modbus communication with computer ; Features : Auto tuning, Auto/ Manual Mode Facility ; Range : Field Settable ; Display : Digital Front Keypad : Membrane Type ; Power Supply : 230 V AC, 5 amp. ; Control Valve: Body Type : Globe Valve ; Nominal Size : 15 mm ; Stem Diameter : 10 mm ; Sealing : Metal ; Actuator: Fail Safe Action : extends ; Bench Range : 0.2-1.0 bar Valve Positioner (pneumatic type): I/P Converter: Input : 4 - 20 mA ; Output : 3 -15 psig ; Air Supply : 1.4 bar ; Connection : ¼” NPT(F) ; Pressure Vessel: Housing : SS ; Service : Air ; Max. Pressure : Upto 3 kg/cm2 With Safety valve, Pressure Gauge mounted. Air Regulator: Service : Air ; Max. Input Pressure : 10 kg/ cm2 ; Hose Connection : ¼” ; Nos. : 2 Current Meter: 1. to indicate &amp; measure Pressure Transmitter Output (0 - 20 mA) ; 2. to indicate &amp; measure control valve Input (0- 20 mA) Pressure Gauge: 1.to indicate &amp; measure supply air pressure to Valve Positioner ; 2.to indicate &amp; measure control air pressure from Valve Positioner Air compressor : Electric motor : 1 H.P. ; Supply : 440 Volt ; With storage tank, safety valve, pressure relief valve, pressure gauge and pressure switch. RS 485 RS 232 Converter: Input : RS 485, 2 wire ; Output : RS 232 (Female DB-9) ; Power Supply : 230 V AC Cable : 9 pin male/ female for RS 232 &amp; 2 meter long wire for RS 485 with Suitable Connector if necessary. The unit should also consist of necessary piping, fittings. Standard pneumatic lines and connections wherever necessary should be provided.3 meter long braided type flexible pipe should be provided to connect air compressor with the c Control trainer software:- The software package offered contains necessary hardware and software required to interface the setup to a personal computer thus creating full software controlled experimental and instructional environment. The package will enable Windows compatible software package has been developed using SCADA software. This provides direct control of the processes (control trainer) used, including open and closed loop control, plus multi loop configurations associated with Features: Industrial SCADA software. User friendly Windows interface. Two way communication for control and data acquisition. Auto-configuration with multi-port selection option. Manual (Open Loop) and automatic control Simulation Studies of Pressure Control Trainer : This teaching and training system provides a comprehensive experimental introduction to the fundamentals of process control using an example of Pressure Control Trainer. - Introduction to the fundamentals of process control - Operation and parameter setting of the local industrial controller - Freely selectable parameters: P, I, D and all combinations - Optimization of control behavior - Process diagrams including online display of all process data - Facility to monitor behavior of the PID output and process variable on the PC Screen - Set point and Disturbance response - Investigation of the properties of the open and closed control loops - Familiarization with and use of process control software (SCADA)</p>	2

Sl. No.	ITEM Name	Qty.
8	<p>Trainers on invertors &amp; convertors The Trainer on Inverters and Converters should be able to impart both elementary as well as advanced training of Inverters and converter circuits using SCR, MOSFET and IGBT. The trainer should be modularly designed and should be a self - contained system. The trainer should cover almost all regular discrete &amp; power based circuits of Power electronics. All the terminations should be provided on 4 mm / 2 mm sturdy brass terminations on a front panel with powder coated metal enclosure for longer life. A virtual power electronics laboratory should be provided where fast, accurate and easy circuit design, simulation and analysis can be done. It should make the student understand the concepts of Power Diode, Power Transistor, Power MOSFET, Power Thyristor, 1<math>\phi</math> / 3<math>\phi</math> Rectifiers, Inverter, Converter and chopper. It should also make clear the concepts of High speed power switching, Buck and Boost regulators, single / four quadrant choppers, etc. It should have a easy to use circuit editor with a comprehensive list of components, devices and functional blocks. It should have the facility of waveform processing and FFT analysis.</p>	4
9	<p>Voltage to frequency converter trainerThe Voltage to Frequency converter trainer should demonstrate the principle of working of a V / F converter using Transistor, opamp and two dedicated IC's. It should be able to provide a comparative study of voltage to frequency converter parameters like input dc voltage range, output frequency range, for the above mentioned different circuits. A digital LCD display should be provided to measure the both the input DC voltage and output frequency. The required dc input should be provided. The trainer covers all the circuits by solderless inter connections through use of 2 mm brass terminations &amp; patch cords. The module should be housed in a powder coated metal cabinet / enclosure with provision for safe keeping of mains cord, patch cords and top lid for protection during storage. A well spread circuit / block layout should be provided on the front panel of size 200 mm x 250 mm of module.</p> <p>All necessary components / circuits to perform the above experiments are in - built and a detailed instruction manual is provided.</p> <p>IC based DC Reg. ; Power Supplies a.; b. + 12 V / 250 mA ( fixed ). ; - 12 V / 250 mA ( fixed ). ; Input Signal 0 – 12V DC</p> <p>V / F Converter Using four different circuits ; LCD display 1 Nos, to measure the output frequency and the input DC supply.</p> <p>Power ON Power ON switch with indicator for mains on indication and fuse for protection.</p> <p>Patch Cords : (Stackable ) Set of 15 assorted coloured multi-stand wires with 2mm stackable plug termination at both ends</p> <p>Power Requirement 230V + 10% single phase AC.</p> <p>Instruction Manual One detailed instruction manual with well thought out experiments covering the above topics is provided.</p>	4
<b>TOTAL =</b>		<b>22</b>

**LIST OF AOCp MACHINERIES FOR UPGRADATION OF EXISTING TRADES  
ITI, Rourkela (Package No.23)**

Sl. No.	ITEM Name	AOCp
1	Blake jaw crusher	1
2	Boiler	1
3	Hammer Mill	1
4	Moulding Machine hand squeeze with stripping device pin lift type	1
5	Moulding Sand mixmuller 35 Kg capacity with motor Impeller 30 RPM	1
6	Multistage compressor fitted with interceders and after coolers	1
7	Oil fired tilting type crucible furnace to fit no. 100 crucible.	1
8	Packed distillation column	1
9	Packed tower of glass for flooding velocity experiment	1
10	Plate and frame filter press	1
11	Rotary vacuum filter	1
12	Shell and tube heat exchanger	1
13	Sieve shaker and sieves	1
14	Transformer welding set 300 amps- continuous welding current, with all accessories and electrode Holder.	1
15	Venturimeter	3
16	Vertical tube evaporator	3
17	Vertical milling machine motorized	1
	<b>TOTAL =</b>	<b>21</b>

**LIST OF ELECTRICAL MACHINERIES FOR UPGRADATION OF EXISTING TRADES  
ITI, Cuttack & Rourkela (Package No.24)**

Sl. No.	ITEM Name	ITI, CUTTACK					ITI, ROURKELA	Total Qty
		Fitter	Instrument Mech	Electricain	Plumber	Fitter	Electrician	
1	A.C.B.5 KVA Technical Specifications: Air Circuit Breakers are designed for use in an systems upto 415 V A.C. and for a current ratings above 100A. The robust construction is suitable for industrial use in most severe condition. It is subjected to several mechanical electrical test to ensure trouble free performance.			2				2
2	Bath Impregnating Unit should be capable of impregnating electrical components like transformers, coils, stators of electric motors, winding of electric machine etc. Customized system will have round chambers (impregnating and storage chambers) with immersion heater in jacket and easily open able lid for ease of operation with provision of 'I' bolt and 'v' nut. Special arrangement should be provided for opening and closing(tightening) the lid and holding the lid at the time of removing the components from the chamber. PID type temperature controller should be provided to maintain the temperature in the jacket. Rubber gasket will be provided for sealing the chamber against leakages. The chamber will have (a) dial type vacuum gauge cum pressure gauge (b) air admittance valve(c) drain valve at the bottom (d) piping to the tank (e) interconnecting valves. The double stage vacuum pump with 0.5 HP motor will be mounted on the same frame. All interconnecting piping, valves will be provided with the system.			2				2
3	Brake test arrangement with two spring balance of 0 to 25 kg rating			4				4
4	D.C compound generator, 2.5 KW 250 V with control panel including field rheostat, voltmeter, ammeter and circuit breaker.			2				2

Sl. No.	ITEM Name	ITI, CUTTACK					ITI, ROURKELA	Total Qty
		Fitter	Instrument Mech	Electricain	Plumber	Fitter	Electrician	
5	D.C shunt generator, 2.5 KW,220 V with control panel Motor Shunt D.C., Continuous rating, 230 V.D.C., 3 HP,1500 rpm class F insulation, Fan cooled, body should be spray painted. Motor should be confirmed to As per IS 4722. Motor Should be foot mounted and energy efficient, with 3 point D.C. starter.			2				2
6	Diesel generator, 5 KVA, 440V, AC 3 phase with change over switch, current breaker, water-cooled with armature, star-delta connections.			1				1
7	<p>Electric FurnaceTwin Chambers(275*150*150)Upper chamber &amp; Size: 150*300*150 mm (W*D*H)</p> <p>Lower chamber With Refractory Brick lining</p> <p>MS door with handle - Thermally and electrically insulated</p> <p>Furnace Shell Rectangular cubical made of Heavy angle and Supported by MS sheets</p> <p>Heating Elements: kanthal wire</p> <p>Insulation: Cerawool and Insulating Bricks.</p> <p>Temperature Range: 1050 °C. (Max.)</p> <p>Control panel: PID Type Digital Temperature indicator cum controller with a "K" type Thermocouple, Digital timer (Range: 0-999 min. ) with alarm. Ampere Meter, Mains MCB, a Lamp for indication.</p> <p>Connections: 5 m long suitable type cable with three phase 4 wire system.</p> <p>The furnace should be painted with epoxy paint over a layer of red oxide.</p> <p>It should have individual independent control panel for both the chamber. Sensor centrally placed for measuring temperature.</p> <p>This unit should be operated on 4 wire 440 V AC 50 Hz.</p>		1					1

Sl. No.	ITEM Name	ITI, CUTTACK					ITI, ROURKELA	Total Qty
		Fitter	Instrument Mech	Electricain	Plumber	Fitter	Electrician	
8	<p>Electric furnance, twin chambers(300*200*1200_)Upper chamber &amp; Size: 150*300*150 mm (W*D*H)  Lower chamber With Refractory Brick lining  MS door with handle - Thermally and electrically insulated</p> <p>Furnace Shell Rectangular cubical made of Heavy angle and Supported by MS sheets</p> <p>Heating Elements: kanthal wire</p> <p>Insulation: Cerawool and Insulating Bricks.</p> <p>Temperature Range: 1050 °C. (Max.)</p> <p>Control panel: PID Type Digital Temperature indicator cum controller with a "K" type Thermocouple, Digital timer (Range: 0-999 min. ) with alarm. Ampere Meter, Mains MCB, a Lamp for indication.</p> <p>Connections: 5 m long suitable type cable with three phase 4 wire system.</p> <p>The furnace should be painted with epoxy paint over a layer of red oxide.</p> <p>It should have individual independent control panel for both the chamber. Sensor centrally placed for measuring temperature.</p> <p>This unit should be operated on 4 wires 440 V AC 50 Hz.</p>		2					2
	Electric furnace with capacity with 600 <sup>0</sup> C to 1400 <sup>0</sup> C	2				1		3

Sl. No.	ITEM Name	ITI, CUTTACK					ITI, ROURKELA	Total Qty
		Fitter	Instrument Mech	Electricain	Plumber	Fitter	Electrician	
9	Electric Pump 1HP				1			1
10	Electrical machine trainer Electrical Machimne Trainer Suitable for demonstrating the construction and functioning of different types of DC machines and AC machines (single phase and three phase). Should be complete with friction brake dynamometer, instrument panel and power supply units,			1				1
11	Motor universal 230 volts, 50 cycles 1/4HP with starter/switch 230 V $\pm$ 4 %, 50 Hz. $\pm$ 3 %, AC/DC, Speed 3000 RPM insulation class 'F', Brush adjust arrangement, internally fan cooled, speed arrangement in pole winding controlled by suitable switch. Motor Should be foot mounted and energy efficient			2				2
12	Motor AC series type 230V, 50 cycles, ¼ HP with mechanical loadContinuous rating, rated output-1/4 HP As per IS 325, rated voltage-230 V $\pm$ 4%, Single phase, 50 Hz $\pm$ 3 %, class of insulation-B .Motor have facility for adjustable brush axis to run motor in any direction and at adjustable speed, rated power factor- 0.85 to 0.95, Totally enclosed fan cooled type, brass terminal box, the whole body should be beautifully spray painted. Motor Should be foot mounted and energy efficient.			2				2
13	Motor AC single phase 230 volts, 50 cycles 1HP capacitor type with starter switch 1 HP.Capacitor starter, induction run motor. Continuous rating 1 HP As per IS 325, Phase-1, Voltage 230 V $\pm$ 4 %, AC 50 Hz $\pm$ 3 %, speed -1440 RPM. Totally enclosed type, Robust body should be spray painted, insulation class 'F' type. Motor Should be foot mounted and energy efficient fan cooled.			1				1
14	Motor DC compound wound, 220 volt 2 to 3 HP with starter & switch.Voltmeter digital : 300 V Ammeter digital : 3 1/2 digit : suitable to read sh.field current Ammeter digital : 3 1/2 digit : suitable to read f.l. current up to starting current. Indicating lamps			4				4

Sl. No.	ITEM Name	ITI, CUTTACK					ITI, ROURKELA	Total Qty
		Fitter	Instrument Mech	Electricain	Plumber	Fitter	Electrician	
15	<p>Motor Series DC. 220 volt 0.5 to 2 HP coupled with mechanical load D.C. series motor 230 Volt, with suitable starter, Continuous rating, 2 H.P. 1500 R.P.M. Class "F" type insulation, body should be beautifully spray painted, all terminal should come out at terminal box for laboratory experiments. Motor should confirmed to As per IS 4722. Motor Should be foot mounted and energy efficient.</p> <p>Panel Board : (Education Type) Above all equipments, accessories, fuse miniature pilot lamp and all above machine and equipments terminals non detachable banana type min. 4 mm size with aluminum anodized sticker and should be fitted and neatly spaced back side wired up and connected on dark brown colour glazed abonite panel sheet 10 mm thick of 1.00 x 0.8 mtr. size panel board should be fitted on 35 x 35 x 5 mm. M.S. angle fabricated frame work with large, top height of panel frame from ground level 1.85 meter with panel foundation setting depth 30 cm. having projected legs frame work should be coated and painted with primar and machine gray colour. The make and specifications of the above motor switch starter, regulator TC, should be clearly indicated.</p>			2				2
16	<p>Motor shunt DC 220 volts, 2 to 3 HP Motor Shunt D.C., Continuous rating, 230 V.D.C., 3 HP, 1500 rpm class F insulation, Fan cooled, body should be spray painted. Motor should be confirmed to As per IS 4722. Motor Should be foot mounted and energy efficient, with 3 point D.C. star</p>			2				2

Sl. No.	ITEM Name	ITI, CUTTACK					ITI, ROURKELA	Total Qnty
		Fitter	Instrument Mech	Electricain	Plumber	Fitter	Electrician	
17	Oil testing Kit 3 liter Type: It should be portable and compact with sturdy carrying handle with motor operated to uniformly increase the output voltage 0-60 KV with the help of continuously variable auto transformer at the rate of 2KV/ sec approx. It should have resolution of 0.01 KV, accuracy class 1.5 and voltage scope: 20% -100% Input supply 230V/240V AC, 50Hz, Single phase AC supply through 3 core x of 3 m length cable, 5A capacity 3 pin plug for input supply. Output 0-60 KV; It should give smooth variable output voltage for testing the dielectric strength of insulating oil with Max Generated test Voltage: a. Between Transformer Terminals: 60 KV RMS      b. Between Transformer Terminals & Earth: 30 KV RMS			2				2
18	Oven stoving The Stoving Oven will have sturdy double walled construction. The inner coating. The set up is insulated with glass wool insulation from all sides. Oven will be consisting of fully insulated Door with best quality magnetic door lock and gasket. It will also contain efficient and adjustable ventilation. Air Circulation will be done with the help of Fan. Control panel will be consisting of Mains, Switches and Indicating lamps for Heater, PID Controller, timer etc. Size : 18" x 18" x 18" Shelves : 2 Adjustable wire mash type Heating Element : Nichrome wire, 2 kW Temp. Controller : PID type, 200 oC Max. Temp. Power supply : Single phase, AC 230 volts from mains. Chamber is made of SS-304 and outer of MS with good quality powder			2				2
19	Thyristor/IGBT controlled AC motor drive with VVVF control, 3 phase 2HP			2			1	3
	<b>TOTAL =</b>	<b>2</b>	<b>3</b>	<b>33</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>41</b>

**LIST OF MMV & DIESEL MECHANIC MACHINERIES FOR UPGRADATION OF EXISTING TRADES  
ITI, Cuttack (Package No.25)**

Sl. No.	ITEM Name	MMV	Diesel Mech	Total Qnty
1	<p>A.C. Units (Car)Gauge : Suction gauge 62 mm dial Discharge gauge 62mm dia. Suitable Condenser, Evaporator, Motor, Blower wheel, Grill, Filter Drier, Hosepipe, set, etc. Electrical panel board: 1. Motor : 1 HP ; power : 230 volt AC, 50HZ single phase 2. DOL starter switch for above motor Test chamber: Size : 3'x2 1/2'x2 1/2' The test chamber will be properly insulated with armocoal chamber shaped like a car fitted on plywood and acrylic sheet 4mm and suitable of 35x35x5mm steel angle structure.</p>	2		2
2	<p>Arbor Press hand operated two ton capacityMaximum pressure exerted (tons – kgs) : 2 tons – 2000 Centre to bake (inch – mm) : 7.1 / 2-190 Maximum height from base to guide (inch – mm) : 15 – 380 Maximum height arbor plate to guide (inch – mm) : 13.1/2-345 Size of arbor round or square (inch – mm): 1.3/4-45. ; Approx net weight kgs : 85.</p>		1	1
3	<p>Diesel Engine cut away model to show working parts for demonstration(1 two stroke and one four strok)• Four stroke four cylinder diesel engine mounted on sturdy stand. The cutting will enable the working parts visible i.e. connecting rod, piston, valve spring, pump, crankshaft, Timing gear /chain etc. • Internal components such as timing gears, Rocker arm, push rod, inlet valve &amp; outlet valves will be chrome plated. • Cooling system in sectional radiator, water pump, elbow, water jackets. Lubricating System in sectional oil pump, oil filter, oil chamber. Fuel Supply system in sectional Fuel injection pump, injector, air cleaner, intake manifold. Exhaust system in sectional exhaust manifold, silencer. Electrical system in sectional starter &amp; Alternator. Show bellow stated parts movable &amp; stationary. Cylinder head, Engine block, Piston, Rings and connecting rod, Rocker Shaft assembly. Crank shaft, Timing gear / chain,Fly wheel, Valves • Suitable Electric motor drive with reduction gear to be provided to under stand working of engine. • Necessary parts of engine will be attractive colors for better understanding. • Whole assembly will be mounted on suitable stand. • Manual will be provided</p>		2	2

Sl. No.	ITEM Name	MMV	Diesel Mech	Total Qty
4	<p>Diesel Engine four stroke multi cylinder 4/6 vehicular type1. Type : 4 Stroke Cycle water cooled</p> <p>2. Piston Displacement : 4600 cc to 5700 cc</p> <p>3. No. of Cylinder : 6</p> <p>4. Max. Output (Bhp) : 84 to 116 KW at 2700 - 3800 RPM</p> <p>5. Torque : 395 to 415 NM at 1000 - 2000 RPM</p> <p>6. Fuel Tank Capacity : 15 lit to 25S lit</p> <ul style="list-style-type: none"> <li>• With Suitable stand.</li> <li>• Manual will be provided</li> </ul>		4	4
5	Distributor Assembly suitable for LMV		1	1
6	Dynamo and voltage regulator suitable for LMV		1	1
7	Engine with PT system		1	1
8	Fuel feed pump suitable for LMV		2	2
9	Fuel injection pump calibration equipment and its accessories and special tools with attachments for distributor pump & inline pump		1	1
10	<p>Fuel injection pump(diesel) in line• Fuel pump suitable for four cylinder.</p> <ul style="list-style-type: none"> <li>• Cut section model showing arrangement of pump, roller assembly, cam plate etc.</li> <li>• Cut section will be mounted on wooden plate, in which all parts will be displayed.</li> <li>• The whole assembly will be supported with a suitable stand.</li> <li>• A separate handle provided for manual operation for demonstration</li> </ul>	1		1
11	Jack hydraulic hi-lift type(trolley) type	2		2
12	Multi point fuel injection pump Suitable for LMV.	2		2

Sl. No.	ITEM Name	MMV	Diesel Mech	Total Qty
13	<p>Petrol Engine running condition MPFI type • MPFI four cylinder Petrol engine having cubic capacity of 1500 to 2000 cc developing about 60 to 90 KW at 4500/6500 RPM water cooled.</p> <ul style="list-style-type: none"> <li>• Multipoint fuel injection system complete with all required accessories like radiator with safe guard, fuel tank, alternator, battery, starter motor, cooling fan etc.</li> <li>• Engine is mounted on M.S. sturdy frame having four caster wheels for easy shifting and a panel board fitted on a frame having in cluster unit.</li> <li>• Engine must start from panel board by ignition switch and it must be in a working condition with speed controlled from panel board of knob.</li> <li>• Engine is with all necessary sensors like 1. ECU, 2. Absolute Pressure Sensor, 3. Throttle Position Sensor, 4. Intake Air Temperature Sensor and Pressure Sensor, 5. Lambda sensor, 6. T.D.C. Sensor, 7. Engine Idling Actuator, 8. Engine Coolant Temperature Sensor etc.</li> </ul> <p>Engine Specifications:- (1) Type : 4 Stroke Cycle, Water Cooled, (2) Timing : Twin Overhead Camshaft, (3) Fuel System : M.P.F.I System, (4) No. Of Cylinder : 4 Cylinders, (5) No. Of Valve : 16 Valves, (6) Piston Displacement : 1500 to 2000 CC, (7) Maximum Output : 60 to 90 KW</p>	2		2
14	<p>Petrol Engine vertical(two stroke) Motor cycle/Scootortype 1.5 HP Indian Make contemptary model • Petrol engine (2 stroke) having cubic capacity of 60 to 150 cc developing about 03 to 8 BHP at 2500/6000 RPM.</p> <ul style="list-style-type: none"> <li>• Complete with all necessary accessories like fuel tank, accelerator unit, and transmission system with operating unit &amp; silencer etc.</li> <li>• Engine will be in a running condition with speed controlled.</li> </ul> <p>Engine Specifications: (1) Type : 2 Stroke petrol engine, (2) No. Of Cylinder : 1 Cylinder (3) Piston Displacement : 60 to 150 CC, (4) Maximum Output : 3 to 8 BHP at 2500 to 6000 RPM (5) Fuel Tank Capacity : 5 to 10 Liters , (6) No. of Gear : 3 or 4</p> <ul style="list-style-type: none"> <li>• Manual will be provided. • With Suitable stand.</li> </ul>		1	1
15	Piston ring compressor		2	2
16	Portable lifting crane 1 ton capacity with chain block and tackle arrangement		1	1

Sl. No.	ITEM Name	MMV	Diesel Mech	Total Qty
17	<p>Sectionised Engine Gear box and differential mounted on chassis • Motorized actual working cut sectioned of Gearbox &amp; Differential mounted on chassis. The cutting should be enabling the working parts visible i.e. the Gears &amp; Synchronized unit. Main shaft, counter shaft, Reverse Gears, Selector Mechanism. Crown Wheel &amp; Pinion Assembly and Rear Axle shaft, etc.</p> <ul style="list-style-type: none"> <li>• Suitable Electric motor drives with Reduction gear to be provided understand working of gear &amp; Differential mounted on chassis.</li> <li>• The Gearbox &amp; Differential should be cut in such a way to demonstrate bellow stated parts movable &amp; stationary parts.</li> </ul> <p>1. Gears, 2. Synchronized Ring, 3. Main shaft, 4. counter Shaft, 5. Reverse Gear, 6. Selector Mechanism, 7. Crown wheel 8. Pinion, 9. Rear Axle, 10. Propeller shaft, 11. Suitable Electric Motor with Reduction Gear Box (with V-belt, Pulley).</p> <ul style="list-style-type: none"> <li>• With Suitable stand. • Manual will be provided</li> </ul>	1		1
18	<p>Washing pump-ratiprocating type electrically operayted with one KW motor-1000 ltr tankType : Triplex plunger type Working Pressure : 650 LPS / PSI ( 45 Kg/cm2) Max. Design Pressure : 100 Bar (100 Kg/ cm2) No of Gun : 1 Nozzles : 2 (00 Pencil Jet, 250 FLAT Jet) Discharge Flow Rate : 1020 LPH (270 GPH) Pump RPM : 420 Required Motor : 3 HP (Single/Three Phase) 1440 rpm Standard Accessories : High pressure gun, 30 ft pressure hose, v-belts, pump pilley. Motor pulley, base frame, safety relief valve, 1 rubber washer set.</p>		1	1
	<b>TOTAL =</b>	<b>10</b>	<b>18</b>	<b>28</b>

**LIST OF REF & AC MACHINERIES FOR UPGRADATION OF EXISTING TRADES  
ITI, Cuttack (Package No.26)**

Sl. No.	ITEM Name	Ref & AC
1	Condensing unit with open type compressor evaporative condenser controls etc.capacity 3000 k.cal/hr	1
2	HC refrigerant in cylinders/disposable containers	2
3	Pipe bending tool lever type with degree indicator,for tube OD 6.4 to 16 mm.	2
4	Ammeter AC/DC portable precision grade teak wood case leather belt,0 to 30 amp.	2
5	Anemometer (vane type)	1
6	Capillary plug gauge	4
7	Heating kit with infra red bulb (200 watt.capacity)	1
8	Sensor thermometer (digital)	2
9	Sling psychrometer mountrd on aluminum back scale-50 deg c.to+50 Deg.C.	1
10	Tachometer digital,multirange 0 to 3000 rpm, portable small size in leather caseRange : 0-9999 RPM Type : Non-contact ; Display : 3 ½ digt, LED/LCD Accuracy : +/- 1 % for full scale auto ranging ; Motor Specification : (for RPM measurement) Revolutions : 100-3000 RPM variable speed ; Compactable AC variable power supply for varying speed of motor having compactable disc/ fan ; Power supply : 230 V, 50 Hz	1
11	Tong-tester 0-10-30 amps.,0-500 volts (clamp on Multimeter)	2
12	Pitot tube & inclined tube manometer	1
13	Visi coolerCapacity : 60 NO. Of 300 mL Bottle + 5 Cans of 330 MI. Compressor -CFC free R-134 A fan ; Cooled. Shelves - 1 No. Top half Shelve + 1 No. Middle shelf + 1 no middle shelf inner Light – 9 W CFL ; Glass Assembly - Double Glass Assembly with Molecular sieve and properly Sealed outer glass tempered. Insulation : PUF 40 mm ; Power : 170 W, With fitted of temperature controller, fan cooling and roller for easy movement and built with stabilizer with instruction manual.	1
	<b>TOTAL =</b>	<b>21</b>

**LIST OF CNC MACHINES FOR UPGRADATION OF EXISTING TRADES  
ITI, Rourkela(Package No.27)**

Sl. No.	ITEM Name	Instrument Mech.	TURNER	Total Qty
1	<p><b>CNC Milling Machine with option of 6 Station Automatic Tool Changer (ATC), FANUC emulated Control C.N.C.,</b> Milling trainerA 3 Axes CNC Bench Milling Machine with Fanuc Emulated Control Programming Software and Industrial Fanuc Emulated Control Panel With advanced Digital graphics Simulation With Virtual onscreen of Fanuc series, driven by Direct Numerical Control TECHNICAL SPECIFICATIONS: XL MILL.6 CONTROL PC Based 3 Axis continuous path7 Table Size 360 mm X 132 mm8 Travel X axis 225mm9 Travel Y axis 150mm10 Travel Z axis 115mm11 Spindle to Table Distance 70mm to 185mm12 Spindle to Column 110mm13 Spindle Nose Taper BT 3014 Programmable Spindle speed 150-4000 R.P.M15 Programmable Feed Rate - X , Y and Z axis 0 - 1000mm/min16 Repeatability 0.005mm17 Posional Accuracy ± 0.010mm18 Rapid Rate (X, Y and Z axis) 1.2 M/min19 Spindle Motor Capacity 0.5 HP AC Induction20 Axis Motors X , Y , &amp; Z (Stepper motor) 400 Steps/rev21 Main Supply 230 V , Single Phase, 50 Hz22 slides Turcite "B" fitted23 Bed CASTING24 Lubrication SINGLE shot centralised Lubrication25 Machine Weight (Approx.) 170 Kg26 Machine Dimentions (LxWxH) mm. 41 ATC Motor 230 V AC reversable42 ATC - Maximum tool diameter ø16mm 43 ATC - Maximim tool length 40mm44 ATC DIRECTION Bi-direction45 ■ Hydro Pneumatic Vice 46 ■ Automatic Door 4</p>	1		1

Sl. No.	ITEM Name	Instrument Mech.	TURNER	Total Qty
2	<p><b><u>CNC Turning Centre with 8 Station Indexing Tool Post</u></b>:-CNC Slant Bed Turning Centre with Industrial type Control Panel with closed loop servo motor control with further option of linking to CAD/CAM and FMS (Flexible Manufacturing System).CNC control FANUC Oi Mate,ed Type Slant bed 45 degree Swing over Bed 275mm Swing over Crossslide 80mm Swing over Way covers 240mm Maximun turning Diameter/Length 80mm / 180mm Minimum Turning Diameter 6 Chuck size: 100mm X axis Travel 95mm 90mm In Dia) Z-axis Travel 210mm Distance between centres 345mm Rapid Traverse Rate (X/Y axis in m/min) 5 m/min Tailstock travel 170mm Tailstroke Quill Stroke 30mm Quill Diameter 35mm Tailstroke Taper Spindle Bore 20mm Spindle Motor Asynchronous AC Spindle motor Spindle Nose Taper A 2/3" Spindle height from floor 1100mm Programmable Spindle speed 150-4000 R.P.M Programmable Feed Rate 0-5000 mm/min Positioning Accuracy ±0.010 Repeatability 0.003 Resolution 0.001mm Axis Motor (Z and X axis Motors) AC SERVO MOTORS Axis Motor power 3 NM Spindle Motor Capacity 3.7 Kw AC SERVO motor Bor</p> <p><b><u>TOOLING PACKAGE</u></b></p> <p>Set of 5 external turning carbide tool holders with inserts (1 No Turning &amp; Facing Tool holders, 3 Nos Copy Turning Tool Automatic door , Servo Stabilizer 10 KVA,3 Phase – 1 no.</p>		1	1
	<b>TOTAL =</b>	<b>1</b>	<b>1</b>	<b>2</b>

**LIST OF DRILLING MACHINES FOR UPGRADATION OF EXISTING & NEW TRADES  
ITI, Cuttack & Rourkela (Package No.28)**

Sl. No.	ITEM Name	ITI, CUTTACK					ITI, ROURKELA			Total Qty
		Fitter	Electricain	Instrument Mech.	Ref & AC	Plumber	FITTER	TURNER	AOCP	
1	Bench drilling machine with chuck and key up to 15mm cap.		4			1				5
2	Drill hand brace 0 to 100 mm		14							14
3	Drill machine hand 0 to 6 mm capacity• Rated voltage : 235 v • Nature of supply : d.c & a.c 50 hz. • Watts input (full load) : 500 watts • No load speed : 2500 rpm • Full load speed : 1650 rpm • No load current : 0.9 amps • Full load current : 2.3 amps • Duty cycle rating : continuous • Approx.net weight : 3.3 kg		6							6
4	Drill Power,Bench Type,Precision, Motorised With Chuck 0 to 12 mm			1						1
5	Drill S.S Twist block 2 mm, 5 mm, 6 mm set of 3		16							16

Sl. No.	ITEM Name	ITI, CUTTACK					ITI, ROURKELA			Total Qty
		Fitter	Electricain	Instrument Mech.	Ref & AC	Plumber	FITTER	TURNER	AACP	
6	Drilling machine bench to drill upto 12 mm dia• Specification in mm : 13 mm <ul style="list-style-type: none"> <li>• Speed : 4</li> <li>• Spindle Nose Taper : Solid</li> <li>• Range of Speed : 500-2825</li> <li>• Spindle Center to Column : 155</li> <li>• Spindle Travel : 75</li> <li>• Size of Square Table : 210 x 200</li> <li>• Base Size : 340 x 220 mm</li> <li>• Max Distance From Spindle to Base: 356</li> <li>• Working Surface of Table : 160 x 155</li> <li>• Working Surface of Base Plate : 170 x 170</li> <li>• Power Required for Electric motor: 0.25 HP</li> <li>• Approx. Weight of Machine : 45 Kg</li> </ul>	7							7	
7	Drilling machine (Bench Type one additional number is require to be provided for each additional batches i.e. in the 1 <sup>st</sup> & 2 <sup>nd</sup> shift.						1		1	

Sl. No.	ITEM Name	ITI, CUTTACK					ITI, ROURKELA			Total Qty
		Fitter	Electricain	Instrument Mech.	Ref & AC	Plumber	FITTER	TURNER	AACP	
8	Drilling Machine bench sensitive 0-12 mm cap motorized with chuck & key • Specification in mm : 13 mm • Speed : 4 • Spindle nose taper : solid • Range of speed : 500 - 2825 • Spindle center to column : 155 • Spindle travel : 75 • Size of square table : 210*200 • Base size : 340*220 mm • Max. Distance from spindle to base : 356 • Working surface of table : 160*155 • Working surface of base table : 170*170 • Power required for electric motor : 0.25 hp • Approx. weight of machine : 45 kg.						2	1	1	4

Sl. No.	ITEM Name	ITI, CUTTACK					ITI, ROURKELA			Total Qty
		Fitter	Electricain	Instrument Mech.	Ref & AC	Plumber	FITTER	TURNER	AOCP	
9	Drilling machine pillar sensitive 0-20mm cap with swivel table motorized with chuck & key. Specification in mm : 19 mm <ul style="list-style-type: none"> <li>• Speed : 8</li> <li>• Spindle Nose Taper : MT-2</li> <li>• Range of Speed : 86-3360</li> <li>• Spindle Center to Column : 199.5</li> <li>• Spindle Travel : 130</li> <li>• Size of Square Table : 270 x 270</li> <li>• Base Size : 470 x 315 mm</li> <li>• Max Distance From Spindle to Base : 710</li> <li>• Working Surface of Table : 210 x 210</li> <li>• Working Surface of Base Plate : 300 x 250</li> <li>• Power Required for Electric motor : 0.5 HP</li> <li>• Approx. Weight of Machine : 101 Kg</li> </ul>	1					1			2
10	Electric drill machine portable 6 mm capacity <ul style="list-style-type: none"> <li>• Rated voltage : 235 v</li> <li>• Nature of supply : d.c &amp; a.c 50 hz.</li> <li>• Watts input (full load) : 500 watts</li> <li>• No load speed : 2500 rpm</li> <li>• Full load speed : 1650 rpm</li> <li>• No load current : 0.9 amps</li> <li>• Full load current : 2.3 amps</li> <li>• Duty cycle rating : continuous</li> <li>• Approx.net weight : 3.3 kg</li> </ul>	1	1							2
11	Electrical drill portable with chuck and key capacity 6.4 mm.				1					1

Sl. No.	ITEM Name	ITI, CUTTACK					ITI, ROURKELA			Total Qty
		Fitter	Electricain	Instrument Mech.	Ref & AC	Plumber	FITTER	TURNER	AOCP	
12	Hand drill machine 6 mm cap..• Rated voltage : 235 v <ul style="list-style-type: none"> <li>• Nature of supply : d.c &amp; a.c 50 hz.</li> <li>• Watts input (full load) : 500 watts</li> <li>• No load speed : 2500 rpm</li> <li>• Full load speed : 1650 rpm</li> <li>• No load current : 0.9 amps</li> <li>• Full load current : 2.3 amps</li> <li>• Duty cycle rating : continuous</li> <li>• Approx.net weight : 3.3 kg</li> </ul>			2						2
13	Pillar electric drill machine 12 mm capacity• Specification in mm : 13 mm <ul style="list-style-type: none"> <li>• Speed : 4</li> <li>• Spindle Nose Taper : Solid</li> <li>• Range of Speed : 500-2825</li> <li>• Spindle Center to Column : 155</li> <li>• Spindle Travel : 75</li> <li>• Size of Square Table : 210 x 200</li> <li>• Base Size : 340 x 220 mm</li> <li>• Max Distance From Spindle to Base : 356</li> <li>• Working Surface of Table : 160 x 155</li> <li>• Working Surface of Base Plate : 170 x 170</li> <li>• Power Required for Electric motor : 0.25 HP</li> <li>• Approx. Weight of Machine : 45 Kg</li> </ul>	8	4							12
<b>TOTAL =</b>		<b>17</b>	<b>45</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>4</b>	<b>1</b>	<b>1</b>	<b>73</b>

**LIST OF Fabrication Mechanical MACHINERIES, ITI BHAWANIPATNA**

**Package No. 29**

Sl. No	Name of the Machineries	BBBT	ADV. MODULE	Total Qty
1	2	3	4	5
1	AG 7 Grinder	02 Nos.	06 Nos.	8
2	AG4 Grinder	Nil	06 Nos.	6
3	Bench shear hand capacity up to 5 mm	01 No.	02 Nos.	3
4	<p><b><u>Buffing machine with all accessories &amp; optional accessories &amp; Raw materials//</u></b>  <b><u>SPECIFICATION</u></b>=Motor: 1 1/3 HP Max Rating Motor: 1 HP Long Term Duty Rating (Motor drops to 1 HP after 2-3 hours of continual use) ,Speed: 3,450 RPM (single speed) Weight: 62 lbs. Amps: 10.7, Rotates buffing wheels 10" and smaller, Arbor: 3/4", Shank Length:7 3/8" (from bearings to wheel) , Shank Width: 1", Cast Iron Housing and Base measures: 27"L x 8"W x 11"H Includes manual book. Optional Accessory Kit :- (2) 10" spiral sewn buffing wheels ,(2) 10" loose cotton buffing wheels , 4 pc. polishing compound kit . Optional Heavy Duty Industrial Pedestal :-Height: 32" ,Table Dimensions: 10 1/4" x 11 1/8" ,Post Diameter: 2 3/4"                      Certified company under ISI /</p>	02 Nos.	Nil	2
5	<p><b><u>Brinell hardness testing machine with all accessories &amp; optional accessories.</u></b> Testing Table Dia 200 mm 1No., Loads of Kgf : 500 to 3000in Stages of 250 Testing Table dia 70 mm with 'V' groove for round jobs dia 10 to 80 mm – 1No. max. Test Heights X Throat (mm) : 380x200 , Ball holder dia 5 mm with T.C. ball-1No. Ball holder dia 10 mm with T.C. ball-1No. Depth of Elevating Screw Below Base (mm) : 1880 Test Block HB-5/750-1No. Machine Height (mm) 1225 Appx. Test Block HB-10/3000-1No. Size of Base (mm) 380 x 740 Appx. Motor Drive : 0.33HP Mains Supply : 415V, 50Hz, 3 Phase AC Indentation Measurement : Direct Reading Optical Device with 14 x Magnification. Allen Spanner-9Pcs., Instruction Manual-1No</p>	01 No.	Nil	1
6	<p><b><u>Beading machine with 380 mm throat clearance (with crimping rollers) with all accessories &amp; optional accessories.</u></b> Deep throat swaging and beading machine , complete with one pair of swage rolls, motorized model, supplied with suitable stand, speed reduction gears, 2HP , AC 440V, 50Hz, 3Phase, Motor pulley , V belt guard and starter , Maximum capacity to work on MS 16SWG centre distance between rolls 2 1/2" depth of gap 18".</p>	01 No.	Nil	1
7	Bench Liver Shears 250 mm blade X 3 mm Capacity	01 No.	Nil	1
8	Centre lathe swing over dia 10"	Nil	02 Nos.	2

Sl. No	Name of the Machineries	BBBT	ADV. MODULE	Total Qty
9	Centre lathe, height of centre 150 mm with all standard accessories	Nil	01 No.	1
10	Circle cutting machine 300 mm diameter with all accessories & optional accessories	01 No.	Nil	1
11	D.E.grinder 30cm wheel motorized pedestal type (one fine & one rough)	02 Nos.	03 Nos.	5
12	Electric drill machine 6 mm capacity universal type 250V	01 No.	Nil	1
13	Fly press / Ball press No.4 single body with all accessories	01 No.	Nil	1
14	Gullitine shearing machine	Nil	01 No	1
15	Impact testing machine	01 No.	01 No.	2
16	Lathe general purpose all geared (gap bed) ,height of centres 150mm bed length 1500 mm with 3 jaw & 4jaw chuck, face plate, taper turning attachment steadies etc., and set of lathe tool holders.	02 Nos.	Nil	2
17	<b><u>Milling universal cutter grinder with all accessories &amp; optional accessories.</u></b> (For grinding HSS and carbide engraving cutter as well as single lip or multiple lip cutters of various shapes such as radius cutters or negative taper angle of cutters. The universal index head is provided at 24 positions so that any particular angle of shape can be obtained, free 360degree or 100 rotations is allowed for grinding End Mills, Twist Drill, Lathe Tools, only replace the attachment to the index head without any complex setup. ) <b><u>ACCESSORIES</u></b> = Certified company- CE,ISO9001:2000, Max. collet capacity-28mm/Max. grinding dia-28mm, Taper angle-0~ 180 (degree)/Relief angle-0~ 45 (degree), Negative angle-0~52(degree/Grinding spindle-5200 r.p.m., Cup grinding wheel-100*32*20mm/Motor-1/3HP 220V/380V 50HZ. Net weight- 50KG/Gross weight-60KG/Standard Accessory, Diamond Wheel /Dresser ....1pc/ Wheel flange, (mounted).....1pc. Collect :4,6,8,10,12mm (or inch).....5pc/ Grinding Wheel .....1pc./ Aligning Finger.....1pc/ Lock Pin.....1pc/ Drive Belt .....1pc/ Tools.....1set/ Optional Accessory/ End mill grinding attachment, Twist drill grinding attachment/Lathe tool grinding attachment	01 No.	Nil	1
18	<b><u>Milling cutter grinder-Cutter Sharpener(GD-40) with all accessories .</u></b> (Cutter sharpener is applicable to grind milling cutter of all kinds of diameter, shapers and angles for die sinker, also to die pin corresponding to the miller according to die sinker scale, it has ability of grinding turning tool, drill. So it is an necessary equipment in using die sinker with excellent figuration, new structure and good application). <b><u>ACCESSORIES</u></b> = Certified company- CE,ISO9001:2000, Wheel Diameter-100mm/Thickness-50mm/Hole size- 20mm, Spindle speed- 5600rpm/Collet clamping diameter range- 3-16mm Tool post longitudinal travel-140mm, Tool post longitudinal mircro adjustment- 18mm, Spindle post longitudinal mircro adjustment-8mm, Grinding taper range-0°~180°/Grinding negative angle range-0°~52° Grinding relief range-0°~44°	01 No.	Nil	1

Sl. No	Name of the Machineries	BBBT	ADV. MODULE	Total Qty
19	Muffle Furnace	01 No.	Nil	1
20	Nibbling machine with all accessories & optional accessories (Bosch, GNA 2.0)	01 No.	Nil	1
21	<b><u>Polishing machine with all accessories &amp; optional accessories with polishing wheels .</u></b> <b>ACCESSORIES=</b> Motor: 1 1/3 HP Max Rating Motor: 1 HP Long Term Duty Rating (Motor drops to 1 HP after 2-3 hours of continual use) , Speed: 3,450 RPM (single speed), Rotates polishing wheels 10" and smaller, Arbor: 3/4", Shank Length:7 3/8" (from bearings to wheel)Shank Width: 1", Cast Iron Housing and Base measures: 27"L x 8"W x 11"H Includes manual book . Certified company under ISI / ISO	02 Nos.	Nil	2
22	Pedestal Grinder, double ended with 170 mm wheel(one fine & one rough)	02 Nos.	Nil	2
23	<b><u>Portable Pneumatic shear</u></b> , Blade length: 300mm , Cutting Capacity: a) MS sheets of up to 125mm wide X 4mm thick b) Aluminium, Copper and Brass bars of up to 100mm wide X 10mm thick. Controls: Pneumatic or Electric Push button or foot pedal operated. Accessories: Cutting platform with side and toggle clamp provided. Working Pressure: Compressed air at 5 bar pressure is required for operating the machine.	02 Nos.	Nil	2
24	<b><u>Portable sand / shot blasting equipment with all accessories with blasting materials with air compressor &amp; optional accessories.</u></b> <u>Portable Shot Blasting Equipments with Blasting Materials</u> Pressure Tank Fabrication : MS Sheet thickness 6mm, Dish End thickness : 8mm., Max. Working Pressure : 100 (7.0 PSI (Kg/cm2), Hydraulic Test Pressure : 250 (17.5) , Abrasive Storage Capacity : Metallic 150 Kg Appx. Sand 65 Kg Appx., Volume : 42 Ltrs. , Compressed Air Requirement at 5.63Kg / cm2 : For 5mm Nozzle with following Blasting Materials : (a) Airfed Blasters Helmet (b) Pneumatic Hose for Helmet with end fittings (c ) Rubber Hand Gloves (d) Gum Boots (e) Operators suit (f) Helmet Air Conditioner (g) Helmet Air Breather	01 No.	Nil	1
25	Phospating plant with all accessories & optional accessories & equipment	01 No.	Nil	1
26	Pneumatic rivet gun	02 Nos.	Nil	2
27	Paint Mixer Machine	01 Nos	Nil	1
28	Power hacksaw Machine	Nil	03 Nos.	3
29	Portable Drilling machine ( Cap. 6mm)	Nil	03 Nos.	3

Sl. No	Name of the Machineries	BBBT	ADV. MODULE	Total Qty
30	<b><u>Rockwell hardness testing machine with ABC scale lead 60, 100 &amp; 150Kgs with all accessories &amp; optional accessories.</u></b> Test Loads : 60, 100, 150 (Rockwell) Rockwell Diamond Indentor : 1No., Supply Voltage : 230V, 50Hz, Single Phase, Testing Table dia 50mm : 1No. Initial Loads (Kgf) : 10, Testing Table dia 40mm with "V" Groove for Round Jobs dia 6 to 45mm : 1No. , Max. Text Height (mm) : 300 , Steel Ball Indentor dia 1/16" : 1No., Depth of Throat (mm) : 155, Test Block HRC : 1No. Test Block : 1No., Size of Base (mm) 645 x 260mm Appx. Steel Ball dia 1/6" : 5Nos., Allen Spanners : 3Nos. Machine Height (mm) 745, Clamping Device : 1No. PVC Cover for Machine : 1No., Rubber Bellow : 1No. Instruction Manual : 1 Book	01 No.	Nil	1
31	<b><u>Spinning lathe Machine with all accessories &amp; optional accessories</u></b> Length of Bed : 1600mm, Height of Center : 330mm, Diameter of Spindle : 77mm, Width of Bed : 280mm, with following accessories. Revolving Centre, Electronic Motor, Reversible Switch, V Belt with Motor Pully Fittings.	01 No.	Nil	1
32	Sensitive Drilling Machine Pillar 12 mm capacity with accessories	01 No.	Nil	1
33	<b><u>Seaming Machine</u></b> .Hand Operated Grooving or Side Seaming Machine for closing side seaming on round or irregular shaped bodies with detachable mandrel having full length groove for inside seams , complete with a set of grooved two wheels for outside seams and one plain wheel for inside seams. Working Length of Mandrel 18" , Capacity in MS SWG : 22	01 No.	Nil	1
34	Tin smiths bench folder 600 x 1.6 mm	01 No.	Nil	1
35	Universal Testing machine 10 ton capacity.	01 No.	02 Nos.	3
	<b>TOTAL=</b>			<b>67</b>

**LIST OF MECHANICAL EQUIPMENTS, ITI BHAWANIPATNA**  
**Package No. 30**

Sl. No	Name of the Equipments	BBBT	ADV. MODULE	Total Qty
1	2	3	4	5
1	Angle plate adjustable 250X150X175	02 Nos.	Nil	2
2	Anvil 50 kgs with stand	01 No.	Nil	1
3	Annealing box 152 x 50 x 45 cm M.S. 3 mm thick	01 No.	Nil	1
4	Alloy steel test piece of known composition (at least 15 different steel sizes 150 mm length & 10 mm diameter)	01 Kit	Nil	1
5	Case hardening box 38 x1.25 cm M.S.	01 No.	Nil	1
6	Chart for spark test	01 No.	Nil	1
7	Dye penetrant Testing Kit	02 Set	06 Set	8
8	Hand press brake capacity (0.8 mm)	01 No.	Nil	1
9	IIW/ASTM reference radiograph standard	Nil	03 Set	3
10	Light general purpose portable forge	02 Nos.	Nil	2
11	Magnifying glass 6"(150 mm ) diameter	Nil	04 Nos.	4
12	<p><b><u>Powder Coating Equipment Complete with Drying Oven</u></b></p> <p>a) Micro Flow Powder Welding Process Cold An assortment of spray blow pipes each with its own injector and mixing chamber. Fast manual assembly, spray blow pipe easily rotated. Specially designed high performance WC nozzle. Quick shut out level cuts supply of gases to the torch. Heating in the torch causes sintered plugs to fuse, blocking the gases. Longer blowpipe keeps the operator at a safe and comfortable distance when higher flame setting are used due to increase in coating power increases. Heat shield designed for maximum protection at different working angles.</p> <p>b) Powder Welding Process Cold No bond coat – start and finish coating with one powder alloy. Exceptionally high bond strength and strong interparticle bonds, provide very tough coatings. Unique composition provides exceptional wear resistance property. Application temperature less than 250°C. Also suitable for thin build up.</p> <p>c) Electrode Drying Oven Thermostatically Controlled , Temperature 0 – 250 C 10Kg Cap. Potable Electrode Drying Oven made of Thick Mild Steel Sheet with cover and carrying handle duly painted temperature range 50°C to 250°C</p>	01 No.	Nil	1
13	Reference Radiographic standard	Nil	01 Set	1
14	Reduction sleeve MT as required	01 Set	Nil	1

Sl. No	Name of the Equipments	BBBT	ADV. MODULE	Total Qty
15	Spirit level 2V 250,05 metre	01 No.	Nil	1
16	Slip roll former 1.6 mm x 1000 mm	01 No.	Nil	1
17	Spray Gun gravity or pressure feed container and Gun 20 Litres capacity	01 No.	Nil	1
18	Solid parallels in pairs ( Different sizes) in Metric	16 Pairs.	Nil	16
19	Surface plate 900 x900 x1200 mm with Table	01 No.	Nil	1
20	<b>Ultrasonic flaw detector with all accessories.</b> With Ultrasonic Probes (12 & 24mm dia), Angle Probe ( 12.5mm) BNC to BNC Cable . Frequency : 0.5-12MHz (0.5-25.00MHz), Sensitivity : 140+/-3dB, Gain Control : 103dB in 0.25 dB Steps. Horizontal Linearity : $\pm 1\%$ of Test Range. Vertical Linearity : $\pm 3\%$ of Screen Height. Accuracy of calibration Gain : $\pm 1$ dB. Test Range : 10mm – 10 mt in Steel. CRT Screen : 70 x 55mm (100 x 80mm), Delay : 0-500mm in steel (Up-to 4 meter), Suppression : 0-50% of screen height, PRF : 125Hz-2KHz coupled with test range. Voltage Supply : 7.2 VDC (Ni-cd Batteries)–(Mains 230V) , Battery Life : 3 - 4 Hours. Acceptable Temperature : 0-500C. Test Method : Pulse echo / through transmission. Operating Mode : Single / Double Probe, T/R Mode	Nil	03 Nos.	3
21	Wire brush (SS)	21 Nos.	34 Nos.	55
22	Wire Brush (MS)	23 Nos.	34 Nos.	57
23	Water tank for quenching capacity about 300 liters	01 No.	Nil	1
	<b>TOTAL=</b>			<b>164</b>

**LIST OF WELDING MACHINERIES, ITI BHAWANIPATNA**  
**Package No. 31**

Sl. No	Name of the Machineries	BBBT	ADV. MODULE	Total Qty.
1	2	3	4	5
1	Air plasma cutting system with all accessories with air compressor	Nil	02 Nos.	2
2	Arc welding set rectifier type 400A with all accessories	Nil	02 Set	2
3	Acetylene Cylinder	Nil	06 Nos.	6
4	Argon Cylinder	Nil	05 Nos.	5
5	Apron Leather	17 Nos.	51 Nos.	68
6	CO2 Cylinder	Nil	05 Nos.	5
7	Co2 Welding Machine complete 400 Amp. With cooled goose necked torch 300 Amp	Nil	01 Set	1
8	Cutting torch oxy-acetylene with cutting nozzles	Nil	04 Set	4
9	Carbon Arc gouging torch 300 Amp.	Nil	01 No.	1
10	Electrode Holder 400 Amp.	Nil	12 Nos.	12
11	Earth Clamps	12 Nos.	30 Nos.	42
12	Electrode drying oven Temp. range 0-250o C , 10Kg cap.	01 No.	03 Nos.	4
13	Fiber welding booth and welding screen	08 Nos.	24Nos.	32
14	Fume extractors	04 Nos.	12 nos.	16
15	Gloves pair leather	17 Nos.	34 Nos.	51
16	Gas welding goggles	Nil	34 Nos.	34
17	Glass coloured 108 x 82 x 3mm DIN 9A,11A & 13A	Nil	48 Each	48
18	Glass white 108 x 82	Nil	60 Doz.	60
19	Heavy duty cutting blow pipe with cutti9ng nozzles	01 Set	03 Set	4
20	Leather sleeves	Nil	32 Pair	32
21	Lugs for cables	Nil	08 Nos	32
22	Liquified Petroleum Gas (LPG) Cylinder, Regulator and Torch with Burner 19.5 kg	02 Set.	Nil	2
23	Oxygen Cylinder	Nil	06 Nos.	6
24	Outfit Spanner	Nil	24 Nos.	24
25	Pug Cutting Machine	Nil	02 Nos.	2
26	Pressure regulator oxygen double stage	Nil	20 Nos	20

Sl. No	Name of the Machinerics	BBBT	ADV. MODULE	Total Qnty.
27	Pressure regulator Acetylene regulator	Nil	16 Nos.	16
28	Rubber hose pipe black & red 5mm	Nil	50 Mtrs.each	60
29	Rubber hose clips	50 Nos.	150 Nos.	200
30	Spindle Key ( For opening cylinder Valve)	Nil	24 Nos.	24
31	Safety boots for welders	Nil	34 Nos.	34
32	Spark Lighter	Nil	34 Nos.	34
33	Safety Goggles	39 Nos.	34 Nos.	73
34	Screen welding helmet type	Nil	51 Nos.	51
35	Submerged Arc welding machine 600 Amp	Nil	02 Nos.	2
36	<b>Spot welding machine</b> – 15 KVA With all accessories, 15KVA with all accessories , Input Supply : 415V, KVA Rating @ 50% duty Cycle - 15KVA Rating @ 100% duty Cycle- 15KVA, Spot Capacity Max 4mm, Combined Thickness _Min 1.5, Water Requirement 5 LPM, Main Cable Size- Copper 2.10 Sq.mm	01 Set	01 Set	2
37	Transformers welding set with all accessories 300 A	Nil	02 Set	2
38	TIG welding set complete 300 Amp AC/DC with water cooled torch	Nil	02 Set	2
39	Tip cleaner	Nil	24 Nos.	24
40	Welding Helmets	Nil	32 Nos.	32
41	Welding Rubber hose pipe Oxygen & Acetylene 8mm	30 Mtrs.	90 Mtrs.	120
42	Welding torches with 10 nozzles	06 Set.	06 Set.	12
43	Welding hand screen dual coloured	Nil	51 Nos.	51
44	Welding helmet dualcoloured	Nil	17 Nos.	17
45	Welding cables to carry 600 amps with flexible rubber	Nil	150 Mtrs.	150
	<b>TOTAL=</b>			1421