

INSTRUMENT MECHANIC

Syllabus e S.No.	Name of the items	Quantity of DGET norm's
1	Steel Rule 150 mm (metric and English Marking)	21 Nos.
2	Watch maker screw driver (set of six)	21 Nos.
3	Plier flat Nose 100 mm	21 Nos.
4	Hammer ball pain 250 gms. With handle	21 Nos.
5	Twiser fine point 125 mm	21 Nos.
6	File hand smooth 200 mm	21 Nos.
7	File Flat 2 nd cut 200 mm	21 Nos.
8	Screw driver set of 5 pieces	21 Nos.
9	Adjustable spanner	21 Nos.
	B. Tool, Measuring Instruments & General Shop Outfit	
1	Try square hardened blade 100 mm	4 Nos.
2	Neon (phase) tester 230 volt	4 Nos.
3	Eye glass 3" focus watch maker	4 Nos.
4	Surface plate 400×400 mm	2 Nos.
5	Universal scribing block 250 mm plier	2 Nos.
6	Angle plate 150×100	2 Nos.
7	Vee block with clamp pair	2 Nos.
8	Punch frame set 2 mm	2 Nos.
9	Hacksaw frame adjustable 200 – 300 mm	8 Nos.
10	Hammer ball pain 450 gms, with handle	2 Nos.
11	Electric soldering iron 6 watt pencil tip	4 Nos.
12	Vice bench jaw 100 mm	4 Nos.
13	Pointer extractors (puller)	4 Nos.
14	Screw pitch gauge B.A. & metric each	1 each
15	Punch center 100×10 mm	2 nos.
16	Tool maker's clamps 65×15×25 mm opening	2 nos.
17	Plier side cutting 150 mm	2 nos.
18	Sine bar 125 mm plate	1 no.
19	Flaring tool set	1 set
20	Micrometer outside 0 to 25 mm	2 nos.
21	Micrometer outside 25 to 50 mm	1 no.
22	Vernier height gauge 300 mm	2 nos.
23	Combination set 300 mm	1 no.
24	Vernier caliper 150 mm	2 nos.
25	Standard wire gauge	1 no.
26	Feeler gauge leaf type, 26 blades, eng.& metric	1 no.
27	Radius gauge leaf type 1 to 15 mm	1 no.
28	Dial test indicator in mm with accessories.	1 No.
29	Micrometer inside 25 mm with extension up to 150 mm	1 Nos.
30	Combination plier heavy duty 150 mm	6 no.
31	Fire buckets	4 no.
32	Tube cutter	1 no.
33	Tube bender	1 no.
34	Pinching tool	1 no.

35	Allen key set (metric)	2 sets.
36	Allen key set (English	2 sets
37	Soldering station (temp. controlled)	2 nos.
38	Screw driver 200 mm	3 nos.
39	Philips screw driver 200 mm	2 sets.
40	Round nose plier 150 mm	4 nos.
41	Magnifying glass 75 mm	2 nos.
42	Slip Gauges (workshop grade)	2 nos
43	Fire extinguishers	2 nos

C.MECHANICAL PRECISION INSTRUMENTS

1	Plug gauge	2 nos.
2	Ring gauge	1 no.
3	Snap gauge	1 no.
4	Surface gauge	2 nos.
5	Telescopic gauge	1 no.
6	Vernier bevel protractor	2 nos.
7	Dividers, 250 mm	3 nos.
8	Gauge blocks	3 nos.
9	Monochromatic light source	1 no.
10	Wire type strain gauge (load cell/cantilever beam) instrument	4 nos. (each 2 no)
11	Vibrometer sensing elements	2 nos.
12	Accelometer	1 no
13	Sesmic instruments	2 nos.
14	Load cells of various ranges	2 nos.

D. Rotational/velocity Instruments

1	Speedometers (at least four different popular make) with adopters of various sizes	1 no. each.
2	Centrifugal type tachometer	1 nos.
3	Drag cup type tachometer	1 nos.
4	Electrical tachometer	1 nos.
5	Chronometric type tachometer	1 nos.
6	Digital type tachometer	1 no.
7	Stroboscope	1 no.

E.Precision Instruments

1	Digital panel meters, 4 digit	6 nos.
2	Digital line frequency indicator	2 nos.
3	D.C. regulated power supply (+/-15V / +/- 30V) Technical Specifications: Variable Output Output Voltage:0 ~ 30VDC Output Current:0 ~ 2A Source Regulation:< 0.05% +10mV Load Regulation:< 0.05% +10mV Ripple & Noise:<1mV (rms) Digital Display:3 digit voltage & current display Accuracy :+1%, +1 Digit	2 nos.

	<p>Fixed Output Output Voltage:Fixed 5VDC/3.3VDC Output Current:1A Source Regulation:<5mV Load Regulation:<15mV Ripple & Noise:<2mV (rms) Power requirement: 220 VAC +10% , 50 Hz Weight: 4.0Kg Approx. Dimensions (mm): 120(L) x 250(B) x 150(H) Standard Accessories : Power cable, Instruction manual</p>	
4	<p>Digital multi signal generator (1 MHz) with frequency counter (8 digit or 10 MHz) Technical Specifications : Frequency range: 0.2Hz ~ 2MHz Digital Output waveform : Sine, Triangle, Square, Pulse, Ramp Output impedance : 50ohms + 10% Amplitude : >20Vp-p (1Mohm Load) :>10Vp-p (50ohm Load) DC offset : 0~+10V (1Mohm Load) :0~+5V (50ohm Load) Symmetry range: 10% ~ 90% Output attenuation: 20dB, 40dB, 60dB Sine wave distortion:20Hz ~ 20kHz<1 % Frequency response:2Hz ~ 2MHz < +1dB Square wave rise or fall time:<30ns TTL output :<50ns Low level :<0.4V High level :>3.5V Impedance :100ohm</p> <p>VCF Input Input voltage : -5V~0V Input impedance:10kohm +10% 50Hz Output :2Vp-p, main synchrony</p> <p>Frequency Counter Display :6 Digit Measuring range : 0.5Hz ~ 30MHz Input impedance : 10kohm +10% Sensitivity : 200mV rms Accuracy : 0.1Hz / 1Hz Error :<0.1%+1digit Max. Input voltage:50Vp-p Power requirement: 220 VAC +10% , 50 Hz Weight : 3.0Kg Approx. Dimensions (mm): 250(L) x 275(B) x 100(H)</p>	1 no.

	Standard Accessories : Power cable, BNC to Crocodile Clip Probes - 1No & BNC to BNC Probe - 1No., Instruction manual	
5	Digital function generator	1 no.
6	Pulse generator	1 no.
7	Digital insulation tester Features : Multi test voltage Auto range LCD background light Data hold Working LED indicator Low battery warning Function symbol display AC Voltage test Technical Specification Test voltage :250/500/1000/2500V Insulation resistance:0.1Mohm~20Gohm Accuracy :+(3%Rdg+5Digit) Resolution :0.01Mohm AC Voltage range:600VAC Accuracy : +(2%Rdg+5Digit) Weight : 1.0Kg Approx. Dimensions (mm): 190(L) x 155(B) x 75(H) Standard Accessories : Probes, Batteries, Instruction manual	1 nos.
8	Digital multimeter Features : LCD Display, Max. Upto 1999 Manual operation Diode test, Triode test, Continuity test, Low Battery indication, Data hold, Auto power off, Function protection, Self recover protection, Shock Protection Measure AC, DC Voltage & AC, DC Current , Resistance, Capacitance, Temperature Technical Specifications: DC Voltage range:200mV, 2V, 20V, 200V, 1000V Accuracy :+(0.5% + 3 Digit) DC Current range: 20microA, 2mA, 200mA, 20A Accuracy :+(1.5% + 3 Digit)	2 nos.

	<p>AC Voltage range: 2V, 20V, 200V , 750V Accuracy :+(0.8% + 5 Digit) AC Current range:2mA, 200mA, 20A Accuracy :+(1.5% + 3 Digit) Resistance range:200ohm, 2Kohm, 20Kohm, 200Kohm, 2Mohm, 20Mohm Accuracy :+(0.8% + 3 Digit) Capacitance range:20nF, 200nF, 20microF, 200microF Accuracy :+(2.5% + 20 Digit) Temperature :- 40OC ~ 1000OC Accuracy :+(0.8% + 4 Digit) Input impedance:10Mohm Sampling Rate:3s AC Frequency Response:40 ~ 400Hz Power requirement:Battery 9V (Included) Standard Accessories : Probes, Batteries, Instruction manual</p>	
9	<p>Analog multimeter Technical Specifications : DC Voltage range : 0.1, 0.5, 2.5, 10, 50, 250, 1000V Accuracy at FSD : 4% Sensitivity : 20Kohm / V DC Current range : 50microA(at 0.1VDC position),2.5~25mA, 0.25A Accuracy at FSD : +3% Volt drop : 250mV AC Voltage range : 10, 50, 250, 1000V Accuracy at FSD : 5% Sensitivity : 9Kohm / V Decibel meter : -10 ~ +50dB, 0dB = 1mw/600 Resistance range : X1~0.2ohm up to 2Kohm, Mid scale at 20ohm : X10~2ohm up to 20Kohm, Mid scale at 200ohm : X1K~200ohm up to 2Mohm, Mid scale at 20Kohm : X1K~2Kohm up to 20Mohm, Mid scale at 200Kohm ICEO (leakage current test) : 150microA, 15mA, 150mA hFE (DC amplification) : 0-1000 Power requirement : Battery AA, 1.5V x 2nos. &9V (Included) Weight : 300g Approx. Standard Accessories : Probes, Batteries, Instruction manual</p>	1 no
10	<p>Digital L.C.R. bridge Technical Specifications : R: 0.0001ohm - 99.99 Mohm , C : 0.01 pF -19999microF, L :0.01 microH - 9999H D: 0.0001 - 9.999, Q: 0.01 - 9999 Measuring parameters:L-Q , C-D , R-Q Test frequency :100 Hz , 1 kHz , 10 kHz</p>	1 no

	<p>Level :0.3Vrms Accuracy :0.25% Display range:R, 0.0001ohm -99.99 Mohm :C, 0.01 pF -19999 microF :L, 0.01microH -9999 H :D, 0.0001 - 9.999 : Q, 0.01 - 9999</p> <p>Sampling rate : 5 times/sec. Equivalent circuit : Series, Parallel Test Mode : Auto, Hold Calibration :Open circuit, Short circuit and ZeroingTest Ports 5 terminals</p> <p>Display mode : Direct readout Power requirement : 220 VAC +10% , 50 Hz Weight : 3.0Kg Approx. Dimensions (mm) : 360(L) x 340(B) x 120(H)</p> <p>Standard Accessories : Power cable, Instruction manual</p>	
11	<p>Digital I.C. tester Features : Tests most of the 6 to 40 pin ICs in DIP package as per give in Test Library Automatic testing of variety of Ics Potential free 40 pin universal ZIF socket Six Seven Segment/16x2 LCD Display It has 16/12 keys for its operation Audio alarm to user whenever it is required Power requirement : 220 VAC +10% , 50 Hz Weight : 1.0Kg Approx.</p>	1 no
12	<p>Analog dual trace CRO 30MHz Features : 30MHz Inbuilt 6 Digit seven segment display Dual channel, X Y mode 6" display cathode ray tube, sensitivity triggering up to 1mV/divison TV synchronous separation circuit to observe stable TV signal Polarity reversal, CH 1Sync output</p> <p>Technical Specifications : CRT : 6" Rectangular screen with internal graticule, 8 x 10 Div (1Div=1cm)</p> <p>Vertical Deflection Vertical Operation Mode : CH1, CH2, ADD, ALT, CHOP (CH1, CH2) Sensitivity : 5mV/div to 5V/div +3%, 1mV/div to 1V/div +5% (x5),10 steps Rise time : <17.2ns Input impedance : 1Mohm Max. Input voltage : 250V (DC+AC peak value) at 1kHz (250V, DC+AC) Input coupling : AC, DC, GND</p>	1 no

	<p>Polarity selection : +(CH2 only) Display mode : 1, 10, X-Y</p> <p>Horizontal Deflection Sweep time : 0.2micros/div to 0.2s/div Sweep expansion : x10 Accuracy : 3%</p> <p>Trigger System Triggering mode : Auto, NORM, TV-V, TV-H Trigger source : VERT,CH1, LINE, EXT Sensitivity auto : 20Hz~30MHz(VERT) Frequency norm : 0.5div INT, 0.5Vp-p EXT TV-H : At least 1 div or 1Vp-p Input impedance : 1M ohm X-Y Phase Difference : <30, DC-50KHz Calibration waveform : Frequency: 1kHz 20%, Voltage: 0.5V 1% Power requirement : 220 VAC +10% , 50 Hz Weight : 8.0Kg Approx. Dimensions (mm) : 310 (L) x370(B) x 130(H)</p> <p>Standard Accessories : Power cable, Probe - 2Nos., Instruction manual</p>	
13	<p>Decade resistance boxes Technical Specifications : High quality standard laboratory tool to fulfill the requirement of different values of standard resistance Each dial consisting of 10 steps High quality band switches Housed in plastic molded box Resistance Type: Metal Film Resistance (MFR), 0.5 Watt Accuracy : +1.5% Dial range : Three Dials of 1, 10, 100ohms Total range: 1 ~ 1111ohms</p>	1 no
14	<p>Decade capacitance boxes Technical Specifications : High quality standard laboratory tool to fulfill the requirement of different values of standard capacitance Each dial consisting of 10 steps High quality band switches Housed in plastic molded box Working Voltage : 250V Capacitance Type : Polyester & Paper Type Accuracy : +1.5% Dial range : Two Dials of 0.001, 0.01microF Total range : 0.001 ~ 0.11microF</p>	1 no
15	<p>Decade inductance boxes Technical Specifications : High quality standard laboratory tool to fulfill the requirement of different values of standard inductance Each dial consisting of 10 steps High quality band switches Housed in plastic molded box</p>	1 no

	<p>Inductance Type: Copper wound air core type Accuracy : +2% Dial range :Two Dials of 0.1, 1mH Total range:0.1 ~ 11mH</p>	
16	<p>Transistor tester Features : Various semiconductor DC parameters transistor, diode, triac, FET Capacitor withstand voltage Electrical appliance insulation 78 & 79 series voltage regulator Neon bulb and lamp starting voltage AC voltage test Technical Specifications : Breakdown Voltage V(BR) Measuring range : 1000V, Display 0~1000 Resolution 1V : 200V, Display 0~199.9 Resolution 0.1V\ Operating condition : Breakdown current less then 1mA Collector Emitter Saturation Voltage Drop VCE(sat) Measuring range : 2A (IC), Display 0~6.00, Resolution 0.01 Operating condition : IC approx 2000mA : Ibapprox 200mA Measuring range:800mA (IC), Display 0~6.00, Resolution 0.01 Operating condition:IC approx 800mA : Ibapprox 80mA Measuring range:100mA (IC), Display 0~6.00, Resolution 0.01 Operating condition : IC approx 100mA : Ibapprox 10mA Measuring range: 10mA (IC), Display 0~6.00, Resolution 0.01 Operating condition : IC approx 10mA : Ibapprox 1mA hFE DC Current Measuring range: 10mA (IB), Display 0~199.9, Resolution 0.1 Operating condition : IC approx 10mA Measuring range : 1mA (IC), Display 0~1999, Resolution 1 Operating condition : Ibapprox 1mA Measuring range: 10microA (IC), Display 0~1999, Resolution 1 Operating condition : Ibapprox 0.01mA Reverse Leakage Current Measuring range:2000microA, Display 0~1999 Resolution 1microA Operating condition : Testing voltage approx 27V 78 & 79 Voltage Regulation Measuring range: 78XX / 79XX, Display 0~24 Resolution 0.1V Operating condition : Testing voltage approx 27V Weight : 500gm Approx. Dimensions (mm) : 150(L) x 100(B) x 65(H) Standard Accessories : Probes, Batteries, Instruction manual</p>	1 no
1	<p>Instrumentation amplifier trainer Technical Specifications : Inbuilt Variable / Fixed DC Regulated Power Supplies</p>	1 no

	<p>Output Voltages : 0-5VDC (2 Nos.) : + 15VDC</p> <p>On Board Digital Panel Meter Voltmeter : 2V/ 20VDC (Duel Range)</p> <p>IC & Components Provided IC : 741 Potentiometer : 5 Nos.</p> <p>High quality Aluminum used as front panel of 300mm x 220mm & mounted on light weight shock proof plastic cabinet Symbol diagram printed on Aluminum Front Panel & all important test Points</p> <p>are brought out on front panel Power requirement : 230 VAC 10%, 50Hz. Weight : 1.5 Kg Approx. Dimensions (mm) : 330(L) x 225(B) x 75(H) Standard Accessories : Power chord, Patch chords & Instruction manual.</p>	
2	<p>Trainers on network circuits i.e. Kirchoff's law resonance</p> <p>Technical Specifications : Inbuilt Variable DC regulated power supply Output Voltage : 0-3VDC On Board Analog Moving Coil Meters (60 mm x 35 mm) Voltmeter : 0-3VDC : 0-250mA</p> <p>Components Provided Resistance : 5 ohms (5W) : 10 ohms (5W) : 22 ohms (5W) : 33 Ohms (5W)</p> <p>High quality Aluminum used as front panel of 270mm x 170mm & mounted on light weight shock proof plastic cabinet Symbol diagram printed on Aluminum Front Panel & all important test Points are brought out on front panel Power requirement : 230 VAC 10%, 50Hz. Weight : 1.5 Kg Approx. Dimensions (mm) : 300(L) x 175(B) x 75(H) Standard Accessories Power chord, Patch chords & Instruction manual.</p> <p>LCR Resonance Apparatus with Inbuilt Sine wave Ocillator</p> <p>Objective: Plot the frequency v/s current characteristics of L, C & R when connected in series & parallel</p> <p>Technical Specifications : On Board Analog Moving Coil Meters (60 mm x 35 mm) Voltmeter : 0-5V AC Ammeter : 0-25mA AC. Inbuilt Sine wave oscillator : Range : 100Hz to 100KHz (Variable) Components provided Resistances : 3 Nos. Capacitors : 3 Nos. Inductance : 2 Nos.</p> <p>High quality Bakelite used as front panel of 400mm x 225mm & mounted on light weight shock proof plastic cabinet</p>	1 no

	<p>Circuit diagram printed on Bakelite Front Panel & all important test Points are brought out on front panel</p> <p>Power requirement : 230 VAC 10%, 50Hz.</p> <p>Weight : 2.5 Kg Approx.</p> <p>Dimensions (mm) : 430(L) x 230(B) x 90(H)</p> <p>Standard Accessories : Power chord, Patch chords & Instruction manual.</p>	
3	electromagnetic and transformer	1 no
4	<p>Trainers on linear circuits i.e. operational amplifiers</p> <p>Technical Specifications :</p> <p>Inbuilt Fixed DC Regulated Power Supplies</p> <p>Output Voltages : 1.5VDC (2 Nos.)</p> <p>On Board Analog Moving Coil Meters (60 mm x 35 mm)</p> <p>Voltmeter : 5 VDC / 20VDC (2 Nos.)</p> <p>IC , Diode & Components Provided</p> <p>IC : 741</p> <p>Diode : 4148</p> <p>: Zener Diode 2 Nos.</p> <p>Resistances</p> <p>Capacitors</p> <p>High quality Aluminum used as front panel of 270 mm x 170mm & mounted on light weight shock proof plastic cabinet</p> <p>Circuit diagram printed on Aluminum Front Panel& all important test Points are brought out on front panel</p> <p>Power requirement : 230 VAC 10%, 50Hz.</p> <p>Weight : 1.0Kg Approx.</p> <p>Dimensions (mm) : 300(L) x 175(B) x 75(H)</p> <p>Standard Accessories : Power chord, Patch chords & Instruction manual</p>	1 no
5	<p>Trainer on basic digital electronics i.e. logic gates Boolean Expression adder subtractor flip flop counter register converter etc</p> <p>Technical Specifications :</p> <p>DC Regulated Power Supplies</p> <p>Output voltages : One fixed DC regulated power supply of +5V/1Amp</p> <p>: One fixed DC regulated power supply of -5V/500mA</p> <p>: One variable DC regulated power supply of + 3 - +12V /500mA</p> <p>Load regulation : + 0.2%</p> <p>Line regulation : + 0.05%</p> <p>Ripple : Less than 3mV RMS</p> <p>Protections : Short circuit & over load protected</p> <p>Pulse Generator</p> <p>Operating modes : Square</p> <p>Frequency range : 1Hz to 1MHz in 6 Steps (Amplitude 3V~15V (CMOS), 5V (TTL)</p> <p>Duty Cycle : 50%, TTL/CMOS output</p> <p>Switches/LED/Display</p> <p>2 nos. Push to on Pulser Switches</p> <p>8 Nos toggle switches for both TTL & CMOS mode</p> <p>8 Nos. LED Display (TTL/CMOS Mode)</p> <p>3 Nos. Seven Segment Display</p> <p>Logic Probe Logic level indicator for TTL/CMOS (7 Seg.)</p> <p>Power requirement : 220 VAC +10% , 50 Hz</p> <p>Weight : 3.0Kg Approx.</p>	1 no

	<p>Dimensions (mm) : 330 (L) x225(B) x 75(H)</p> <p>Standard Accessories :</p> <p>5 mtr.hookup wire, 10 nos. Patch Chords with2mm banana plug on one end,</p> <p>Power Chord & Instruction Manual</p> <p>Bread Board Strips 2 Nos vertically common strips (640 Tie points each), 4 Nos horizontally common strips(100 Tie points each)</p> <p>modules</p> <p>Logic Gates</p> <p>Binary Adder/Subtractor</p> <p>Flip-Flops (R-S,D,J-K,T Flip-Flops)</p> <p>4Bit Synchronous Binary Counter (Up Counter)</p> <p>Shift Resistors 4 Bit Serial n-Parallel Out</p> <p>Digital to Analog Converter (R-2R Ladder)</p>	
6	<p>Trainers on power supplier's half wave rectifier full wave rectifier bridge rectifier and power supply regulated power supply</p> <p>Technical Specifications :</p> <p>Inbuilt variable AC power supplies</p> <p>Output Voltage : 8-0-8VAC : 10-0-10VAC</p> <p>On Board Analog Moving Coil Meters (60 mm x 35 mm)</p> <p>Voltmeter : 0-15VDC</p> <p>Ammeter : 0-250mADC</p> <p>Components provided</p> <p>Diode : 4 Nos.</p> <p>Filter : 2 Nos.</p> <p>Load Resistances : 50 ohm to 500 ohm .</p> <p>High quality Aluminum used as front panel of 270mm x 170mm & mounted on light weight shock proof plastic cabinet</p> <p>Circuit diagram printed on Aluminum Front Panel & all important test Points</p> <p>are brought out on front panel</p> <p>Power requirement : 230 VAC 10%, 50Hz.</p> <p>Weight : 1.8 Kg Approx.</p> <p>Dimensions (mm): 300(L) x 175(B) x 75(H)</p> <p>Standard Accessories</p> <p>Power chord, Patch chords & Instruction manual.</p>	1 no
7	rectifier bridge rectifier and power supply regulated power supply	1 no
8	SCR driven/controlled power supply trainer	1 no
9	<p>Discreet component trainer</p> <p>Technical Specifications :</p> <p>Inbuilt Variable / Fixed DC Regulated Power Supplies</p> <p>Output voltages : 0-3VDC : 0-30VDC : +5VDC</p>	1 no

	<p>Inbuilt AC Power Supplies Output voltages : 10 - 0 - 10VAC/ 500mA Glass Epoxt PCB used as front panel of 270 mm x 170 mm & mounted on light weight shock proof plastic cabinet Symbol diagram printed on Glass Epoxt PCB & all important test Points are brought out on front panel Power requirement : 230 VAC 10%, 50Hz. Weight : 2.2 Kg Approx. Dimensions (mm) : 300(L) x 175(B) x 75(H) List of Experiments under above Topics : PN Junction Diode V-I Characteristics Zener Diode V-I Characteristics Voltage Stabilization of Zener Diode LED Characteristics Resistance in Series & Parallel Charging & Dischrnging of Condensor LCR Resosnace Circuit Clipping & Clamping Half Wave, Full Wave & Bridge Rectifier Common Base Transistor Amplifier Common Emitter Transistor Amplifier Common Collector Transistor Amplifier RC Coupled Amplifier Basic Logic Gates RC Passive Filter Circuits Standard Accessories : Power cable, Patch Chord & Instruction manual</p>	
10	Trainer on RS485 to RS232 converter.	1 no each
	G. Electrical Instruments	
1	DC moving coil miliammeters(various ranges)	3 nos.
2	Centre zero galvanometers	2 nos.
3	AC moving iron type voltmeter (various ranges)	3 nos.
4	AC moving iron type ammeter (various ranges)	3 nos.
5	Wattmeter dynamometer type	1 no.
6	Power factor meter Single Phase Dynamometer Type Portable Power Factor Meter Select any one range : Current Coil/Potential Coil : 5A/250V	1 no.
7	Watt hour meter induction type 1 ph	2 nos.
8	Ampere hour meter	1 no.
9	Ohm meter Features : Auto range 200mohms, 2ohms, 20ohms, 200ohms, 2kohms, 20kohms, 200kohms Resolution 10micro ohms Single/Repent measuring Four terminal measuring Percentage error three steps selectable	2 nos.

	<p>Dual Display +(0.5%+2digit) LED Display sampling rate 17 Times/s</p> <p>Technical Specification</p> <p>Measuring range : 200mohm , 2ohm, 20ohm, 200ohm, 2kohm, 20kohm 200kohm</p> <p>Output current : 100mA at 200mohm , 2ohm : 10mA at 20ohm : 1mA at 200ohm : 100microA at 2kohm, 20kohm : 10microA at 200kohm</p> <p>Resolution : 10micro ohm at 200mohm , 2ohm : 0.1micro ohm at 20ohm : 1mohm at 200ohm : 10mohm at 2kohm : 100mohm at 20kohm : 1ohm at 200kohm</p> <p>Open circuit voltage : <1.0V at 200mohm, 2ohm, 20ohm : <4.0V at 200ohm, 2kohm, 20kohm, 200kohm</p> <p>Power requirement : 220 VAC +10% , 50 Hz</p> <p>Weight : 3.0Kg Approx.</p> <p>Dimensions (mm) : 280(L) x 220(B) x 90(H)</p> <p>Standard Accessories : Power cable, Instruction manual</p>	
10	Synchroscope	1 No
11	Potentiometer / thermocouple test set Technical Specifications : Transducer K-Type Thermocouple signal conditioning circuit of constant current, power supply of $\pm 5V$ DC display at 3 1/2 digital panel meter with resolution of 0.01mV.	1 no.
12	Autotransformer	2 nos.
13	Calibration test bench for AC and DC voltmeter, AC and DC Ammeter, ohmmeter	1no
	H.Pressure Instruments	
1	“ U” tube manometers	1 no.
2	Well type manometer	1 no.
3	Inclined limb manometers	1 no.
4	Bourdon tube type gauges of various ranges	5 nos.
5	Capsule type pressure gauges	3 nos.
6	Aneroid barometers	1 no.
7	Dead weight tester	1 no.
8	Pressure regulators with filter and input & output gauges	1 no.
9	Differential pressure transmitter (pneumatic)	1no.
10	Differential pressure transmitter (electronic -HART/field bus type)	1 no.
11	Diaphragm type pressure gauges of various ranges	2 nos.

12	<p>Transducers training kits</p> <p>Potentiometer Specifications : The system facilitates measurement of linear displacement in the range 0 to 20 mm with digital indicator, power supply and cable. Typical accuracy of $\pm 1.5\%$ of the range is claimed.</p> <p>Capacitive Specifications : Inductive pick up is mounted on a rigid base holding 25 to 50 mm precision micrometer with least count of 10 microns. The displacement of the magnetic core of the micrometer can be measured with an accuracy which is better than $\pm 2\%$ in the range 0 to 5mm. Appropriate test points are provided on the rear of the panel display with $3 \frac{1}{2}$ DPM.</p> <p>Reluctive strain gauge Strain Gauge Trainer Kit (with Cantilever Beam) The instrument is designed to study the Strain Gauge Transducer as a Direct Weighing machine's to observe the effect of weight on the strain or resistivity of the Strain Gauge. DC Regulated Power Supply of for +12V Signal Generationing circuit. DC Regulated Power Supply for 5V.</p> <p>Power Requirement : 230V, $\pm 10\%$, 50Hz Range : 0-500m Strain Sensor : Strain Gauge fitted on Strain Bar. Weight Capacity : 2 Kg. (Minimum)</p> <p>LVDT Specifications : Linear variable differential transform with ± 10mm isplacement. On Board Digital Panel Meter with displacement Signal. Output Available for Control & Monitoring. Micrometer for reference Displacement Reading using screw gauge. Provided with excitation frequency. Waveform display on CRO. Test pins for monitoring. Inbuilt power supply, signal conditioning using IC 5521.</p> <p>Load cell Strain gauge with load cell with 3.5 Digital Panel Meter. Measurement up to 2Kg. Weight set 50gm, 100gm, 200gm, 500gm. Power requirement 230VAC $\pm 10\%$ 50Hz Detailed instruction manual.</p> <p>Servo type Technical Specifications : Control Unit In built fixed AC power supply for AC servo motor: - 100VAC/ mA for reference winding - 0 ~ 60VAC/mA for control winding</p> <p>RPM meter provide on board for speed measurement Ammeter provided on board for load current measurement Loading arrangement provided for Servo Motor Front panel of 400mm x 225mm & mounted on light weight shock proof plastic cabinet Circuit diagram printed on panel & all important test points are brought out on</p>	1 no. each
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	<p>front panel Power requirement : 220 VAC +10%, 50Hz Weight : Kg Approx. Dimensions (mm) : 430(L) x 230(B) x 90(H) Motor Unit AC Servo Motor with 2 phase windings having both side shaft coupled with loading arrangement on one end and 20 holes disc provided on other end. Photoelectric pickup and photo transistor act as a optocoupler in between disc for speed sensing Standard Accessories : Motor Unit, Power Chord, Patch Chords & Instruction Manual</p>	
13	Experimental set up for pressure measurement consisting of air compressor pressure vessel pressure transmitter controller recorder and final control element, computer i.e. closed loop system or full scope system i.e. pressure instrumentation process control trainer / simulator	1 no.
14	HART device communicator and calibrator	1 No.
15	Pneumatic calibrator	1 no.
16	Electronic (HART/Field bus/profibus type device compatible) calibrator	1 no.
17	Pressure switches of various ranges	4 nos.
18	Low pressure measuring gauges such as thermal conductivity gauge and Mcloyd gauge	1 no.
19	P to I and I to P converters	1 no. each.
20	Vacuum tester with pump	1 no. each.
21	Vacuum gauge 100 mm dial bourdon tube type	1 no.

I. Flow meters / Instruments

1	Simple tank type quantity meter	1 no.
2	Impeller type flow meter	1 no.
3	Below and liquid seal drum type flow meter	1 no. each.
4	Deflecting and rotating vane type flow meter	1 no. each.
5	Helical and turbine flow meter	1 no.
6	Pitot tube flow meter	1 no.
7	Orifice type flow meter	1 no.
8	Ventury tube flow meter	1 no.
9	Rotameter	1 no.
10	Magnetic flow meter	1 no.
11	Vortex flow meter	1 no.
12	Flow control loop set with flow controller recorder, D.P. transmitter, receiver, unit control valve and impulse line, computer complete experimental set- up for flow measurement	1 no.
13	Experimental closed loop set up for solid flow measurement and Control with storage vessel, hopper, solid flow sensor, controller, Recorder and final control element	1 no.
14	Coriolis mass flow meter	1 no.
15	Flow nozzle	1 no.

	J. Level Instruments	
1	Integrated direct level indicator trainer (Hook type, sight glass type, float type level indicator)	1 no.
2	<p>Static pressure and air purge type level indicator</p> <p>SPECIFICATIONS:</p> <p>1. For Static Pressure Type Level Indicator:</p> <ul style="list-style-type: none"> • One No. of MS tank (300mm*300 mm*300 mm) • One no. of static pressure switch fitted inside the tank. • Connecting Lead for connecting the indication unit • Indication unit consists of: • Power socket for Mains Supply. • One no. of ON/OFF Switch & indications for ON/OFF indications. • One no. of Red indicator for Tank Empty indication • One no. of Green Indicator for Tank full indication • One no. of Line Connector for connecting sensor to the unit <p>2. For Air Purge Type Level Indicator</p> <ul style="list-style-type: none"> • One no. of purge Sensor fitted with “T” joint for further connections • One no. of Purge Rotameter 91-10 LPM) with control knob • One no. of Manometer (0-40 mm) • Metal Frame for Assembly • One no. of Acrylic tank 	1no.
3	Level transmitter (inter face)(HART/Field bus/profibus compatible)	1no. each
4	Level control set up with level transmitters level recorder Controller & control valve complete Experimental set up or level simulator	1 no.
5	Level measurement equipments for solid, sonic solid level, microwave, capacitance probes, diaphragm switches, nuclear gauge, sonic and microwave solid level detectors point level detector, conductivity type	1 no. each
	K.. Temperature Instruments	
1	Mercury in glass thermometer (various ranges)	3 nos (consumable item)
2	Alcohol or other liquid in glass thermometers (consumable item)	2 nos. (consumable item)
3	Stem and dial type bimetallic thermometer(various ranges)	2 nos.
4	Mercury in steel remote indicating thermometers	2 nos.

5	Resistance bulb Wheatstone bridge type	2 nos.
6	Thermocouple type pyrometer with milivoltmeter (with different types of thermocouples)	1 no.
7	Optical pyrometer with all accessories	1 no.
8	Radiation Pyrometer with all accessories	1 no.
9	Vapour pressure thermometer	2 nos.
10	Temperature transmitter, pneumatic	1 no.
11	Temperature transmitter electronic((input RTD ,TC)	1 no.
12	Experimental set up for measuring and controlling of temperature-Consisting of measuring, controlling, indicating, recording and final controlling elements, complete closed loop system with simulator	1 no.
13	Digital temperature calibrator, mV/mA injector and measuring unit	1 no.
	L. Recorders	
1	Pneumatic and electronic recorders (single point and multi point) both circular and strip chart types	1no.each
2	Paperless LCD/LED recorder setup	1 no.
	M. Controllers	
1	PID controller trainer consisting of instrument panel, digital computer and interface system	1 no.
2	Real PID controller training kit Technical Specifications : In built DC regulated power supply +15V Amplifier circuit using IC Ad741 Control circuits using operational amplifier IC 741 Controller unit provided with all controls. Complete circuit is viewable in terms of connections & PCB circuits Model process unit consist of: - Electrically heated arrangement using high wattage bulbs (3Nos.) - 2 Analog moving coil meter to display temperature deviation and percentage of Power applied - RTD (PT 100) sensor placed to monitor the process temperature - Fan controller Power requirement : 220 VAC +10%, 50Hz Weight : 10.0Kg Approx. Standard Accessories : 3nos. High wattage bulbs, Electrical fan, Power Chord, Patch Chords & Instruction Manual	1 no.
3	With HART/Field bus devices, consisting operations of feed forward,, cascade, ratio controlling	1 no.

4	<p>Programmable logic controller (micro PLC) trainer ME-1125 - PLC Trainer</p> <p>Features :</p> <p>Input switches (16)- 13 Nos. of toggle switches, and 3 Nos of push to on switches for input data to PLC.</p> <p>Output - 8 nos. of output shown by LED and terminals also provided.</p> <p>Connectors - Connector facilities is also given for Input and output data</p> <p>Technical Specification</p> <p>Description: Specification: Delta</p> <p>Power Supply Voltage 100-240V AC (-15%~10%), 50/60Hz</p> <p>Connector European standard removable terminal block (pin pitch:5mm)</p> <p>Operation DVP24ES2 start to run when the power rises to 95~100VAC and stops when the power drops to 70VAC. if the power is suddenly cut off,the MPU will continue running for 10ms.</p> <p>Power consumption 30VA</p> <p>DC 24V current output 500mA</p> <p>Power Supply Protection DC 24V output short circuit protection.</p> <p>Voltage withstand 1,500VAC (primary-secondary), 1,500VAC(primary-PE),500VAC (secondary-PE)</p> <p>Insulation resistance 5 M OHM.at 500VDC(between all I/O points and ground)</p> <p>NOISE IMMUNITY ESD: 8KV Air Discharge EFT: Power line: 2KV, Digital I/O: 1KV, Analog & communication I/O: 1KV RS: 26MHz~1GHz, 10V/m</p> <p>Grounding The diameter of grounding wire shall not be less than that of L, N terminal of the power supply.</p> <p>Environment Operation: 0 degree to 55 degree C (temperature), 50`95% (humidity), pollution degree 2 storage: -25 degree C to 70 degree C (temperature), 5~95% (humidity)</p> <p>Optional Ready to use Modules applications for above PLC Trainer</p> <p>ME PLC A Module for Traffic Light Control using PLC</p> <p>ME PLC B Module for DOL Starter using PLC</p> <p>ME PLC C Module for Star Delta Starter using PLC</p> <p>ME PLC D Module For Conveyer Belt Control</p>	1 no.
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	ME PLC E Module for Motor start and stop operation using Timers , Counters and Motor Forward & Reverse direction control using PLC ME PLC F Module for DOL & Star Delta Starter using PLC ME PLC G Module for Water Level Control using PLC ME PLC H Module for Temperature Control using PLC ME PLC I Module for Sequence Control System using PLC ME PLC J Module for Elevator Control using PLC	
5	HART/field bus communicator	1 no.
6	HART/Field devices (pressure/ flow/level)	1 no. each
7	Multifunction process control system consisting of level, flow , Temperature, pressure with remote set point control, ratio, cascade and feed forward with feedback loops with computer interface and software	1 no.
	N. Final Controlling Elements	
1	Electric actuators	1 no.
2	Pneumatic and hydraulic actuators	1 no.
3	Different type of control valves such as gate valves, globe valves, Ball valves, diaphragm valves, butterfly valves etc. eclectically actuated, pneumatic actuated and hydraulic actuated	1 no. each
4	Valve petitioners, booster relays, gland pickings etc.	1 no. each
5	Cut section models of various type of control valve	1 no. each
6	FIART/ field bus final control elements(two different type)	1 no. each
	O. Equipment for Microprocessors	
1	Training kits or trainers as available on microprocessors applicable to process control and instrumentation and accessories	1 no.
2	Data acquisition system (DAS)	1 no.
3	ADC to DAC cards	4 nos
4	Digital I/O cards	4 nos
	P. Computer and software	
1	Computers (latest configuration) with tables(For operating various control system trainers)	4 no.
2	Lap top (for convenient to field bus system/control system)	2 no.
3	Licensed operating system (latest version)	6 no.
4	Latest Office (licensed version)	1 no.
5	LCD multimedia projector with trolley	1 no.
6	Broad band internet connection	1 no.
7	Printer (Scan/copy)	1 no.
8	Networking tool kit	2 no.
	Q. Equipment on Hydraulics and pneumatics	
1	Hydraulic trainer Technical Specification:	1 no

Hydraulic Components

- Hydraulic Power pack with following features
- Operating pressure 40 bar approx., Flow rate 4-8lpm approx.
- Hydraulic Tank capacity 20 liters
- Geared pump coupled with induction motor 2HP 220V AC,50 Hz, and mounted externally over the tank with anti vibration pads
- Having non return valve, pressure relief valve

Different type of valves

- 4/3 Double solenoid valve AC operated
- 4/2 Single solenoid valve AC operated
- 4/3 Way hand lever valve (Manual)
- Flow control valve and Pressure reducing valve (Manual)

Pressure gauges 0-1500Psi - 3nos.

- Pressure gauges (glycerin filled) to measure the pressure at Pressure line, reduced pressure line

Hydraulic Cylinders - 2nos.

- Double acting cylinder (Stroke length 100mm & diameter 32mm)
- Piston rod: Chrome plated and hardened

Hydraulic pipe for fittings

- Connection type 3/8", Length 600mm - 15nos
- Connection type 3/8", Length 1000mm - 2nos

Hydraulic motor

- Type : Gear motor and Bi -directional

Electronic Controller

- 220 V AC operated
- 8051 CPU, Memory 64kB Flash
- Line indicator
- DOL starter start/stop button for Induction motor
- Double solenoid control switch (Manual and Automatic)
- Single solenoid control switch (Manual and Automatic)
- Push buttons for manual control for actuators I, II, & III
- USB cable connector

Power requirement: 220VAC +10%, 50Hz

Weight: - 65Kg Approx. (Main Control Unit)

- 70Kg Approx. (Hydraulic Power Pack)

Dimensions (mm): 900(L) x 380(B) x 670(H)

Standard Accessories:

Hydraulic Power Pack

Hydraulic oil 20ltr

Instruction Manual

USB cable and Program CD with Software

2	<p>Pneumatic trainer</p> <p>Technical Specification:</p> <p>Pneumatic Components</p> <ul style="list-style-type: none"> - Air compressors with following features <ul style="list-style-type: none"> - Displacement 3cfm - Working pressure 0- 10kg / cm² (10 bar) - Capacity of cylinder 180 Psi - 1HP Electric motor 230V, 50Hz, Auto cut facility - 0 -10 Bar Pressure Gauge & Shut off valve with suitable hose and end connector - Filter regulator and lubricator (FRL) unit with pressure gauge - Direction control valves of different configuration <ul style="list-style-type: none"> - 5/2 Double solenoid valve - 5/2 Single solenoid valve - 5/2 Single solenoid timer operated valve - 5/2 Pilot operated valve - 5/3 Hand lever operated valve - 3/2 Roller Switch - 4 Way manifold - Pneumatic cylinders <ul style="list-style-type: none"> - Double acting cylinder (Stroke length 100mm & diameter 32mm) - Double acting cylinder (Stroke length 125mm & diameter 40mm) <p>Electronic Controller</p> <ul style="list-style-type: none"> - 220 V AC operated - 8051 CPU - Memory 64kB Flash - Selection for Auto / Manual operation through SPST, SPDT & DPDT switches <ul style="list-style-type: none"> - System control manually through Push to ONswitches <ul style="list-style-type: none"> - Power Indicator LED - Reset button for micro controller - USB Connector type B <p>Power requirement: 220VAC +10%, 50Hz</p> <p>Weight: - 30Kg Approx. (Main Control Unit)</p> <ul style="list-style-type: none"> - 10Kg Approx. (Air Compressor) <p>Dimensions (mm): 900(L) x 380(B) x 670(H)</p> <p>Standard Accessories:</p> <ul style="list-style-type: none"> Air Compressor Instruction Manual USB Cable Program CD with Software 	1 no.
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	R. Analytical equipments	
1	Conductivity meter	1 no.
2	pH meter	1 no.
3	Experimental set up for online conductivity measurement	1 no.
4	Experimental set up for online pH measurement	1 no.
5	Experimental set up for online dissolved oxygen measurement	1 no
	S. WORKSHOP FURNITURE:	
1	Work benches (1800 x 900 x 900 mm)	4 Nos
2	Instrument test bench with cup boards	4 no.
3	Steel cup boards with eight lockers for trainees (100×1200×450 mm)	2 no.
4	Steel cup boards/ almirah 1800×1200×450(with five shelves)	4 no.
5	Steel cup boards with eight lockers for trainees (100×1200×450 mm)	2 no.