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**St. PETER'S INSTITUTE OF HIGHER EDUCATION & RESEARCH, CHENNAI – 600054**

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**AICTE IDEA LAB TECHNICAL SPECIFICATIONS**

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## 1. MANDATORY EQUIPMENTS

| S.NO. | COMPONENTS | SPECIFICATIONS | QTY |
|---|---|---|---|
| 1 | Laser Cutter | Working Area: Min 600 x 900 mm or above Laser Type: CO2 DC Glass Laser Tube/RF Metal Laser Tube Laser Power: 80/100W Wave Length: Upto 10.6 Micrometer Cutting Speed: 30000 mm/min or more Engraving Speed: 64000 mm/min or more XY Axis: LM Guide Rail or equivalent Cooling: Air/ Water Cooling Supply Voltage: 230V/415 V Accessories: CO2 Focus Lens: 1 No. Mirror 25mm: 3 Nos. Acetone: 1 litre Acrylic sheet: 2 Nos | 1 |
| 2 | Vinyl Cutter | **Cutting Plotter** 800G Size 770*310*265 mm Max Force-800 g + software) | 1 |
| 3 | 3D Printer | Fused Deposition Modeling (FDM). <br> Printable area: 310 x 310 x 310 mm <br> Printer Design: Core XY or Cartesian <br> Temperature range: <br> Hot end: Up to $300^0$C or above <br> Heat bed: Up to $120^0$C or above. <br> Nozzle: Compatible with All polymers, 0.4, 0.6 and 0.8 mm <br> Filament Diameter:1.75 mm (supports PLA, PETG, ASA, ABS etc.) <br> Extruder: Gearbox with 1/10 ratio <br> Speed:550 MM/Sec <br> Stepper Motors: Choose between 1.8° or precise 0.9° X, Y stepper motors. LCD Screen: 3.5″ graphic 65k color screen or larger. <br> Compatibility: Windows, macOS, Linux. Printer Dimensions: The maximum physical dimensions of the system 700 X 700 X 700 or above. | 1 |
| 4 | 3D Scanner | Technology: Stereo camera structured light with focusable cameras or equivalent <br> CPU: Quad-core 64-bit SoC, <br> 1.5GHz with integrated GPU <br> RAM: 4 GB <br> Projector: DLP MEMS mirror or equivalent <br> Camera Sensor: Sony 13 MP or better Scan Speed: 4 seconds or more Working Distance: Effective Working Distance: 160mm-1400mm Scan Speed： <br> 980,000points/s, up to 14FPS <br> Scanner Weight: 500 grams or less Scanner Dimensions: upto $240 \times 60 \times 60$ mm | 1 |

| | | Compatible OS: Any OS supporting a modern web browser<br>Output Formats：OBJ; STL; PLY; P3; 3MF | |
|---|---|---|---|
| 5 | CNC Router | Working Area: Min 1300 x 2500 mm Z Axis<br>Working Area: 200 or above<br>Resolution: ±0.03/300mm or more<br>CNC Spindle: 3KW or more<br>Lathe Structure : Welding Steel Structure or equivalent<br>XYZ Structure: Rack Pinion , Ball Screw Linear Rails<br>Max Spindle Speed : Min 18000RPM<br>Table: T-Slot/Vacuum Bed/Water Bed Repeatability: ±0.03 Working Mode: Stepper Motor/Servo Motor<br>Dust Collector : To be included by Vendor Voltage: AC 220V/415V, 50/60 Hz, 3 Phase | 1 |
| 6 | Lathe cum Milling | Centre Width: Up to 400 mm or better Height of Centers: Up to 88 mm Maximum Workpiece Diameter: Up to 100 mm Machine Base: Cross-ribbed surface,<br>high quality cast iron with ground prismatic guide, capable of fitting milling/drilling attachment Spindle: Supported with adjustable taper roller bearings<br>Spindle Receiver: MK3 or compatible<br>Spindle Drill Hole: Up to 22 mm or better<br>Spindle Concentricity: Up to 5 microns or better Chuck: 3-jaw chuck as per DIN 6386, centrically clamped, 100 mm diameter or better Run Out (without Chuck): Up to 10 microns Sleeve Receiver: MK2, retractable sleeve with scale Spindle Speed Range: Between 50 to 2500 rpm Speed Stages: 6-8 Motor Rating: 550W or better, induction motor, single phase 230V 100-1000 +-10%RPM | 1 |
| 7 | Drilling M/c 1 HP Motor | No Load Speed: 0 - 630 rpm<br>Motor Power: 1 HP<br>Max Torque: 11 Nm | 1 |
| 8 | Handheld High Speed Drilling. | Rated input power : 450 W | 1 |
| 9 | Benchtop Grinder Machine | 373W or better | 1 |
| 10 | Solder stations | Watts 600 watts all combined<br>Iron 60watts 480ºC max. | 5 |
| 11 | Desoldering M/c | Power Source: Corded Electric | 10 |

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|---|---|---|---|
| 12 | Advanced motorized Sewing Machine | | 1 |
| 13 | Wood Lathe | Wood lathe machine with chuck and accessories V 200 v 580 W Speed 5000 RPM 680*93*140 mm  6.5 kg | 1 |
| 14 | Power Tools |  10 RE Professional Corded-Electric Drill Tool Kit MS & Plastic 100 Pcs | 1 |
| 15 | Portable Welding M/c | 200i - MIG/MAG/MMA IGBT Inverter based Welding Machine | 1 |
| 16 | Refrigerator | l 184 L 3 Star Direct-Cool Single Door Refrigerator with stabilizer | 1 |
| 17 | Normal and Microwave Oven |  20 L Stainless steel cavity Solo Microwave Oven | 1 |
| 18 | Magnifying Glass with Stand | Power adapter: Input 110-240V50/60Hz | 1 |
| 19 | Digital Microscope | Specification: Magnification: 1600X Light source: 8 LED lights Resolution: 1920×1080, 640*480 Pixel: 30W Focal length: 3-40mm manual adjustment Support Android 4.2 or above/widows/Mac system | 1 |
| 20 | Mixed Signal Oscilloscope | Bandwidth: Up to 100 MHz<br>Analog Channels: 4 or more<br>Real-Time Sampling Rate: Maximum 1 GSa/s per channel<br>Memory Depth: 10 Mpts per channel<br>Waveform Update Rate: Approximately 120,000 wfms/s<br>Vertical Resolution: 8 bits Vertical Scale: Ranging from 1 mV/div to 10 V/div<br>Horizontal Scale: Spanning 1 ns/div to 100 s/div Spectrum Analyzer Frequency Range: DC to 500 MHz FFT Points: Up to 1M points for enhanced frequency domain resolution Waveform Math Functions: Includes addition, subtraction, multiplication, division, minimum, maximum, root, square, absolute, inverse, derivative, integral, and low-pass filter Trigger Types: Edge, Pulse Width, Video, Pulse Runt, Rise & Fall (slope), Alternate, | 1 |
| 21 | Digital Storage Oscilloscope | Number of Channels: Up to 2 independent analog inputs<br>Memory Record Length: Up to 10 Mpts for extended waveform capture Bandwidth Limiting: Selectable 20 MHz bandwidth filter Sampling Rate: Maximum of 1 GSa/s real-time equivalent per channel Rise Time: ≤ 3.5 ns depending on probe and settings<br>Display: 7" TFT color LCD with 800×480 resolution<br>Time Base Range: From 5 ns/div to 100 s/div, user-adjustable Vertical Resolution: 8-bit digital resolution Trigger Modes: Automatic, Normal, and Signal-dependent triggering<br>Maximum Input Voltage: 300 Vrms (within safety limits) Input Sensitivity: Within the range of 1 mV/div to 10 V/div Input Coupling Options: Selectable among AC, | 1 |

| | | DC, and Ground Trigger Coupling Modes: Configurable as AC, DC, High-pass, or Low-pass Physical Dimensions: Approximately $350 \times 200 \times 120$ mm or above Unit Weight: 2.5 kg or above | |
|---|---|---|---|
| 22 | Signal Generator | Output Function: The equipment shall provide output waveforms including sine, square, triangle, and TTL signals as required.<br>Frequency Range:<br>For sine and square waveforms: approximately 0.1 Hz up to 3 MHz.<br>For triangle waveform: approximately 0.1 Hz up to 1 MHz.<br>Frequency Resolution: Frequency resolution shall be maintained within a maximum of 0.1 Hz.<br>Frequency Stability: The frequency stability shall be within ±20 ppm (parts per million).<br>Frequency Accuracy: The frequency accuracy shall be maintained within ±20 ppm.<br>Frequency Aging: Frequency aging shall not exceed ±5 ppm per annum. Amplitude Range: Output amplitude shall be up to 10 V peak-to-peak (Vp-p) into a 50 Ω load.<br>Amplitude Accuracy: Amplitude accuracy shall be within ±20% at maximum amplitude setting.<br>Output Impedance: Nominal output impedance shall be 50 Ω with a tolerance of ±10%.<br>Attenuator: A single-step attenuator of -40 dB ±1 dB shall be provided. Display: A 6-digit LED display shall be incorporated for parameter indication. Output Control: Output shall be controlled via an ON/OFF selector switch. Power Source: The device shall operate on an AC supply of 240 V, 220 V, or 110 V ±10%, with frequency 50/60 Hz. | 1 |
| 23 | Variable Power Supply | Series Programmable DC Power Supplies 3 independent high precision outputs: two 32 V /3.2 A one 2.5 V / 3.3 V / & 5 V / 3.2 A total 220 W power<br>No china/pakistan brands | 1 |
| 24 | Benchtop Multimeter | 4½-digit; 150rdgs / s measurement speed; or better<br>No china/pakistan brands | 1 |
| 25 | Projector | 4000 Lumens High Brightness, 20000:1 High Contrast Ratio, Dual HDMI, USB-A, Upto 15000 Hrs Extra-Long Lamp Life, 10 W Speaker, 3D Capable | 1 |
| 26 | Heavy Duty Laser Printer | All-in-One LaserJet Pro Printer with Duplex & Wi-Fi W1A24A | 1 |

| S.NO. | COMPONENTS | SPECIFICATIONS | QTY |
|---|---|---|---|
| 27 | PCB Milling Machine | Cuttable Materials: Modeling Wax, Chemical Wood, Foam, Acrylic, Poly Acetate, ABS, PCB,Copper glad, etc<br>Table Size: 225 (X) × 150 (Y) mm or more<br>Drive System: Stepping Motor (X, Y, Z Axis) Operating Speed: 800 mm/min Software Resolution: 0.01 mm/step Position accuracy : 0.01 to 0.02 mm Max Travel Speed (mm/sec)-58 (2.28 ") Drilling (mm)-0.2 -3.175 (8-125 mil) Maximum Drilling Cycles/Min-50<br>Spindle Motor: DC Motor Type 380 or More Spindle Speed: Adjustable 20,000 and above rpm or more Tool Chuck Type: Collet Interface: USB or cable Control Commands: RML-1, NC code Power Supply: DC 24V, 2.5A (via AC 100 240V, 50/60Hz adapter) Power Consumption: Approx. 50 W or more | 1 |
| 28 | Smart Board | Interactive Flat Panel 75"<br>Version: Android 14<br>RAM: 8GB ROM: 128GB | 1 |
| 29 | Computer Workstation in networking | Workstation<br>32GB (1x32GB) i7<br>1TB SSD<br>NVIDIA RTX 3050 - 4GB<br>Win 11 Pro<br>22 INCH FHD MNTR TFT Mouse and Keyboard or better | 5.00 |

**2. MANDATORY CONSUMABLES**

| S.NO. | COMPONENTS | SPECIFICATIONS | QTY |
|---|---|---|---|
| 1 | Vacuum Cleaner | 1400Watts Dry Vacuuming 24 kPa Suction Power 1.5L Dust Collector | 1 |
| 2 | Hot Air Gun- 5 Nos. | | 1 |
| 3 | Measuring Equipment | [Vernier calliper (0- 200/0.01) Vernier height gauge(0-1000mm) MiCrOmeter 0-50 50-100/0.001 inside and outside)] Metal Scale etc | 1 |

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|---|---|---|---|---|
| 4 | Fire Extinguisher | 6 kg | | 1 |
| 5 | First Aid Box | | | 1 |
| 6 | Digital Multimeter | | | 5 |
| 7 | Clothes Iron | | | 5 |
| 8 | Electronic Component Repository (LCR Meter Variac | | | 1 |
| 9 | 3D printer Filament | PLA+ 3D Printer Filament 1.75mm Dimensional Accuracy +/- 0.03 mm 1 kg Spool (2.2 lbs) | | 2 |
| 10 | Acrylic Sheets | Model: Acrylic Sheets 8 x 4 Ft ACRYLIC SHEETS 2MM ACRYLIC SHEETS 3MM ACRYLIC SHEETS 4MM ACRYLIC SHEETS 5MM | | 8 |
| 11 | Foam Sheets | Model: Foam Sheets 8 x 4 Ft FOAM SHEETS 8MM FOAM SHEETS 10MM FOAM SHEETS 12MM FOAM SHEETS 15MM | | 8 |
| 12 | Ply Boards | Model: Ply Boards 8 x 4 Ft PLY BOARDS 8MM PLY BOARDS 12MM PLY BOARD | 8 | |
| 13 | Nylon Rods | Model: Nylon Rods 12 mm 15 mm 18 mm 25 mm | 20 | |
| 14 | Nuts | Model: Nuts 3mm 4mm 5mm 6mm 8mm 10mm 12mm | 700 | |
| 15 | Bolts | Model: Bolts 3mm 4mm 5mm 6mm 8mm 10mm 12mm | 700 | |
| 16 | Screws | Model: Screws 3mm 4mm 5mm | 300 | |
| 17 | Washers | Model: Washers 3mm 4mm 5mm 6mm 8mm 10mm 12mm | 700 | |
| 18 | Studs | Model: Studs 6mm 8mm | 10 | |
| 19 | Nails | Model: Nails 1" 2" 3" | 300 | |

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|---|---|---|---|
| 20 | Adhesives | | 30 |
| 21 | 2Way Tapes | | 20 |
| 22 | PVC Pipes | Polyvinyl Chloride (PVC), unplasticized (uPVC) or Chlorinated (CPVC), Ranges from **16 mm to 630 mm** (varies by standard). | 5 |
| 23 | Aluminum Channels | | 10 |
| 24 | PCB Drill Bits | | 60 |
| 25 | Drill Bits | | 80 |
| 27 | Carpentry Boring Bits | | 1 |
| 28 | Electronic Active and Passive components | | 10 |
| 29 | USB Cable | | 10 |
| 30 | Radium Cutter knives | | 10 |
| 31 | Glue Sticks | | 50 |
| 32 | Hack Saw Blades | | 10 |
| 33 | 9V Battery Snaps | | 20 |
| 34 | LAN Cables | | 5 |
| 35 | 9V Batteries | | 20 |
| 34 | LAN Cables | | 5 |
| 35 | 9V Batteries | | 20 |

**3. MANDATORY TOOLS- MECHANICAL**

| S.NO. | COMPONENTS | SPECIFICATIONS | QTY |
|---|---|---|---|
| 1 | Hacksaw | | 5 |
| 2 | Micro Chisel Set | | 3 |
| 3 | Pliers | | 3 |
| 4 | Manual PCB Drilling Machine | PCb Manually Drilling machine With 0.3 mm to 1.6 mm | 3 |
| 5 | PCB power Drilling Machine | | 3 |
| 6 | Cordless Drilling Machines | | 2 |
| 7 | Jigsaw Machines | | 2 |
| 8 | Power Circular Saw | | 2 |
| 9 | Files Set | Inditrust 6 pcs Premium Assorted File Set with Handle (6 inch) | 2 |
| 10 | File Handles | | 1 |
| 11 | Needle Files | | 2 |
| 12 | Pipe Vice | | 2 |
| 13 | Mini HackSaw | | 5 |
| 14 | Ball Peen Hammer | | 5 |
| 15 | Steel Shaft Claw Hammer | | 5 |
| 16 | Nylon Mallet | | 5 |
| 17 | Rubber Mallet | | 5 |
| 18 | Allen Key Set | | 3 |
| 19 | multi tool kit | | 2 |

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|---|---|---|---|
| 20 | Double ended spanner sets | | 2 |
| 21 | 12 Piece Open ended Spanner Set | | 2 |
| 22 | Belt and Disc Sanding Machine | | 1 |
| 23 | Scroll Saw Machine | | 1 |
| 24 | Tool Wall covering Perforator | | 3 |
| 25 | Moto Saw | | 1 |
| 26 | Bench Grinding Machine | Powerful 373 watts motor<br>Accepts cotton buffing and wire brush wheels | 1 |
| 27 | Power Return Measuring Tape | | 5 |
| 28 | Tri Square 8" | | 5 |
| 29 | Stainless Steel Rule | | 5 |
| 30 | Digital Vernier Caliper | Power Source: Battery Powered Resolution: 0.01 inch Included Components: 1 | 5 |
| 31 | Spirit Level | | 5 |
| 32 | Dremel Cordless Rotary Tool | | 1 |
| 33 | GPIO Power Router | | 1 |
| 34 | Sewing Machine | | 1 |
| 35 | Impact Drill | | 3 |
| 36 | Ratchet Set | | 2 |

| | | | |
|---|---|---|---|
| 37 | Router Bit Starter kit | | 1 |
| 38 | GPIO Power Router | | 1 |
| 39 | Sewing Machine | | 1 |
| 40 | Impact Drill | | 3 |
| 41 | Ratchet Set | | 2 |
| 42 | Router Bit Starter kit | | 1 |
| 43 | Scroll Saw | | 1 |

| 4. MANDATORY TOOLS-ELECTRICAL | | | |
|---|---|---|---|
| S.NO. | COMPONENTS | SPECIFICATIONS | QTY |
| 1 | Hot Air Blower With Soldering Iron | | 5 |
| 2 | Tin Cutter with Spring | | 10 |
| 3 | Centrifugal Blower | | 1 |

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|---|---|---|---|
| 4 | Screwdriver Sets | | 2 |
| 5 | Cutting Mats | | 5 |
| 6 | Vacuum Cleaner | | 2 |
| 7 | Hot Air Gun- | | 5 |
| 8 | Micrometer - | | 5 |

| | | | |
|---|---|---|---|
| 9 | Glue Gun | | 5 |
| 10 | Air Compressor | | 1 |
| 11 | Allen Set Wi ench | | 5 |
| 12 | Tongue and Groove Pliers | | 5 |
| 13 | Non contact voltage tester | | 5 |
| 14 | Wire Stripper | | 5 |
| 15 | Fish Tape | | 2 |
| 16 | Flashlights | | 2 |
| 17 | DC Regulated Power Supply | | 3 |
| 18 | Solder Wick | | 10 |
| 19 | Filament Dehydrator | | 1 |

| S.NO. | COMPONENTS | SPECIFICATIONS | QTY |
|---|---|---|---|
| 20 | Reflow Oven | • No. of waves: 7<br>• Heating type: Infrared IC Heater<br>• Maximum width of PCB board: 300×320 mm<br>• Power supply: AC110V/ 50Hz AC220V /60Hz | 1 |
| 21 | Glass Cutter | | 1 |
| 22 | Gypsum (10kg | | 10 |
| 23 | Digital Muttimeter | | 5 |
| 24 | Clothes Iron | | 5 |
| 25 | Oscilloscope | Digital Storage Oscilloscope 100 MHZ | 4 |

**5. NETWORKING TOOLS**

| S.NO. | COMPONENTS | SPECIFICATIONS | QTY |
|---|---|---|---|
| 1 | C-Clamp | Carbon Steel Powder Coated | 10 |
| 2 | Ratchet clamp 8 inches/200mm | Ratchet ClampMAF Quick BAR CLAMP 250MM 10INCH | 10 |
| 3 | Baby Vice 60 mm | Baby Vice -Bolt Base 60mm 2 1/2" Precision Machined Unbreakable Steel Powder Coated | 5 |
| 4 | Bench vices | • Heavy Duty Bench Vice<br>• Pre Drilled Holes to Bolt Down To Benchtop<br>• Max Jaw Opening: 100mm | 4 |
| 5 | Anvil | Anvil<br>• Weight: 5 Kg<br>• S G Iron Casting | 1 |

**6. OPT. EQUIP. & CONSUMABLES**

| S.NO. | COMPONENTS | QTY |
|---|---|---|
| 1 | HELTEC Automation LoRa32 compatible Arduino Development Board SX1262 ESP32-S3 OLED WIFI Meshtast | 4 |
| 2 | Sensor set -Temperature sensor module +Vibration switch module +Hall magnetic sensor module+ Key switch module | 5 |

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|---|---|---|---|
| 3 | Arduino UNO boards | | 10 |
| 4 | NodeMCU (ESP8266) | | 10 |
| 5 | Raspberry Pi 4 boards | | 10 |
| 6 | Peripheral sets for Arduino/ NodeMCU/ Raspberry Pi ( Full Set )<br><br>40 jumper Wires Male To Male Male to Female Female to Female/ Breadboard Jumper Wires | | 1 |
| 7 | ESP32 CAM Development Board | | 10 |
| 8 | Raspberry Pi 3 Camera Module Night Vision Camera | | 5 |
| 9 | Actuators : 4- relay2. Servo3. DC 4. Stepper ( full customized set ) | | 5 |
| 10 | IOT Sensors -voltage sensor -Pir -Ultrasonic- Ir- Adxl-Dht1-Touch- Rtc- Matrix keyboard-Voltage divider ( full customized set ) | | 5 |
| 11 | IOT  Wireless-Gps-Gsm- Lora-. Zigbee set  ( full customized set ) | | 5 |
| 12 | IOT -Wires cables  customized pcb boards  ( full customized set ) | | 5 |

| | | | |
|---|---|---|---|
| 13 | Sublimation machine   Dimensions45L x 50W x 50H Centimeters | | 1 |