Bharatiya Vidya Bhavan's
SARDAR PATEL INSTITUTE OF TECHNOLOGY
(Autonomous Institute Affiliated to Mumbai University)
Munshi Nagar, Andheri (W) Mumbai-400 058

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Annexure-III

PART-A (Electrical and Electronic Equipment's)

LIST OF EQUIPMENTS:		
Item 1:- 50MHz 2 CH. DSO		**Qty Required : 20 Units**
Sr. No	**Parameter Name**	**Technical Specification**
1.	Instrument Criteria	Digital Storage Oscilloscope , 50MHz Bandwidth , 2Analog CH.
2.	Input Channel Characteristics	The DSO should have 20K record length on each channelsimultaneously
		Max 1GS/s sampling on Channel simultaneously.
		Input impedance 1 MΩ ±2 % in parallel with 14 pF ±2 pF,
		1mV/div to 10V/div vertical scale setting and 2 ns/div to 100 sec/divtime scale with ±20ppm Time base Accuracy or better.
3.	Control and Measurement Facilities	• Should have individual vertical control for each Channel.
		• Auto Set Feature, Cursor measurement and Automatic Measurement of Time and Amplitude parameters with facilityto Enable / Disable of by password protection as and when require.
		• Dedicated control knobs in the front panel for Zoom, and navigate on the scope Acquisition
		• In-built help Function, Graphical representation with description of all measurement parameters should be available.
		• Facility to load Experimental Documents drawings and images in the DSO and should be able to Read through the Documentsin the DSO screen without needing PC connection.

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		• Should have Snapshot feature to display All available Measurement Parameters on the Screen at a time.
		• 32 or more Automatic Measurements for Time and Amplitude paraments including Burst Width , Phase , Positive and Negative Pulse Count , Rising and Falling Edge count ,Delay FR ,Delay FF and Delay RR measurement.
		• Should support Gating , MATH and FFT measurement. Dual window FFT with simultaneous time and frequency domain views
4.	Acquisition and Trigger	DSO should support Sample, Peak Detect , Average, Hi-Resolution and Roll Acquisition mode
		Trigger Modes as Edge, Pulse Width and Runt. 20nS to 8Sec Trigger Hold Off Range,
		Trigger Source as CH1, CH2, External and AC line trigger.
5.	Display	7-inch TFT color display with adjustable , Interpolation Sin (x)/x display, variable and infinite persistence,
		Display should have 15 Horizontal Div. &10 Vertical Division, Quick Search Function, Built-in Tips for Faster Function , On Screen Scope Basics for New user learning .
6.	Save and Recall Function	The DSO should have facility to save and Recall Waveform, Scope Settings in the Internal and External Memory . Should able to display min. two saved waveform along with both Live channel waveform andone Math Waveform.
7.	Interface Ports and Connectivity	USB Host & Device port Connectivity, Should Support PC connectivity.
8.	Regulatory	The DSO should Comply to Electromagnetic compatibility of EC Council Directive 2014/30/EU Safety UL61010-1, UL61010-2-030, CAN/CSA-C22.2 No. 61010.1, CAN/CSA-C22.2 No. 61010-2:030; complies with the Low Voltage Directive 2014/35/EU for Product Safety

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9.	Warranty	The DSO should Cover 5 Years Comprehensive Warranty including the In-built Display. Std. Probes Supplied should cover 1 year Replacement Warranty.
10	Recommended Brands, not limited to.	Tektronix, Aplab, Rishabh and all others.

Special Instruction :

Ø Vendor Should submit Compliance statement for each parameter along with Complete product data sheet marking the Specification. Should clearly mention deviation from the tender specs, if any and Demonstrate for the Technical Parameter on their Quoted Instrument as & when asked by Technical Team from the Respective Dept. of the Institute for Technical Evaluation.

Ø Vendor Should Provide OEM Authorization Certificate for the Quoted Instrument Brand. OEM or Vendor should have Service Centre in Maharashtra State for Quick Service / Support.

Item 2:- Single/dual Output- DC regulated Power Supply-30V   Qty Required : 30 Units

Sr. No	Parameter Name	Specification
1.	Output Voltage	0-15V/0-32V
2.	Output Current	0-2A
3.	Load & Line Regulation	0.05% max.
4.	Ripple & Noise	1 mV (r. m. S.) Max.
5.	Features	• Protected Against Overload & Short Circuit by Means of Automatic Crossover Characteristics. • Continuous Metering of Output Voltage & Current.
6.	Operating Temperature Range	0-55
7.	Warranty	1 year standard
8.	Recommended Brand	Aplab, Rishabh, ZOMA

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Item 3:- 0.3Hz to 3MHz, Dual output Channel Function Generator Qty Required : 50 Units

Sr. No.	Parameter Name	Specification
1.	Frequency Range	0.01Hz to 1MHz in8 decade ranges.
2.	Frequency Indication	±1% ±1 digit.
3.	Output Impedance	50 ohms
4.	Frequency Indication Accuracy	±1% +1 digit
5.	Output Waveforms	Sinusoidal, Triangle, Square, Ramp, Pulse, TTL (Sync) & DC Outputs.
6.	Sine Distortion	<1% (typical).
7.	Square Wave Rise / Fall Time	<75nsec.
8.	Frequency Stability	<0.5% of the set frequency (after ½ Hour warm up).
9.	Duty Cycle	10% to 90% variable.
10	Maximum Output Voltage ● Into 50 ohms ● Open Circuit	10V p-p output. 20V p-p output.
11.	Amplitude Indication	3 digit seven segment display (Vp-p) ±5%.
12.	Amplitude Flatness	±0.5dB upto 100KHz range / ±1.0dB for 1MHz range.
13.	Attenuator	Two step attenuators of 20dB & 40dB. Fine attenuation of 20dB through verniercontrol. (Total 80 dB attenuation).
14.	Attenuator Accuracy	±0.5dB per 20dB at 1KHz.
15.	DC Offset	±10V ±5% (DC + AC peak) in open circuit ±5V ±5% (DC + AC peak) in 50 ohms.
16.	Warranty	Instrument should be covered under min. 5 years of Standard Comprehensive Warranty including LCD Display.

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17.	Recommended Brands, not limited to.	Aplab, Scientech, keysight.

Mandatory Instruction:
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Vendor Should Provide Authorization Certificate for the Quoted Brand of the Instrument.

Certificates for the genuineness of the warranty and service center(s) in India should be provided by the manufacturer.
After-sales service support for repairs/ replacement of non-functional part(s) should be available in India (including all services under warranty).

Item 4 :- Microprocessor Trainer Kits		**Qty Required : 10 Units**
Sr. No.	**Specification**	
1.	• Microprocessor Trainer kit with SMPS	
2.	Warranty	Instrument should be covered under min. 5 years of Standard Comprehensive Warranty including LCD Display.
3.	Recommended Brands, not limited to.	Micro-embedded, Dynalog

Mandatory Instruction :
Vendor Should submit Compliance statement for each parameter along with Complete product data sheet , clearly mentioning deviation from the tender specs , if any and Demonstrate for the Technical Parameter mentioned in the Tender on their Quoted Instrument , as & when asked by Technical Team from the Respective Dept. of the Institute for Technical Evaluation .
Vendor Should Provide Authorization Certificate for the Quoted Brand of the Instrument.

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Item 5:- Raspberry Pi development board		Qty Required : 05 Units
Sr. No.	**Specification**	
1.	Raspberry Pi 4 Model 8GB or higher version Boards with PiCAM, SD card, HDMI to VGA and power cable.	
2.	Warranty	Instrument should be covered under Standard Comprehensive Warranty.
3.	Recommended Brands, not limited to.	Made in India preferred.
Mandatory Instruction :		
Vendor Should submit Compliance statement for each parameter along with Complete product data sheet , clearly mentioning deviation from the tender specs , if any and Demonstrate for the Technical Parameter mentioned in the Tender on their Quoted Instrument , as & when asked by Technical Teamfrom the Respective Dept. of the Institute for Technical Evaluation .		
Vendor Should Provide Authorization Certificate for the Quoted Brand of the Instrument.		

Item 6 :- Digital Multimeter		Qty Required : 10 Units
Sr. No.	**Specification**	
1.	- Multimeter 3.5 / 4.5 digit, Frequency: 0.1Hz ~ 30MHz - DC Voltage: 0.1mV ~ 1000V, AC Voltage: 0.1mV ~ 750V - DC Current: 200μA / 2000μA / 20mA / 200mA / 10A, AC Current 200μA / 2000μA / 20mA / 200 - Resistance 200W/ 2KW/ 20KW/ 200KW/ 2MW/ 20M mA / 10A - Capacitance 20nF / 200nF / 2μF / 20μF / 200μF / 2mF / 20mF - USB interface	
2.	Warranty	Instrument should be covered under StandardComprehensive Warranty.
3.	Recommended Brands, not limited to.	Aplab, Rishabh, Tektronix
Mandatory Instruction :		

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Vendor Should Provide Authorization Certificate for the Quoted Brand of the Instrument.

Item 7 :- Development Board	Qty Required : 10 units

Sr. No.	Specification	
1.	STM 32 B-L475E-IOT01A2 DISCOVERY KIT STM32L4 SPSGRF-868, STM32 L4 Transceiver; 802.11 b/g/n (Wi-Fi, WiFi, WLAN), Bluetooth® Smart 4.x Low Energy (BLE) 868MHz Evaluation Board	
2.	Warranty	Instrument should be covered under StandardComprehensive Warranty.
3.	Recommended Brands, not limited to.	Digikey or any other brand. Made in India preferred.

Mandatory Instruction :

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Vendor Should Provide Authorization Certificate for the Quoted Brand of the Instrument.

Item 8 :- Wattmeter	Qty Required : 04 units

Sr. No.	Specification
1.	1. Current Range: Range 1: 0 - 5 Amps Range 2: 0 - 10 Amps Must be capable of accurately measuring power in circuits with these current ranges. Measurement Accuracy: ±1% of full scale (or better). 2. Voltage Range: Range 1: 0 - 150 Volts AC/DC Range 2: 0 - 300 Volts AC/DC Range 3: 0 - 600 Volts AC/DC Must allow the user to select and measure power within these voltage ranges. Measurement Accuracy: ±1% of full scale (or better).

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3. Power Measurement:
Power Measurement Range: 0 - rated power (based on the combination of voltage and current ranges)
Power Factor Range: 0 to 1 (for accurate power measurement in AC circuits with varying power factors).
Accuracy of Power Measurement: ±2% or better, across the full measurement range.
Measurement Type: Real power (watts).
4. Frequency Range (for AC measurements):
Frequency Range: 50 Hz - 60 Hz (standard AC mains frequency range).
Specify if the wattmeter supports measurements beyond this range.
5. Display:
Type: Digital or Analog (Specify your preference).
Resolution: Display resolution should be suitable to provide accurate readings (e.g., 0.1 W for low-power circuits).
Backlit Display: If digital, should be backlit for easy readability in low light conditions.
6. Voltage and Current Input Connections:
Input Terminals: Suitable for measuring both voltage and current, with appropriate input terminals (e.g., banana plugs, binding posts, or screw terminals).
Safety Standards: The meter must comply with relevant safety standards (e.g., CE, UL, or IEC 61010-1).
7. Environmental Conditions:
Operating Temperature Range: 0°C to 50°C (or wider if required).
Storage Temperature Range: -20°C to 70°C.
Humidity: Must operate reliably in environments with relative humidity between 10% and 90%, non-condensing.
8. Power Supply:
Type: Battery-operated (specify battery type and duration) or mains-powered (specify voltage and current requirements).
Battery Life (if applicable): Minimum of 100 hours on standard usage (if battery-powered).
9. Size and Weight:
Dimensions: Compact and portable (e.g., approximate size of 200mm x 100mm x 50mm).
Weight: Should not exceed 1.5 kg for ease of handling.
10. Certification and Compliance:
The wattmeter should meet international safety and performance standards (e.g., CE certification, UL listing, IEC 61010 compliance).
Calibration Certificate: Provide a calibration certificate with the wattmeter, ensuring it meets accuracy standards.
11. Warranty and Support:
Minimum 1-year warranty for manufacturer defects.
Availability of technical support and spare parts.
12. Optional Features (if available):
Data logging capability.
RS232/USB or Bluetooth for data transfer to computers or smartphones.
Power factor measurement for AC circuits.

2.	Warranty	Instrument should be covered under StandardComprehensive Warranty.

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3.	Recommended Brands, not limited to.	Made in India preferred.

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Vendor Should Provide Authorization Certificate for the Quoted Brand of the Instrument.

Item 9:- Ammeter	**Qty Required : 10 Units**
Sr. No.	**Specification**
1.	**Type 1: 5/10 Amp Dual Range Ammeter** • Measurement Range: 0–5 A and 0–10 A (switchable) • Accuracy: ±[Specify, e.g., 1% of full scale] • Display Type: Analog/Digital (specify preferred option) • Input Resistance: [Specify if critical] • Mounting Type: Panel-mounted/Portable • Operating Temperature Range: [e.g., -10°C to +50°C] • Power Supply: [Specify if applicable] • Certifications: [e.g., ISO, CE] **Type 2: 15/20 Amp Dual Range Ammeter** • Measurement Range: 0–15 A and 0–20 A (switchable) • Accuracy: ±[Specify] • Display Type: Analog/Digital • Input Resistance: [Specify if critical] • Mounting Type: Panel-mounted/Portable • Operating Temperature Range: [e.g., -10°C to +50°C] • Power Supply: [Specify if applicable] • Certifications: [e.g., ISO, CE] •
2.	Warranty Instrument should be covered under StandardComprehensive Warranty.
3.	Recommended Brands, not limited to. Aplab, Rishabh, Tektronix,… made in India preferred.
Mandatory Instruction :	

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Vendor Should Provide Authorization Certificate for the Quoted Brand of the Instrument.

Item 10:- TMS 320C6748DSP Development Board	Qty Required : 10 Units

Sr. No.	Specification
1.	**Processor**: - DSP: TMS320C6748 floating-point DSP processor. - Frequency: Up to 456 MHz. - C674x DSP core with VLIW architecture. - Built-in DSP instructions for single-precision floating-point and fixed-point processing. **Memory**: - On-chip RAM: 256 KB. - External memory interface support: DDR2 SDRAM, NAND, NOR, and SPI Flash. **I/O Interfaces**: - Ethernet: 10/100 Mbps (IEEE 802.3 compliant). - USB: USB 2.0 OTG (On-The-Go) support. - UART: At least two UART ports. - SPI/I2C: Support for standard peripheral communication. - GPIO pins: Configurable general-purpose pins. - SD/MMC card interface: Support for SD/MMC storage. **Audio/Video Support**: - Audio Interface: McASP for audio codecs (e.g., stereo input/output, support for I2S protocol). - LCD Interface: Integrated controller for external LCDs (optional requirement). **Development and Debugging**: - JTAG Debugger interface support. - Boot options: NAND, NOR, SD card, USB, and Ethernet. - Pre-installed bootloader. **Software Support**: - Compatible IDE: Code Composer Studio (CCS) v6 or later. - DSP libraries and examples: Basic and advanced algorithms for signal processing and control. - RTOS support: SYS/BIOS or FreeRTOS. **Power Supply**: - Input voltage: 5V or 12V DC (specify power adapter if included). - Low power consumption. **Form Factor**: - Compact development board with mounting holes.

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	o Durable and lightweight.
	• **Additional Features**:
	  o LEDs and push buttons for GPIO testing.
	  o Expansion connectors for add-on modules.
	  o Heat sink or passive cooling support for the processor.
	• **Documentation**:
	  o User manual with board setup and usage instructions.
	  o Schematics and PCB layout diagrams (optional).
	  o Sample projects and tutorials.	

2.	Warranty	Instrument should be covered under StandardComprehensive Warranty.
3.	Recommended Brands, not limited to.	Made in India preferred.

Mandatory Instruction :
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Vendor Should Provide Authorization Certificate for the Quoted Brand of the Instrument.

Item 11:- EDGE Artix 7 FPGA Development Board and Modules Qty Required : 5 Units	
Sr. No.	**Specification**
1.	**FPGA Chip:** Model: Xilinx Artix 7 (e.g., XC7A35T or XC7A100T). Logic Cells: Minimum 33,280 (for XC7A35T) or 101,440 (for XC7A100T). Block RAM: At least 1.8 Mb for XC7A35T or 4.9 Mb for XC7A100T. DSP Slices: Minimum 90 (for XC7A35T). **Memory**: External DDR3 RAM: Minimum 512 MB. Flash Memory: At least 128 Mb. **Connectivity:** USB 3.0 for programming and data transfer. GPIO headers: 50+ pins. JTAG header for debugging. Ethernet: 10/100 Mbps. UART for serial communication. **Display**: TFT Display: 3.2-inch or larger, with touch interface support. Resolution: Minimum 320x240 pixels.

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Camera Interface:
Support for CMOS camera modules (e.g., 5MP OV5640).
MIPI CSI-2 or parallel interface.
Power Supply:
Input voltage: 5V or 12V DC.
Low power consumption.
Software/Tool Support:
Compatible with Xilinx Vivado Design Suite.
Pre-configured demo designs (e.g., VGA controller, image processing).
Support for Verilog/VHDL and high-level synthesis tools.
B. CMOS VGA Camera and TFT Display Module
CMOS Camera Module:
Resolution: VGA (640x480) or higher.
Interface: Parallel or I2C/SPI.
Features: Auto white balance, exposure control, and image processing support.
TFT Display Module:
Size: Minimum 3.2 inches.
Resolution: 320x240 or higher.
Interface: SPI/I2C or parallel.
Touch: Resistive/Capacitive.
C. CMOS 5MP Camera Module
Camera Sensor:
Model: OV5640 or equivalent.
Resolution: 5 MP.
Interface: MIPI CSI-2 or parallel.
Features: Auto-focus, white balance, and low-light support.
D. Sensor Add-ons
Gesture Sensor:
Technology: Infrared-based or capacitive gesture detection.
Interface: I2C/SPI.
Range: Up to 10 cm.
Ultrasonic Sensor:
Range: 2 cm to 4 m.
Accuracy: ±3 mm.
Interface: GPIO/I2C.
Touch Sensor:
Technology: Capacitive touch sensing.
Interface: GPIO/I2C.
Accelerometer:
Model: ADXL345 or equivalent.
Interface: I2C/SPI.
Features: 3-axis acceleration, tap detection.
E. Motor
Type: DC or Stepper motor.
Voltage: 6V to 12V.
Torque: Minimum 1 kg-cm.
Control: PWM or I2C-based motor driver module.

2.	Warranty	Instrument should be covered under StandardComprehensive Warranty.

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3.	Recommended Brands, not limited to.	Made in India preferred.

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Vendor Should Provide Authorization Certificate for the Quoted Brand of the Instrument.

Item 12:- PINE-S7 SPARTAN7 FPGA BOARD with 16x2 LCD, Keypad Wooden Box Add-on
Qty Required : 5 Units

Sr. No.	Specification

1.	1. **FPGA Chip**:
	   ○ **Model**: Xilinx Spartan-7 (e.g., XC7S25 or XC7S50).
	   ○ Logic Cells: At least 23,360 (for XC7S25) or 52,160 (for XC7S50).
	   ○ Block RAM: Minimum 1.6 Mb for XC7S25 or 2.7 Mb for XC7S50.
	   ○ DSP Slices: Minimum 80 (for XC7S25) or 120 (for XC7S50).
	2. **Memory**:
	   ○ Onboard DDR3 RAM: Minimum 512 MB.
	   ○ Flash Memory: At least 128 Mb.
	3. **Connectivity**:
	   ○ USB 2.0/3.0 for programming and data transfer.
	   ○ GPIO headers: Minimum 40 pins.
	   ○ UART interface for serial communication.
	   ○ Ethernet: 10/100 Mbps optional support.
	4. **Display Support**:
	   ○ Header or connector for 16x2 LCD module.
	5. **Development and Debugging**:
	   ○ JTAG debugger interface support.
	   ○ Boot options: Flash, SD card.
	   ○ Pre-installed bootloader for quick deployment.
	6. **Power Supply**:
	   ○ Input Voltage: 5V DC.
	   ○ Power efficiency: Low power consumption.
	7. **Software/Tool Support**:
	   ○ Compatible with Xilinx Vivado Design Suite.
	   ○ Support for Verilog, VHDL, and high-level synthesis tools.

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B. Add-ons

1. **16x2 LCD Module**:
   - o Character-based LCD with 16x2 characters display.
   - o Backlight: LED with adjustable brightness.
   - o Interface: GPIO or I2C/SPI.
2. **Keypad**:
   - o Matrix Keypad: 4x4 or 4x3 configuration.
   - o Interface: GPIO.
   - o Features: Durable keys for long-term use.
3. **Wooden Box Add-on**:
   - o **Purpose**: Secure storage and portability for FPGA board and accessories.
   - o Material: High-quality, polished wood.
   - o Compartments: Dedicated slots for the FPGA board, LCD, keypad, and cables.
   - o Features: Lockable lid, anti-static lining for sensitive components.

2.	Warranty	Instrument should be covered under StandardComprehensive Warranty.
3.	Recommended Brands, not limited to.	Made in India preferred.

Mandatory Instruction :

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Vendor Should Provide Authorization Certificate for the Quoted Brand of the Instrument.

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Item 13:- LTE modem- USB connection with driver software	
Qty Required : 10 Units	

Sr. No.	Specification	

1.	• **Connectivity**:
	   • **Interface**: USB 2.0 or higher.
	   • Plug-and-play functionality preferred.
	• **LTE Specifications**:
	   • **Network Support**: LTE (4G) Cat 4 or higher.
	   • **Frequencies**: Support for global LTE bands (e.g., B1, B3, B5, B7, B8, B20, B28).
	   • Backward compatibility: 3G (HSPA+, WCDMA) and 2G (EDGE, GPRS).
	• **Data Transfer Rates**:
	   • Downlink: Up to 150 Mbps (or higher for Cat 6+).
	   • Uplink: Up to 50 Mbps.
	• **SIM Support**:
	   • Slot for micro-SIM/nano-SIM.
	   • Support for multiple operators (unlocked).
	• **Additional Features**:
	   • Antenna: Internal or external with SMA connector.
	   • Indicators: LED indicators for power, network, and data status.
	   • Compact and lightweight design.	

2.	Warranty	Instrument should be covered under StandardComprehensive Warranty.
3.	Recommended Brands, not limited to.	Made in India preferred.

Mandatory Instruction :

Vendor Should submit Compliance statement for each parameter along with Complete product data sheet , clearly mentioning deviation from the tender specs , if any and Demonstrate for the Technical Parameter mentioned in the Tender on their Quoted Instrument , as & when asked by Technical Teamfrom the Respective Dept. of the Institute for Technical Evaluation .

Vendor Should Provide Authorization Certificate for the Quoted Brand of the Instrument.

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Item 14:- ADALM-PLUTO SDR active learning module **Qty Required : 10**	

Sr. No.	Specification

1.	**Technical Specifications**
	A. General Features
	   1. **Frequency Range**:
	      ○ 325 MHz to 3.8 GHz, with a software option to extend to 70 MHz to 6 GHz.
	   2. **Channel Support**:
	      ○ Full-duplex transceiver with independent transmit (Tx) and receive (Rx) paths.
	   3. **Bandwidth**:
	      ○ Up to 20 MHz instantaneous bandwidth.
	   4. **RF Performance**:
	      ○ Output Power: Configurable and capable of at least 0 dBm.
	      ○ Noise Figure: Optimized for educational and prototyping applications.
	   5. **Antenna**:
	      ○ SMA connectors for external antennas.
	      ○ Includes omnidirectional antennas for Tx/Rx.
	
	B. Connectivity
	   1. **Interface**:
	      ○ USB 2.0 connection for data transfer and power.
	   2. **Compatibility**:
	      ○ Works with Windows, Linux, and macOS.
	
	C. Software Support
	   1. **Driver and Software Tools**:
	      ○ Compatible with GNU Radio, MATLAB/Simulink, and IIO Oscilloscope.
	      ○ Includes support for Python APIs and C/C++ programming.
	   2. **Communication Protocols**:
	      ○ Support for FM, GSM, LTE, and other standard wireless protocols.
	   3. **Documentation and Tutorials**:
	      ○ Comprehensive online resources, including user manuals, quick-start guides, and example projects.
	
	D. Additional Features
	   1. **Onboard Processor**:
	      ○ Integrated ARM Cortex-A9 processor for standalone operations.
	   2. **Power Supply**:
	      ○ USB-powered.
	   3. **Form Factor**:
	      ○ Compact and portable for lab and field use.

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2.	Warranty	Instrument should be covered under StandardComprehensive Warranty.
3.	Recommended Brands, not limited to.	Made in India preferred.

Mandatory Instruction :

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Vendor Should Provide Authorization Certificate for the Quoted Brand of the Instrument.

Item 15 :- SparkFun RTL-SDR Blog V3 USB Dongle with Dipole Antenna Kit
Qty Required : 10

Sr. No.	Specification
1.	**RTL-SDR Blog V3 USB Dongle**

1. **Frequency Range**:
   - Covers 500 kHz to 1.75 GHz.
2. **Features**:
   - R820T2 tuner for better sensitivity and tuning.
   - TCXO (Temperature Compensated Crystal Oscillator) with ±1 PPM stability.
   - SMA female antenna connector.
   - Built-in Bias-T for powering external devices like LNA (Low Noise Amplifiers).
   - Support for direct sampling for HF (500 kHz to 24 MHz).
3. **Connectivity**:
   - USB 2.0 for data transfer and power supply.
   - Plug-and-play functionality with support for third-party SDR software.
4. **Software Compatibility**:
   - Compatible with SDR# (SDRSharp), GQRX, HDSDR, GNU Radio, MATLAB, and other SDR software.
   - Supports Windows, macOS, Linux, and Android platforms.

B. Dipole Antenna Kit
1. **Antenna Components**:
   - Telescopic dipole antennas adjustable for multiple frequency bands.
   - SMA male to MCX male adapter for compatibility with the RTL-SDR dongle.
   - Antenna base with an SMA connector and suction mount for easy setup.
2. **Frequency Coverage**:
   - Designed for coverage from 70 MHz to 1.6 GHz.

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	3. **Additional Features**:
	   o Modular design for custom configurations.
	   o Compact and portable for fieldwork.	

2.	Warranty	Instrument should be covered under StandardComprehensive Warranty.
3.	Recommended Brands, not limited to.	Made in India preferred.

Mandatory Instruction :

Vendor Should submit Compliance statement for each parameter along with Complete product data sheet , clearly mentioning deviation from the tender specs , if any and Demonstrate for the Technical Parameter mentioned in the Tender on their Quoted Instrument , as & when asked by Technical Teamfrom the Respective Dept. of the Institute for Technical Evaluation .

Vendor Should Provide Authorization Certificate for the Quoted Brand of the Instrument.

Item 16:- Satellite Communication Trainer kits
Qty Required : 1

Sr. No.	Specification

1.	**RTL-SDR Blog V3 USB Dongle**
	  5. **Frequency Range**:
	    o Covers 500 kHz to 1.75 GHz.
	  6. **Features**:
	    o R820T2 tuner for better sensitivity and tuning.
	    o TCXO (Temperature Compensated Crystal Oscillator) with ±1 PPM stability.
	    o SMA female antenna connector.
	    o Built-in Bias-T for powering external devices like LNA (Low Noise Amplifiers).
	    o Support for direct sampling for HF (500 kHz to 24 MHz).
	  7. **Connectivity**:
	    o USB 2.0 for data transfer and power supply.
	    o Plug-and-play functionality with support for third-party SDR software.
	  8. **Software Compatibility**:
	    o Compatible with SDR# (SDRSharp), GQRX, HDSDR, GNU Radio, MATLAB, and other SDR software.
	    o Supports Windows, macOS, Linux, and Android platforms.
	
	B. Dipole Antenna Kit
	  4. **Antenna Components**:
	    o Telescopic dipole antennas adjustable for multiple frequency bands.
	    o SMA male to MCX male adapter for compatibility with the RTL-SDR dongle.
	    o Antenna base with an SMA connector and suction mount for easy setup.

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5. **Frequency Coverage**:
   o Designed for coverage from 70 MHz to 1.6 GHz.
6. **Additional Features**:
   o Modular design for custom configurations.
   o Compact and portable for fieldwork.

2.	Warranty	Instrument should be covered under StandardComprehensive Warranty.
3.	Recommended Brands, not limited to.	Made in India preferred.

Mandatory Instruction :

Vendor Should submit Compliance statement for each parameter along with Complete product data sheet , clearly mentioning deviation from the tender specs , if any and Demonstrate for the Technical Parameter mentioned in the Tender on their Quoted Instrument , as & when asked by Technical Teamfrom the Respective Dept. of the Institute for Technical Evaluation .

Vendor Should Provide Authorization Certificate for the Quoted Brand of the Instrument.

Item 17:- 3 phase Auto transformer 0-440V, 10KVA
Qty Required : 1

Sr. No.	Specification
1.	**Electrical Specifications:** 1. **Input Voltage**: o 3-phase, 415V AC ±10%, 50 Hz. 2. **Output Voltage**: o 3-phase, 0-440V AC, continuously variable. 3. **Power Rating**: o 10 KVA. 4. **Voltage Regulation**: o Precision voltage regulation for smooth operation. 5. **Frequency**: o 50 Hz (±3%). 6. **Phase Configuration**: o 3-phase, delta or star connection (as required).

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2.	Warranty	Instrument should be covered under StandardComprehensive Warranty.
3.	Recommended Brands, not limited to.	Made in India preferred.

Mandatory Instruction :

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Vendor Should Provide Authorization Certificate for the Quoted Brand of the Instrument.

Item 18:- Single phase transformer Ratio 1:1, Primary230V, Secondary 230V, 5 K **Qty Required : 2**	
Sr. No.	**Specification**

1.	**Electrical Specifications**
	 1. **Ratio**:
	    o 1:1 (Primary 230V, Secondary 230V).
	 2. **Power Rating**:
	    o 5 KVA (Kilovolt-Amps).
	 3. **Primary Voltage**:
	    o 230V AC ±10%, 50 Hz.
	 4. **Secondary Voltage**:
	    o 230V AC ±10%, 50 Hz.
	 5. **Frequency**:
	    o 50 Hz.
	 6. **Phase**:
	    o Single-phase operation.

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2.	Warranty	Instrument should be covered under StandardComprehensive Warranty.
3.	Recommended Brands, not limited to.	Made in India preferred.

Mandatory Instruction :

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Vendor Should Provide Authorization Certificate for the Quoted Brand of the Instrument.

Item 19:- LORA STM32 Integrated Boards
Qty Required : 5

Sr. No.	Specification

1.	**LoRa STM32 Integrated Board Features**
	1. **Microcontroller**:
	   o STM32 series MCU (e.g., STM32L4, STM32F7, or equivalent) with low power consumption and high processing power.
	2. **LoRa Module**:
	   o LoRa transceiver (e.g., SX1276, SX1262, or equivalent).
	   o Supports LoRaWAN® 1.0/1.1/1.0.2 specifications.
	3. **Frequency Bands**:
	   o 868 MHz and/or 915 MHz bands (customizable based on requirement).
	4. **Communication Range**:
	   o Up to 15 km (line-of-sight) depending on antenna type and environmental conditions.
	5. **Power Supply**:
	   o Powered via USB or battery-operated with optional Li-Ion/PoE power options.
	6. **Interfaces**:
	   o UART, SPI, I2C, ADC, and GPIO for flexible interfacing with sensors and other peripherals.
	7. **Security Features**:
	   o AES encryption, secure boot, and OTA (Over-the-Air) firmware updates.

2.	Warranty Instrument should be covered under StandardComprehensive Warranty.

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3.	Recommended Brands, not limited to.	Made in India preferred.

Mandatory Instruction :		
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Vendor Should Provide Authorization Certificate for the Quoted Brand of the Instrument.		

Item 20:- LoRa Multi-Channel Access Point	**Qty Required : 2**
Sr. No.	**Specification**
1.	**Frequency Bands**: 868 MHz and/or 915 MHz bands with support for regional frequency regulations. **Channel Count**: - Supports multiple simultaneous channels (e.g., 8, 16, or more channels). **LoRa Transceiver**: - Supports SX1276/SX1262 or equivalent LoRa transceivers. **Data Rate**: - Configurable up to 50 kbps per channel. **Range**: - Up to 15-20 km (line-of-sight) per channel, depending on environmental conditions. **Power Supply**: - AC power or PoE (Power over Ethernet) for flexible deployment.
2.	Warranty Instrument should be covered under StandardComprehensive Warranty.
3.	Recommended Brands, not limited to. Made in India preferred.

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Vendor Should Provide Authorization Certificate for the Quoted Brand of the Instrument.

Item 21:- 1KW PV Inverter with Battery	Qty Required : 1

Sr. No.	Specification

1.	• **Power Rating**:
	
	  • 1KW (1000 Watts) output capacity.
	
	 • **Input**:
	
	  • Compatible with 12V, 24V, or 48V DC from solar panels or battery.
	  • Max input voltage: 150V DC.
	  • MPPT (Maximum Power Point Tracking) for efficient power conversion.
	
	 • **Output**:
	
	  • 220V/230V AC output, single-phase.
	  • Frequency: 50/60 Hz (configurable).
	
	 • **Efficiency**:
	
	  • High efficiency (>90%) at full load.
	
	 • **Battery Support**:
	
	  • Compatible with various battery types (e.g., Lead Acid, Lithium, Gel).
	  • Supports charge/discharge control with protection features.

2.	Warranty Instrument should be covered under StandardComprehensive Warranty.

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3.	Recommended Brands, not limited to.	Made in India preferred.

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Vendor Should Provide Authorization Certificate for the Quoted Brand of the Instrument.		

Item 22:- RTL-SDR. Model V4 500khz to 1.7GHz		**Qty Required : 2**
Sr. No.	**Specification**	

1.	**RTL-SDR Model V4 Features**
	 1. **Frequency Range**:
	    o 500 kHz to 1.7 GHz.
	 2. **Receiver**:
	    o Supports wideband reception for AM, FM, LSB, USB, and other modulation types.
	 3. **Sample Rate**:
	    o Up to 3.2 MSPS (Mega Samples per Second).
	 4. **Interfaces**:
	    o USB 2.0 interface for data transfer and control.
	 5. **Antenna**:
	    o SMA connector for external antenna compatibility.
	 6. **Resolution**:
	    o 8-bit and 12-bit data resolution options.
	 7. **Power Supply**:
	    o USB-powered with low power consumption.	

2.	Warranty	Instrument should be covered under StandardComprehensive Warranty.
3.	Recommended Brands, not limited to.	Made in India preferred.

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Vendor Should Provide Authorization Certificate for the Quoted Brand of the Instrument.

Item 23:- Digilent Analog Discovery Board Version 3 (Pro Bundle)		Qty Required : 1
Sr. No.	**Specification**	

1.	**Digilent Analog Discovery Board Version 3 (Pro Bundle) Features**
	  1. **Functionality**:
	    o Comprehensive mixed-signal testing with analog and digital I/O, waveform generation, and measurement capabilities.
	  2. **Channels**:
	    o 2 Analog Channels.
	    o 16 Digital I/O Channels (including SPI, I2C, UART, and more).
	  3. **Waveform Generator**:
	    o 2 Waveform Generators with DDS (Direct Digital Synthesis) capable of producing various waveforms (sine, square, triangular, noise, DC).
	  4. **Oscilloscope**:
	    o 2-channel 100 MS/s sample rate with 14-bit resolution per channel.
	  5. **Power Supply**:
	    o USB-powered for ease of use in different environments.
	  6. **Interface**:
	    o USB 3.0 for high-speed data transfer and control.
	    o Compatible with Windows, macOS, and Linux operating systems.	

2.	Warranty	Instrument should be covered under StandardComprehensive Warranty.
3.	Recommended Brands, not limited to.	Made in India preferred.
Mandatory Instruction :		

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Item 24:- Soldering & Rework Station Setup	Qty Required : 1
Sr. No.	**Specification**
1.	**Temperature Controlling Soldering Gun** 1. **Power Rating**: ○ 60-100 Watts for soldering precision tasks. 2. **Temperature Range**: ○ Adjustable temperature from 150°C to 450°C. 3. **Heat Element**: ○ Ceramic heating element for fast heating and long life. 4. **Handle Design**: ○ Ergonomic design with anti-static handle for comfort and safety. 5. **Smoke Absorption Function**: ○ Integrated smoke filtration system for cleaner soldering environments. **B. Soldering Iron with Smoke Absorption Function** 1. **Power Rating**: ○ 30-60 Watts for fine SMD soldering tasks. 2. **Temperature Range**: ○ Adjustable temperature from 150°C to 450°C. 3. **Smoke Extraction**: ○ Built-in smoke absorption for enhanced air quality during soldering. 4. **ESD Safe Design**: ○ Electrostatic discharge protection for sensitive components. **C. Hot Air Gun** 1. **Power Rating**: ○ 500-1000 Watts for desoldering and rework tasks. 2. **Temperature Range**: ○ Adjustable from 100°C to 500°C with various air flow speeds. 3. **Nozzle Options**:

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o   Interchangeable nozzles for different sizes and shapes.
4. **Ergonomic Handle**:
   o   Lightweight, anti-static handle for comfortable use.

D. SMD Soldering Rework Station

1. **Features**:
   o   Integrated soldering iron, hot air gun, and desoldering pump.
   o   Adjustable parameters for soldering, desoldering, and rework tasks.
2. **Control Panel**:
   o   LCD display for precise control over temperature and airflow.
3. **Safety Features**:
   o   Over-temperature protection and automatic cooling system.

E. ESD Table and Mat

1. **Table Specifications**:
   o   ESD-safe workstation with grounding options.
   o   Dimensions: [Insert dimensions]
2. **Mat Specifications**:
   o   Conductive anti-static mat with grounding cable.
   o   Dimensions: [Insert dimensions]

F. Hot Air Desoldering Rework Station

1. **Power Rating**:
   o   500-1000 Watts for desoldering and rework.
2. **Temperature Range**:
   o   Adjustable from 100°C to 500°C.
3. **Ergonomic Design**:
   o   Lightweight handle with anti-static design for comfortable use.
4. **Built-in Suction System**:
   o   Integrated suction nozzle for efficient desoldering.

2.	Warranty	Instrument should be covered under StandardComprehensive Warranty.
3.	Recommended Brands, not limited to.	Made in India preferred.

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