

## Working with Machines & Materials

### 7.3. Tool List - Electronics/Mechatronics

#### 7.3.1. Tools

S. No.	Item	Specifications	Quantity (for a class of 40 students)
1	Arduino UNO along with Cable	ATmega328P – 8-bit AVR family microcontroller, equivalent or better. Operating Voltage: 5V Digital I/O Pins: 14 (of which 6 provide PWM output) PWM Digital I/O Pins: 6 Accessories: Case shell enclosure, compatible USB cable (length - 6 inch or more)	4
2	Breadboard	Solderless 400-pin breadboard	4
3	DC Motor	12V DC Gear 150 RPM	4
4	DHT 11 sensor	Operating Voltage: 3.5V to 5.5V Operating current: 0.3mA (measuring) 60uA (standby) Output: Serial data Temperature Range: 0°C to 50°C Humidity Range: 20% to 90% Resolution: Temperature and Humidity both are 16-bit Accuracy: $\pm 1^\circ\text{C}$ and $\pm 1\%$	4
5	Digital MultiMeter	Digital Multimeter Voltage Current Resistance-7 functions + 19 ranges to cover DC voltage 200mV to 1kV,	4
6	Digital Pen Electric Tester	Voltage tester	4
7	ESP32	I2C, 1 wire, plug and play	4
8	Hand Tools Set	(Bits, Hammer, Hex, Keys, Knife, pliers, Ratchet, Screwdriver, Sockets, Spanners, Drilling machine and Bench Grinder)	2 sets
9	Handsaw	Size 6 inch	4
10	Hot Glue Gun	Works with standard 0.5-inch glue sticks. Temperature - 230 to 280 degrees Celsius.	4
11	Humidity Sensor	Operating range: 20 – 95 % RH Temperature: 0 - 60 Celsius Power supply: 1.5V AC (Max sine) Operating frequency: 500Hz - 2kHz	4

S. No.	Item	Specifications	Quantity (for a class of 40 students)
12	I2C Module	Operating Voltage: 5V DC I2C control using PCF8574 Can have 8 modules on a single I2C bus I2C Address: 0X20~0X27 (the original address is 0X20, you can change it yourself via the onboard jumper pins)	4
13	IR Sensor	Board Size 3.2 x 1.4cm Working voltage 3.3 to 5V DC Operating voltage 3.3V: ~23 mA, to 5V: ~43 mA Detection range 2cm – 30cm (Adjustable using potentiometer) Active output level the output is “0” (Low) when an obstacle is detected	4
14	L298P Motor Driver	L298P Motor Driver Shield or relative Driver Shield	4
15	LCD Display	Dot matrix LCD display. 16 characters X 2 lines. I2C	4
16	MQ-5		4
17	PIR Sensor		4
18	Pliers: 4.5-inch size	Long Nose Plier External Straight	4
19	Precision Screwdriver Set	6 Piece Precision Screwdriver Set Types: PH0, PH1, Flat head - 1.4mm, 2mm, 2.4mm, 3mm	1
20	Relay	5V 10A - 2 Channel Relay Module. Compatible with Arduino.	4
21	Screwdriver	40 pc multi-purpose screwdriver set	4
22	7 Segment Display	LED 4-Digit Display Module Voltage Rating: 2.4V to 5.5V 4-Pin interface: Vcc, Gnd, Data, Clock	4
23	Servo Motor	Position Servo Angle based Metal Gear Small Servo Metal Gear Continuous Metal Gear Servo 360 Small Servo Plastic Gear	4
24	Soil Moisture Sensor	FC-28 with LM293 comparator Operating Voltage: 3.3V to 5V.	4
25	Soldering Helping hand	Specifications: Adjustable crocodile holding clamps/clip. Soldering iron holder. LED light. Magnifying lens.	4

S. No.	Item	Specifications	Quantity (for a class of 40 students)
26	Soldering Kit	Variable Wattage of Soldering Iron: 15-30 watts/230 volts 4 Equipment Soldering Iron Temperature Range: 280°C to 450°C Desoldering Pump, Soldering Flux (Paste) 100 grams, Desoldering Copper Braid (Solder Wick) - 1.5m*2mm Compatible Soldering Tip - Bevel, Chisel, Conical - 5 each per kit. Soldering Wire: 20/22 AWG soldering Wire with rosin core flux (100 Grams)	4
27	Ultrasonic Sensor Module HC04	Working Voltage - DC 5V Working current - 15 mA Working Frequency - 40 Hz Range - 1 cm to 4 m Effectual Angle - <15° Measuring Angle - 30° Resolution - 0.3 cm	4
28	Water Pump	DC12V 3W Submersible Water Pump	4
29	Wire Strippers	Wire Stripper Cutter Plier with Spring -26x6x20 cm (L x W x H)	4

### 7.3.2. Consumables

S. No.	Item	Specifications	Quantity (for a class of 40 students)
1	9V Battery	9-12V 2000 to 2500 mAh rechargeable battery with two chargers. Equivalent or better	5
2	A4 Size Sheet	70-75 GSM 1 Bundle - 500 Sheets	1
3	Active Buzzer	Medium Buzzer 5 Volts	8
4	Battery clip/Cap	9V battery connector	5
5	Berg Strips	Female Berg Strip, 2.54mm pitch, 40 pins single row, breakable pin	8
6	Berg Strips	Male Berg Strip, 2.54mm pitch, 40 pins single row, breakable pin	8
7	Capacitor	ceramic 0.1 mf, electrolytic 10 mfd.	16
8	Cardboard	1 Roll Medium Size	2

S. No.	Item	Specifications	Quantity (for a class of 40 students)
9	Chart Papers	Big Size Sheets	40
10	Coin Cell	3.3 Volts	40
11	Conductive Tape or Aluminium Foil	Copper Tape with medium thickness - Box of 12 pieces or Aluminium Foil used in kitchen for food wrapping 1 KG Roll	1
12	Cotton Thread	1 Roll - 50 meters.	2
13	Diode	1N4007	16
14	General Purpose Solderable Board	FR2 A Grade Material (140 x 90 mm)	16
15	Hand Tools Set	(Bits, Hammer, Hex, Keys, Knife, pliers, Ratchet, Screwdriver, Sockets, Spanners, Drilling machine and Bench Grinder)	2 sets
16	Hook Up Wire	Red & Black set 100 Meters each	2
17	Jumper Cable	Male-Male - 20 per 10 Students	80
18	Jumper Cable	Male-Female - 20 per 10 Students	80
19	Jumper Cable	Female-Female - 20 per 10 Students	80
20	LED	Regular 5mm 3–5-volt Range	80
21	Paper Cutter	With extra blades	2
22	Potentiometer	10K ohm with power cut switch on/off	5
23	Pulley	1 Inch with hook	4
24	Resistor Kit	One kit contains - 30 carbon film resistors of 20 different resistance values each, assorted, packaged together and labelled. Values: 0Ω, 1.5Ω, 4.7Ω, 10Ω, 47Ω, 100Ω, 220Ω, 330Ω, 470Ω, 680Ω, 1kΩ, 2.2kΩ, 3.3kΩ, 4.7kΩ, 10kΩ, 22kΩ, 47kΩ, 100kΩ, 330kΩ, 1MΩ	2
25	Safety Mask	Filtering efficiency ranging 80 percent when tested against 0.3-micron sodium chloride particle	100
26	Sand Paper	Grit Values - 80, 100, 120, 200, 300. 5 Nos of each	2
27	Toggle switch		6
28	Transistor	BC547, Bc548.	16

\*Please note that existing ATL/Agile ATL/Tinkering Labs may be leveraged for skill subjects such as electronics, mechatronics, automation, IoT, etc.

## 7.4. Tool List - Apparel

### 7.4.1. Tools

S. No.	Item	Specifications	Quantity (for a class of 40 students)
1	Blocks Set	Wood Block Stamps (Pack of 5), Wooden Blocks for Block Printing Stamp Set	2
2	Compass	Compass with rubber top	3
3	Dress Form (optional)	Any size and shapes	2
4	Embroidery Hoops (L, M&S)	4 Pieces of adjustable Wooden Embroidery Hoop Ring Frame: Size - 6, 8, 10, and 12 Inch	4
5	Fashion magazine	Any fashion magazine	2
6	French Curve (optional)	Metal/Wood/Plastic	2
7	Gridding Scale	Fashion Design Kit Gridding Scale, 18 inches	2
8	Iron	600W Dry Iron/Steam Iron	1
9	Iron Table (optional)		1
10	Measuring tape	Soft Sewing Tailor Tape for body measure, Dress-Making Measure Ruler	10
11	Needle Set	30Pcs Assorted Hand Sewing Needles for Embroidery, Mending, Craft, Quilting	2
12	Paint Brush Set	Nylon Paint Brush Combo 6 Flat & 6 Round	2
13	Paint Tray	Plastic Exel Small Tray for Home/Office/Kitchen, Set of 2 pc Tray 2	2
14	Pins	Multi Coloured Pearl Head Pins for Tailoring, Dressmaking, Crafting, Sewing, Decorating - Pack of 80	1
15	Scissors	Fabric Cutting Scissor- All Purpose Scissor	2
16	Sewing Machine (optional)	Manual/Automatic	2
17	Steel Tweezer	Stainless steel tweezer Suturing Forceps 6"	2

### 7.4.2. Consumables

S. No.	Item	Specifications	Quantity (for a class of 40 students)
1	A3 Ivory Sheet	Ivory Paper 210 GSM Pack Of 2 (50 Sheets)	1
2	Beads	Multicolour Seed Beads Set - 8/0 Size (Bead Size 3mm)	1
3	Brown Paper	Brown Paper Roll 100GSM (28 Inch * 5Meter)	1
4	Buttons	Wooden Buttons Used in Sewing- bigger size- Set of 100	1
5	Candle	Unscented Pure Wax Stick Candle Pack of 20 (White)	2
6	Chart Paper	A1 Full-Size Pastel Chart Sheets, 220 GSM, Plain/Unruled	1
7	Cotton Fabric	20 Mtr - width 50 cms (any color)	20
8	Cotton Fabric	5 Mtr - width 50 cms - assorted colours	5
9	Craft Glue	MR 20 GM Craft Glue	5
10	Crayons	Extra Long Wax Crayons - 26 Shades	2
11	Embroidery Threads	Embroidery Thread Set in Multiple Colors	1
12	Eraser	1 Packet - Pack of 20 Erasers	1
13	Fabric Dye	Tie Dye Colour - 25g	2
14	Fabric Glue	Fabric Glue (80g)	5
15	Gloves	Plastic Gloves Disposable (80 Pieces) 11"X 12,	1
16	Hooks and eyes	100 Sets 17mm Silver Metal Hook and Eye Closures	1
17	Pastel Sheets	A4 100 Coloured Sheets (10 Sheets each colour)	1
18	Pencils	2 Packets - HB Pencil - 10 Pcs Pack	2
19	Poster Colours	Acrylic Colours Kit   10 Colours x 15 ml	2
20	Rubber bands, strings, or thread.	Cotton or plastic dori to tie	1
21	Ruler - 10 Cm	Transparent 10 cm Scale- Set of 4	1
22	Ruler - 30 Cm	Transparent 30 cm Scale	2
23	Sequin	Multi Colour Sequins 100 gm Box for embroidery	1
24	Sharpeners	1 Packet - Pack of 20 Sharpeners	1
25	Sponge	2Pc Rectangle Artist Sponge Painting Tool	5

S. No.	Item	Specifications	Quantity (for a class of 40 students)
26	Stitching Thread	100% Spun Polyester 3 Ply Sewing & Stitching Multicolour Box Thread (150 m Pack of 100)	1
27	Tissue Paper	2 Ply Toilet Paper Tissue Roll- Pack of 6	2
28	Tracing Paper	Butter Paper / Translucent Sketching and Tracing Paper (1 Packet- 50 Sheets)	1
29	Zip lock bag	Plastic Zip Lock Pouch Bags (8 X 11 Inches, Transparent) -50 Pieces	1
30	Zipper	Colourful 8-Inch Nylon Zippers (Set of 25)	1

## 7.5. Tool List - Automotive

### 7.5.1. Tools

S. No.	Item	Specifications	Quantity (for a class of 40 students)
1	Adjustable Wrench: 10"	10"	4
2	Adjusting Spanner	10"	2
3	Allen Keys	Set of 5: 3mm, 4mm, 5mm, 6mm, 8mm	2
4	Battery Charger		1
5	Circlip Pliers - Internal / External	7"	2
6	Cylinder Bore Gauge with Dial Gauge		1
7	Engine Compression Gauge		1
8	Extension Rod Set	Set of 2: 3" & 6"	2
9	Feeler Gauge	26 blades-0.04 to 0.63 mm	1
10	Funnel with Filter		2
11	Garage Lamp		1
12	Hammer Ball Pein	250 Gm	3
13		500 Gm	3
14	Impact Screw Driver: Imported (For 2-wheeler)		1
15	Jumper Cable	1000 amp	1