

No. F. DTU/SP/211/12-18/15-16

Dated:

NOTICE INVITING TENDER

E- Tenders along with illustrated literature/leaflets for the supply/execution of item(s)/stores/work detailed below are invited from the Manufacturers or their Authorized Distributors only in two-bids system (**the bidder should be registered with the Delhi VAT Department and carry a valid Tax Identification Number issued by it to ensure that the delivery of goods is made from Delhi against a sale invoice issued from Delhi only**) through 'e' procurement solution only as per the guidelines and terms & conditions given in tender document - details of the NIT along with terms & conditions, specifications etc. can be seen/downloaded at/from the website.

The interested tenderers should upload duly signed tender form and their bids along with scanned copies of all the relevant certificates, documents etc. in support of their technical & price bids - all duly signed - on the: <https://govtprocurement.delhi.gov.in>. latest by **30/03/17 up to 2.30 P.M. An index prepared after pagination of all documents may also be uploaded** The technical bids will be opened online on **30/03/17 at 3.00 P.M** {those bidders only whose original instrument of EMD amount is dropped in Tender Box placed in the office of Officer In-charge (S&P)} in the presence of the bidders who wish to be present and will also be displayed on the website. For participation in the tender through e-procurement solution, the tenderers are required to have digital certificate and get registered with application Service Provider NIC.

Tender document is also available for viewing on the website of Delhi Technological University, Delhi at www.dtu.ac.in

Yours faithfully,

EMD: Rs. 20,700/-

Officer In-charge (S&P)

S.NO.	DESCRIPTION	No. of laboratory
Establishment of followings Advanced Embedded System Laboratories:		
1.	Advanced Embedded System Lab-I (As per features/specification)	01 lab
2.	Advanced Embedded System Lab-II (As per features/specification)	01 lab

Detailed specifications/features on next page...

Technical Specification/Features:

Advanced Embedded System lab-1		
S.No.	Description	Qty.
1	<p><u>Microcontroller with TCP/IP Stack & PHY with following features:</u></p> <p>Lab 1 - Features</p> <ul style="list-style-type: none"> ➤ Independent Web server on the TCP/IP stack and a wireless ad hoc ➤ Complete IEEE 802.11 b/g Wi-Fi Solution ➤ Supports Infrastructure/Ad hoc networks and SoftAP networking ➤ Headers bring out signals for quick prototyping ➤ MRF24WB0MA module is FCC, IC, Wi-Fi® certified and ETSI compliant ➤ Powered by 2 AAA batteries ➤ Supports WEP, WPA and WPA2 security protocols <p>The board has sensor I/O interface enabling application specific demos</p> <p>Lab 2 - Features</p> <ul style="list-style-type: none"> ➤ Ultra-low power: 4 μA sleep, 40 mA Rx, 180 mA Tx at +10 dBm ➤ Complete on-board TCP/IP networking stack ➤ Configurable transmit power: 0 to +12 dBm ➤ UART hardware interface ➤ Up to 1 Mbps data rate over UART ➤ Powered by battery pack (2 AAA batteries) or via USB cable ➤ Push buttons for AP/WPS mode and reset signals ➤ Supports both Adhoc and SoftAP mode (including SoftAP for Android) ➤ 10 general-purpose digital I/O pins ➤ 8 analog sensor interfaces; configurable sensor power outputs 0 to 3.3V DC ➤ Real-time clock for wakeup and time stamping ➤ Wi-Fi Alliance certified for WPA2-PSK ➤ FCC/CE/IC certified and RoHS compliant <p>Lab 3 - Features</p> <ul style="list-style-type: none"> ➤ Direct internet connectivity provides internet access to every node. ➤ Point to point connectivity to every node without the need for custom profiles. ➤ Based on common 802.15.4 footprint. ➤ 3 Antenna options available - wire, reverse polarity SMA connector, and U.FL connector. ➤ Ultra-low power: 4μA sleep mode, 38mA active. ➤ On-board TCP/IP stack includes DHCP, UDP, DNS, ARP, ICMP, HTTP client, FTP client and TCP. ➤ Firmware configurable transmit power: 0dBm to 12dBm. ➤ Hardware interfaces: TTL UART. ➤ Host data rate up to 464Kbps over UART. ➤ Supports adhoc and infrastructure networking. ➤ 8 general purpose digital I/O. ➤ 3 analog sensor inputs. ➤ Real-time clock for time-stamping, auto-sleep, and auto-wakeup modes. ➤ Accepts 3.3VDC regulated power supply. ➤ Configuration over UART or wireless interface (via Telnet) using simple ASCII commands. 	3
2	<p>Zigbee (Pair)</p> <p>Features</p> <ul style="list-style-type: none"> ➤ Superior outdoor LOS range of up to 28 miles. ➤ Over-the-air firmware updates via other XBee-PRO 900HP modules or DeviceCloud™. ➤ Software-selectable channel mask for interference immunity. 	4

	<ul style="list-style-type: none"> ➤ Enables custom application development. ➤ 8-bit Freescale™ S08 microprocessor brings custom intelligence to the module. ➤ XBee-specific CodeWarrior® development tools for easy programming. ➤ Memory: 32Kb Flash, 2Kb RAM. ➤ CPU/Clock Speed: HCS08 / Up to 50.33 MHz. ➤ RF data rate up to 200 Kbps. <p>Including following accessories</p> <ul style="list-style-type: none"> ➤ 4 * xbee pro 900HP RPSMA xbee module. ➤ 2 * xbee adapter with USB cable. ➤ 2* xbee explorer regulated. ➤ 4* 900M antenna. 	
3	<p>GPRS\GSM (Pair) SIM908 SMT based Module Kit - Supports: GPS / GSM / GPRS SIM908 module is a complete Quad-Band GSM/GPRS module which combines GPS technology for satellite navigation. Two Power Interface DC 5V and Lithium Ion battery</p> <ul style="list-style-type: none"> ➤ SMA Antenna Interface for GSM and GPS ➤ Start Button - For Debugging SIM908 Module ➤ Built In TTL Serial Interface ➤ Audio Out channels <p>Kit should Include</p> <ul style="list-style-type: none"> ➤ SIM908 Module mounted on SIM908 Apk. Board. ➤ SIM908 GSM Antenna ➤ SIM908 GPS Antenna <p>SIM800 Module - Support for : GSM/ GPRS/ Bluetooth / Email / DTMF / FM</p> <p>The SIM800 modem should have a SIM800 GSM chip and RS232 interface.</p>	2
4	<p>Bluetooth Transceiver (Pair) Ultra Low Power</p> <p>RN52 - Bluetooth Embedded Stack</p> <p>The RN-52 is a Bluetooth v3.0 module. It is compatible with all Bluetooth v3.0 devices and also backwards compatible with all Bluetooth v2.1 + EDR, 1.2, and 1.1 devices.</p> <p>Bluetooth Profiles Supported with</p> <ul style="list-style-type: none"> ➤ SPP - Serial Port Profile ➤ HFP/HSP - Support of both Hands-Free Profile and Headset Profile mean the module can act as a headset device. ➤ A2DP - Advanced Audio Distribution Profile ➤ AVRCP - A/V Remote Control Profile ➤ iAP - iPod Accessory Protocol <p>Kit Features</p> <ul style="list-style-type: none"> ➤ Fully certified Bluetooth version 3.0 audio module, fully compatible with Bluetooth version 2.1+EDR, 1.2, and 1.1. ➤ Software configurable through commands over UART console interface. ➤ Embedded Bluetooth stack profiles: SPP, A2DP, HFP/HSP, and AVRCP. ➤ Supports iAP profile discovery for iPhone® and iPod® Bluetooth accessories. ➤ Postage-stamp-sized form factor, 13.5 x 26 x 2.7mm. ➤ Dual-channel, differential audio input and output for highest quality audio. ➤ External audio codecs supported via I2S and S/PDIF interface. ➤ Castellated SMT pads for easy and reliable PCB mounting. ➤ Additional support for codecs such as aptX®, AAC, MP3, and others. 	2

	<ul style="list-style-type: none"> ➤ Environmentally friendly, RoHS compliant. ➤ Certifications: FCC, IC, CE. ➤ Bluetooth SIG certified. 	
5	<p>NFC Evaluation Tool: NFC Evaluation Platform using NXP Platform Features</p> <ul style="list-style-type: none"> ➤ Supports full development environment of LPCXpresso TM. ➤ Simple to understand software based on NXP Reader Library should include examples for fast development supporting integrated LPC1227: ➤ Polling loop. ➤ MIFARE Ultralight, MIFARE classic, MIFARE DESFire EV1. ➤ Power supply by 2 USB cables. ➤ 13,56 MHz Antenna can be separated from reader section. ➤ Customized 125 KHz Antenna can be connected on pads. ➤ Fast Software development based on easy to understand firmware. <p>Debugger and Programmer Board</p> <ul style="list-style-type: none"> ➤ Development based in LPCXpress ➤ LPC-Link Debugger ➤ IDE <p>It should Include</p> <ul style="list-style-type: none"> ➤ Three NFC Tags for Evaluation 	1
Embedded Network Bus		
6	<p>CAN Analyzer</p> <p>Features</p> <ul style="list-style-type: none"> ➤ Supports CAN 2.0b and ISO11898-2. ➤ Intuitive PC User Interface for functions such as configuration, trace, transmit, filter, log etc. ➤ Enhanced features in the PC GUI for Microchip's PIC microcontroller support such as ECAN register view in the GUI. ➤ Direct access to CAN H and CAN L, CAN TX and CAN RX signals for robust debugging. ➤ Flexible CAN bus interface options i.e. standard DB9 connector or screw terminals. ➤ Software control of termination resistance and LED display for status, traffic, BUS error. <p>It should have simple-to-use CAN Bus monitor that can be used to develop and debug a high-speed CAN network.</p> <p>The tool features a broad range of functions that allow it to be used across various market segments including automotive, industrial, medical, and marine. Tool should support CAN 2.0b, ISO11898-2 and connection to a CAN network using the DB9 connector. The CAN BUS Analyzer should offer following functionality for Trace:</p> <ul style="list-style-type: none"> ➤ Transmit ➤ Trace filter and log file capability <p>ECAN register view and group CAN message transmit. Software should be Windows 7 supported.</p>	1
7	<p>Modbus : Modbus Evaluation Tool</p> <p>Kits should include</p> <ul style="list-style-type: none"> ➤ RS485 Receiver and Transmitter Pair PCB ➤ FTDI to Serial conversion using Serial Port ➤ RS485 complaint 10 Meter Wire 	1

	This version of the RS485 shield removes the optional DB9 connector bay and adds a second 2-pin screw terminal.	
8	<p>Serial - Ethernet</p> <p>Lab 1 - Features</p> <ul style="list-style-type: none"> ➤ Direct internet connectivity provides internet access to every node. ➤ Point to point connectivity to every node without the need for custom profiles. ➤ Based on common 802.15.4 footprint. ➤ 3 Antenna options available - wire, reverse polarity SMA connector, and U.FL connector. ➤ Ultra-low power: 4µA sleep mode, 38mA active. ➤ On-board TCP/IP stack includes DHCP, UDP, DNS, ARP, ICMP, HTTP client, FTP client and TCP. ➤ Firmware configurable transmit power: 0dBm to 12dBm. ➤ Hardware interfaces: TTL UART. ➤ Host data rate up to 464Kbps over UART. ➤ Supports Adhoc and infrastructure networking. ➤ 8 general purpose digital I/O. ➤ 3 analog sensor inputs. ➤ Real-time clock for time-stamping, auto-sleep, and auto-wakeup modes. ➤ Accepts 3.3VDC regulated power supply. ➤ Configuration over UART or wireless interface (via Telnet) using simple ASCII commands. ➤ Over the air firmware upgrade (FTP). ➤ Secure Wi-Fi authentication: WEP, WPA-TKIP, WPA2-AES. <p>Lab 2 - Features</p> <ul style="list-style-type: none"> ➤ SDIO 2.0, SPI, UART. ➤ 32-pin QFN package. ➤ Integrated RF switch, balun, 24dBm PA, DCXO, and PMU. ➤ Integrated RISC processor, on-chip memory and external memory interfaces. ➤ Integrated MAC/baseband processors. ➤ Quality of Service management. ➤ I2S interface for high fidelity audio applications. ➤ On-chip low-dropout linear regulators for all internal supplies. ➤ Proprietary spurious-free clock generation architecture. ➤ Integrated WEP, TKIP, AES, and WAPI engines. <p>Specification</p> <ul style="list-style-type: none"> ➤ 802.11 b/g/n. ➤ Wi-Fi Direct (P2P), soft-AP. ➤ Integrated TCP/IP protocol stack. ➤ Integrated TR switch, balun, LNA, power amplifier and matching network. ➤ Integrated PLLs, regulators, DCXO and power management units. ➤ +19.5dBm output power in 802.11b mode. ➤ Power down leakage current of <10uA. ➤ Integrated low power 32-bit CPU could be used as application processor. ➤ SDIO 1.1/2.0, SPI, UART. ➤ STBC, 1×1 MIMO, 2×1 MIMO. ➤ A-MPDU & A-MSDU aggregation & 0.4ms guard interval. ➤ Wake up and transmit packets in < 2ms. ➤ Standby power consumption of < 1.0mW (DTIM3). 	2
Renewal Energy and LED Lighting		
9	<p>DALI Interfacing : Mother Board and Daughter Board features</p> <p>The platform should consist of : Following interface adapters to support development of DALI, DMX512A, as well as future protocols.</p>	1

	<ul style="list-style-type: none"> ➤ Main communications board ➤ Prototyping board ➤ Communications interface adapters (DALI, DMX512A) <p>The following is required:</p> <p>Two Main Board</p> <ul style="list-style-type: none"> ➤ Populated with PIC16F1947 for user interface, communications, and LED control. <ul style="list-style-type: none"> • 4-channel constant current control with RGBW color mixing and dimming. • Slider potentiometer for dimming control. • Universal Communications Adapter Interface. • DALI, DMX512A, and future support. • Master& Slave support for DALI and DMX512A. • DALI commissioning and support for custom zones & scenes. • LCD display & push button user interface. • Customizable capabilities. ➤ Populated with MCP6004 op amp for current feedback. ➤ Populated with MCP16322 for 5V power conversion. ➤ Populated with Cree X-Lamp MC-E Color delivering red, green, royal-blue, and white in a single LED - high lumen output in a small form factor. ➤ Populated with LED and LIGHT collimator LLC19N optic and holder by Gaggione for high quality color mixing and tight beam control. ➤ 9-12V Power supply input. <p>Two prototyping boards</p> <ul style="list-style-type: none"> ➤ Populated with PIC16F1947 for user interface and communications <ul style="list-style-type: none"> • Universal Communications Adapter Interface • DALI, DMX512A, and future support • Master & Slave support for both DALI and DMX512A • DALI commissioning and support for custom zones & scenes • Customizable capabilities ➤ Populated with MCP16322 for 5V power conversion ➤ Bread boarding space for customized lighting development ➤ 9-12V Power supply input <p>Two adapter boards</p> <ul style="list-style-type: none"> ➤ XLR5 & RJ45 connectors. ➤ Isolated transceiver. ➤ Bi-directional communication termination (jumper option). ➤ FREE DMX512A 'C' Library. ➤ Demonstration code. ➤ All code resides within the PIC16F1947 on main/prototype board. 	
10	<p>DC-DC Boost Circuit Controller</p> <p>Function</p> <p>Mobile battery bank charger application as a DC-DC Boost Circuit should be provided and various test points to measure required parameters.</p> <p>DC to DC converter circuit demonstrator to study:</p> <ul style="list-style-type: none"> ➤ Line regulation - $5V \pm 200\text{ mV}$ ➤ Maximum Load - 650 - 850 mA ➤ Efficiency - 82% 	1
11	<p>Solar Cell demonstration board</p> <p>Features</p> <ul style="list-style-type: none"> ➤ 16x2 Alphanumeric LCD to display voltage & charging current ➤ LED array : 20W 	1

	<ul style="list-style-type: none"> ➤ Solar panel : 12V , 50W ➤ Panel meters : Voltage & Current ➤ Battery : 12V, 7AH 	
12	<p>Micro-Powered 8-bit Tool Solar Operated Application</p> <p>Microcontroller based hardware and software design should be provided to make boost Dc to DC boost control for charging mobile (3.7 V to 5.5 V converter)</p> <ul style="list-style-type: none"> ➤ Microcontroller based boost circuit mounted on a PCB with various test points. ➤ 3.7V Lithium Battery should be provided ➤ Hardware and software training is provided 	1
13	32 bit Low Cost ARM (USB - 8051) - Nuvoton	2
14	8 bit Low Cost for Power and Energy (12 bit Low pin count) -ST	2
15	8 bit I/O Operations (8051 core) - Silabs	2
16	Low Pin Count Devices - ST/ATMEL	2
17	<p>Google Nexus 6</p> <p>DISPLAY Type AMOLED capacitive touchscreen, 16M colors Protection Corning Gorilla Glass 3 GPU Adreno 420</p> <p>MEMORY Card slot No Internal 32/64 GB, 3 GB RAM</p> <p>CAMERA Primary 13 MP, 4128 x 3096 pixels, autofocus, optical image stabilization, dual-LED (ring) flash, check quality</p> <p>USB microUSB v2.0 (SlimPort), USB Host</p> <p>BATTERY Non-removable Li-Po 3220 mAh battery Stand-by Up to 330 h Talk time Up to 24 h</p>	1
18	<p>ACCESSORY DEV STARTER KIT, ANDROID</p> <p>Features</p> <ul style="list-style-type: none"> ➤ PIC24FJ256GB110. ➤ USB connector for Android device. ➤ User interface buttons. ➤ 8 Status LEDs. ➤ Potentiometer. ➤ Device charger circuitry up to 500mA. ➤ Arduino footprint compatible for prototyping. 	1

19	<p>RTOS for KIOSK Applications</p> <p>Raspberry Pi</p> <ul style="list-style-type: none"> ➤ Raspberry Pi 2 - Model B - ARMv7 with 1G RAM ➤ Adafruit Raspberry Pi B+ Case - Smoke Base / Clear Top - ➤ Adafruit Assembled Pi Cobbler Plus ➤ Full Size Breadboard ➤ Premium Male/Male Jumper Wires - 20 x 6" (150mm) ➤ USB to TTL Serial Cable ➤ USB WiFi Module ➤ 4GB SD card for Raspberry Pi preinstalled ➤ 5V 2A Switching Power Supply w/ 6' MicroUSB Cable or 5V 2A Switching Power Supply with USB port + 6' MicroUSB Cable <table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">Add On Boards - 1 Set Each</td> <td style="width: 50%;">Other Accessories</td> </tr> <tr> <td>➤ HDMI 4 Pi: 5" Display w/Touch and Mini Driver</td> <td>➤ 1x Photo Cell</td> </tr> <tr> <td>➤ USB port power supply - UL Listed</td> <td>➤ 5x 10K 5% 1/4W Resistor</td> </tr> <tr> <td>➤ HDMI Cable - 1 meter</td> <td>➤ 5x 560 ohm 5% 1/4W Resistor</td> </tr> <tr> <td>➤ USB cable - A/MiniB - 3ft</td> <td>➤ 1x Diffused 10mm Blue LED</td> </tr> <tr> <td>➤ Raspberry Pi 2 Model B</td> <td>➤ 1x Electrolytic Capacitor - 1.0uF</td> </tr> <tr> <td>➤ Raspberry Pi Camera Board</td> <td>➤ 1x Diffused 10mm Red LED</td> </tr> <tr> <td>➤ Miniature WiFi (802.11b/g/n) Module: For Raspberry Pi</td> <td>➤ 1x Diffused 10mm Green LED</td> </tr> <tr> <td>➤ 5V 1A (1000mA) USB port power supply</td> <td>➤ 3x 12mm Tactile Switches</td> </tr> <tr> <td>➤ Keyboard</td> <td>➤ Embroidered Raspberry Pi Badge</td> </tr> <tr> <td>➤ Mouse</td> <td></td> </tr> </table>	Add On Boards - 1 Set Each	Other Accessories	➤ HDMI 4 Pi: 5" Display w/Touch and Mini Driver	➤ 1x Photo Cell	➤ USB port power supply - UL Listed	➤ 5x 10K 5% 1/4W Resistor	➤ HDMI Cable - 1 meter	➤ 5x 560 ohm 5% 1/4W Resistor	➤ USB cable - A/MiniB - 3ft	➤ 1x Diffused 10mm Blue LED	➤ Raspberry Pi 2 Model B	➤ 1x Electrolytic Capacitor - 1.0uF	➤ Raspberry Pi Camera Board	➤ 1x Diffused 10mm Red LED	➤ Miniature WiFi (802.11b/g/n) Module: For Raspberry Pi	➤ 1x Diffused 10mm Green LED	➤ 5V 1A (1000mA) USB port power supply	➤ 3x 12mm Tactile Switches	➤ Keyboard	➤ Embroidered Raspberry Pi Badge	➤ Mouse		2
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20	<p>Beagle Board (BEAGLE REV C)</p> <ul style="list-style-type: none"> ➤ Industry's highest performance ARM <ul style="list-style-type: none"> • 720MHz ARM Cortex-A8 (>1GHz ARM11 MIPS). • NEON and VFP extensions for additional acceleration. ➤ State of the art POWERVR™ graphics hardware <ul style="list-style-type: none"> • 10 million polygons per second. • Advanced tile-based rendering ➤ Industry leading C64x+ DSP & video acceleration ➤ Streaming, portable media player, and high-res video ➤ Tiny 3" x 3" PCB that can fit in your pocket ➤ Yet support for 1280x1024 DVI-D monitors <p>Kit Includes</p> <ul style="list-style-type: none"> ➤ Beagle Board ➤ HDMI Cable ➤ USB Keyboard ➤ USB Mouse ➤ Mini Wi-Fi Dongle ➤ SD Card with ROM of Beagle Board ➤ SD card Reader ➤ Two USB cable ➤ Linux with Power Supply /HDMI Cables 	1																						
21	<p>Embedded RTOS</p> <p>Features</p> <ul style="list-style-type: none"> ➤ STM32F429ZIT6 microcontroller featuring 2 MB of Flash memory, 256 KB of RAM in an LQFP144 package 	1																						

	<ul style="list-style-type: none"> ➤ On-board ST-LINK/V2 with selection mode switch to use the kit as a standalone ➤ ST-LINK/V2 (with SWD connector for programming and debugging) ➤ Board power supply: through the USB bus or from an external 3 V or 5 V supply voltage ➤ 2.4" QVGA TFT LCD ➤ SDRAM 64 Mbits ➤ L3GD20, ST MEMS motion sensor, 3-axis digital output gyroscope ➤ Six LEDs : <ul style="list-style-type: none"> • LD1 (red/green) for USB communication • LD2 (red) for 3.3 V power-on • Two user LEDs:LD3 (green), LD4 (red) • Two USB OTG LEDs:LD5 (green) VBUS and LD6 (red) OC (over-current) ➤ Two pushbuttons (user and reset). ➤ USB OTG with micro-AB connector. ➤ Extension header for LQFP144 I/Os for a quick connection to the prototyping board and an easy probing. 	
22	<p>STM32F Kit -Kiosk Development Platform using STM32</p> <p>Features:</p> <ul style="list-style-type: none"> ➤ Should work with most arduino shields (some require .net mf drivers) ➤ 6 adc channels (12-bit) ➤ micro sd storage (up to 2gb) ➤ 3 gibus ports ➤ Netduino 3 wi-fi ➤ Four rubber bumpers ➤ 5 cm gibus cable <p>Technical details:</p> <ul style="list-style-type: none"> ➤ Power: ➤ Input: 7.5-12 VDC or USB powered ➤ Output: 5 VDC and 3.3 VDC regulated <p>Sensor Modules</p> <ul style="list-style-type: none"> ➤ Temperature Sensor ➤ RGB Led ➤ Potentiometer ➤ Button ➤ Ambient light 	2
FPGA/DSP Development		
23	<p>Spartan-6 Dev Board (Xilinx FPGA) Platform</p> <ul style="list-style-type: none"> ➤ SP601 Base Board with the XC6LX16-CS324 FPGA ➤ ISE® Design Suite WebPACK™ Edition <ul style="list-style-type: none"> • Includes Plan Ahead™ Design Analysis Tool • Timing Driven Place and Route, SmartGuide™, and SmartXplorer Technology ➤ Documentation <ul style="list-style-type: none"> • Hardware Setup Guide • Getting Started Guide • Hardware User Guide • Reference Designs User Guide ➤ Schematics and PCB files ➤ Universal 5V power supply ➤ Cables: 2 USB, 1 Ethernet ➤ Reference Designs and Demos <ul style="list-style-type: none"> • Board Diagnostic Demo • - Base System Reference Design featuring DSP48, Gigabit Ethernet, and 	1

	<ul style="list-style-type: none"> • DDR2 Memory Controller • Multiboot Reference Design, featuring fail-safe configuration • - Hardened Memory Controller Reference Design 	
24	<p>TMS320C6713 Texas DSP Platform</p> <ul style="list-style-type: none"> ➤ TMS320C6713 DSK board Features: <ul style="list-style-type: none"> • Embedded JTAG support via USB • High-quality 24-bit stereo codec • Four 3.5mm audio jacks for microphone, line in, speaker and line out • 512K words of Flash and 16 MB SDRAM • Expansion port connector for plug-in modules • On-board standard IEEE JTAG interface • +5V universal power supply ➤ Code Composer Studio features for the TMS320C6713 DSK should include: <ul style="list-style-type: none"> • A complete IDE, an efficient optimizing C/C++ compiler assembler, linker, debugger, an a advanced editor with Code Maestro™ technology for faster code creation, data visualization, a profiler and a flexible project manager • DSP/BIOS™ real-time kernel • Target error recovery software • DSK diagnostic tool • "Plug-in" ability for third-party software for additional functionality ➤ TMDSDSK6713 DSP Starter Kit Contents: <ul style="list-style-type: none"> • C6713 DSP Development Board with 512K Flash and 16MB SDRAM • C6713 DSK Code Composer Studio™ IDE including the Fast Simulators and access to Analysis Toolkit on Update Advisor • Quick Start Guide • Technical Reference • Customer Support Guide • USB Cable • Universal Power Supply • AC Power Cord(s) <ul style="list-style-type: none"> ○ TMDSDSK6713 version includes a standard US power cord ○ TMDSDSK6713-0E version includes both UK & European power cords • MATLAB from The Mathworks 30 day free evaluation ➤ Mounting Type: Fixed ➤ Platform: DSP Starter Kit 	1
ESAT - Basic Lab		
25	AVR Experiment Trainer with Software CD(Limited Experiments) [With DIP Socket]	4
26	8051 Experiment Trainer with Software CD(Limited Experiments) [With DIP Socket]	4
27	Extended Peripheral Library and Experiment List (8051)	1
28.a	DAC Waveform generation – Square, Sine, Triangle, RAMP.	-
28.b	Stepper and DC motor interfacing.	-
28.c	PLC Hardware Simulation Model.	-
28.d	Simple calculator using 7segment/LCD display and Keypad.	-
28.e	External ADC and Temperature control interface.	-
28.f	External Memory Interfacing ROM, EEPROM, FLASH.	-
28.g	External Real Time Clock Interfacing.	-
28.h	Serial Parallel Shift Register Interfacing	-
28.i	Light Detection / Infrared Object Detection and RC5 Remote Protocol.	-
28.j	Device to Device Communication using Uart.	-
Solar Lantern Training Kit		
29	Solar Lantern Training Kit with Solar LED Light Intensity & Wattage Control Training	1
29.a	Battery Charger Algorithm	-

30	Solar Panel 5 Watt with connecting wires for Solar Lantern Training Kit	1
31	Battery 6Volt / 4aH	1
32	Battery charger	1
33	Three LED light PCB with five LED each and with plastic outer body	1
34	Plastic Cabinet for Lantern	1
Programmer & Development Boards		
35	ESAT - ISP 20 (Programmer Board)	1
36	ESAT - ISP 28 (Programmer Board)	1
37	ESAT - ISP 40 (Programmer Board)	1
38	Low Cost Serial Programmer Kit with I/O Interface	1
39	PIC 16F & 12C/12E Programmer Board	1
ESAT - Applications Boards		
40	<p>Parallel Port Tester</p> <p>Hardware Features</p> <ul style="list-style-type: none"> ➤ 8 LEDs for status testing of data lines. ➤ Dual stepper motor driver for dual axis Motion control (XY). ➤ Bread board for further development. ➤ Parallel port cable included. ➤ Operating manual. 	1
41	<p>EEPROM Copier</p> <p>Hardware Features</p> <ul style="list-style-type: none"> ➤ 16 x 2 LCD Display. ➤ PC Connectivity using RS-232 ➤ Two Master / Slave 8 pin sockets. ➤ SDA / SCL Test points ➤ Power-on Reset ➤ Supply voltage: +12V, 600mA `from battery emulator. ➤ 8K Bytes of In-System Self-programmable Flash ➤ 512 Bytes internal EEPROM. ➤ One 16-bit Timer/Counter with Separate Prescaler. ➤ External and Internal Interrupt Sources. <p>Software Features</p> <p>Facility to select EEPROM device numbers using user friendly menu driven software. 24C01, 24C02, 24C04, 24C08, 24C16, 24C32, 24C64, 24C128, 24C256, 24C512, 24C1024 The training kit can work as both copier and programmer</p> <p>Copy data from:</p> <ul style="list-style-type: none"> ➤ Master to slave. ➤ Computer to master. ➤ Computer to slave. <p>Programming memory from :</p> <ul style="list-style-type: none"> ➤ Computer to master ➤ Computer to slave <p>Performs functions: Program, Verify, Blank Check, Erase & Select.</p> <p>Industrial Training</p> <p>Training on concept of serial EEPROM</p> <p>Device Addressing: selection of multiple EEPROM to perform read / write operations on a shared common 2-wire bus.</p> <p>Writing operation : there are two modes of writing data in serial EEPROM's</p> <p>(a) Byte Write (b) Page Write</p> <p>Reading Operation : There are three modes of reading data from serial EEPROM's</p> <p>(a) Current Address Read (b) Random Read (c) Sequential Read</p>	1

42	<p>Mixed Signal PLC System with GUI</p> <p>Hardware Features</p> <ul style="list-style-type: none"> ➤ 16 x 2 LCD Display (backlit). ➤ PC Connectivity using RS 232. ➤ Buzzer for alarm. ➤ Expansion connector for 8 mixed signal input and 8 digital output. ➤ 8 channel ADC with 10 bit Resolution. ➤ 1 AD channel can also be used as temperature sensor input. ➤ 8 Digital Input/Output. ➤ External Data Source Input. ➤ 16X2 Display Keypad. <p>Industrial Training</p> <ul style="list-style-type: none"> ➤ Programmable logic control is a digital computer used for & electro mechanic. ➤ Mixed signal PLC operation using 8 analog input and 8 digit outputs. ➤ Process monitoring. ➤ Temperature detectors and its digital conversion optimization. ➤ Capturing data using, CSV files and NI LabVIEW compatible formats. ➤ How to develop command interface for your application. ➤ Introduction to ADC averaging techniques. <p>Software Features</p> <ul style="list-style-type: none"> ➤ Flexible software control to adjust analog values. ➤ 8 Analog mixed signal input / 8 digital output. ➤ Software configurable trigger voltage. ➤ User friendly commands to configure trigger inputs individually. ➤ Temperature high alarm states & Led. ➤ GUI Software file compatible with LabVIEW. <p>Command output</p> <ul style="list-style-type: none"> ➤ If voltage on AD1 terminal exceeds 1200 mV then output 1 becomes active. ➤ If voltage on temp input trigger corresponds to temperature greater than 200 °C then output 0 become active. ➤ Correspondingly we can program trigger for AD2. 	1
43	<p>USB-HID Interfacing with AVR</p> <p>Hardware Features</p> <ul style="list-style-type: none"> ➤ Low cost USB interface. ➤ USB slide show presenter. ➤ Control output. ➤ Keypad 	1
44	<p>PWM based RGB LED Controller for Mood Light Application</p>	1
45	<p>Auto Light Saver</p> <p>Hardware Features</p> <ul style="list-style-type: none"> ➤ Expansion Connector of Load and Mains output. ➤ Opto coupler used V138T. ➤ TRIAC used BTA12-600B ➤ One 8-bit Timer/Counter with prescaler ➤ Two PWM Channels ➤ 4-channel, 10-bit ADC with Internal Voltage Reference ➤ 8-pin PDIP / SOIC: Six Programmable I/O Lines ➤ External interrupt source ➤ Power ON Reset <p>Industrial Training</p> <ul style="list-style-type: none"> ➤ Power industry application. ➤ How to control power in inductive circuits using TRIAC? ➤ On-off control of an active load for power system. ➤ How to provide insulation from mains to your electrical circuit ➤ Using LDR sensor for home automation. <p>Software Features</p> <p>There are three operating modes in light auto saver.</p> <ul style="list-style-type: none"> ➤ Manual Mode 	1

	<ul style="list-style-type: none"> ➤ Semi-Automatic Mode ➤ Fully Automatic mode 	
46	<p>Color Analyzer</p> <p>Hardware Features</p> <ul style="list-style-type: none"> ➤ 16x2 Alpha numeric LCD Display. ➤ TAOS TCS230 RGB color sensor. ➤ PC Connectivity using RS-232 ➤ Supply voltage: +12V, 600mA ` from battery emulator. ➤ Power ON Reset ➤ External Interrupt ➤ 8-bit Timer/Counters in compare mode. ➤ Input/output Ports. <p>Software Features</p> <ul style="list-style-type: none"> ➤ Facility for measuring RGB component of light using TCS230 RGB color sensor. ➤ Frequency to luminous conversion of primary colors. ➤ Measuring high frequencies using microcontroller. ➤ Principals and precaution for detecting RGB values of on object by using incident white light. ➤ Supported by Labview GUI <p>Software Features</p> <ul style="list-style-type: none"> ➤ RGB & HSL Coordinate value displayed. ➤ LIGHT SOURCE ON\OFF for diagnosing color of an object. ➤ SELF Test Feature for calibration. 	1
47	<p>Auto Tap Controller</p> <p>Hardware Features</p> <ul style="list-style-type: none"> ➤ One6 V Relays (5 Amp) with expansion connector for NC/NO/COM. ➤ Supply voltage: +12V, 600mA from battery emulator. ➤ Power ON Reset. ➤ 2 Nos. 6 pin connector for stepper motor used in thermostatic mixing of water. ➤ Expansion connector for supply of Motor ➤ Expansion connector for proximity sensor input. <p>Software Features</p> <ul style="list-style-type: none"> ➤ Hands free infrared proximity detection. ➤ Manual override button ➤ Thermostatic mixture with adjustable temperature control ➤ Built in thermostatic control valve. ➤ Low Battery Indication. 	1
48	<p>Solar Battery Charger</p> <p>Hardware Features</p> <ul style="list-style-type: none"> ➤ 16x2 LCD Display. ➤ 3 Nos. Alarm LEDs ➤ Expansion connector for Battery, Load and Solar. ➤ 2 Nos. Triac IRF Z44N. ➤ Power-on Reset. ➤ Supply voltage: +12V, 600mA `from battery emulator. <p>Industrial Training</p> <ul style="list-style-type: none"> ➤ Algorithms of various charging methods for charging a SLA battery in a PV system to ensure better performance and improved battery life. ➤ How to use PWM in battery changing algorithms. ➤ SoC (State of charge) estimation of flooded lead acid starter batteries for avoiding deep discharge of SLA batteries. <p>Software Features</p> <ul style="list-style-type: none"> ➤ Microcontroller Based PWM 3 stage solar charging algorithm. ➤ LCD display for battery and PV array voltage and current indications. ➤ Electronic Overcharge Protection & back current blocking to PV panel. ➤ Low voltage battery dis- connects and reconnects at DC output. ➤ Over - discharge protection at DC output. 	1

49	<p>Universal Remote Controller</p> <p>Hardware Features</p> <ul style="list-style-type: none"> ➤ IR receiver (TSOP1838). ➤ IR transmitter. ➤ PC Connectivity using RS 232. ➤ Separate LEDs for status of Rx and Tx. ➤ Timer/Counter2 8-bit Timer in compare output mode. ➤ Timer/Counter1 16-bit Timer in Interrupt capture mode. ➤ Programmable Serial USART. ➤ 23 Programmable I/O Lines. <p>Software Features</p> <ul style="list-style-type: none"> ➤ Decode infrared signal. ➤ Programmable via external remote signal. ➤ Can work as RC5 Receiver or RC5 Transmitter. ➤ PC connectivity to display decoded RC5 signal. 	1
50	<p>USB HID/ Capacitive Sensing & .WAV Trainer Kit</p> <p>Hardware Features</p> <ul style="list-style-type: none"> ➤ Capacitive Sensing pins. ➤ USB-HID Connector. ➤ SD Card. ➤ 12-Bit Stereo Digital to Analog Converter (MCP4822). ➤ Bargraph LED display. ➤ 3.5mm Audio Jack. ➤ Serial Port. ➤ ESAT - ISP Compatible pin out Header. ➤ Free Software Examples and Library files. 	1
51	<p>Mechatronic Trainer Kit</p> <p>Hardware Features</p> <ul style="list-style-type: none"> ➤ PS2 Mouse & Keyboard control. ➤ Working with Stepper & DC motors using LM293D H bridge driver. ➤ LDR sensor for light detection & Infrared obstacle detection. ➤ MAX232 for Serial Interface with Tactile Switches. ➤ Serial to paralleled buffer. ➤ IR Remote Control. <p>Operating Features</p> <ul style="list-style-type: none"> ➤ 2 Axis Stepper Motor control or 4 Axis DC Motor control ➤ Simultaneous movement of motor. ➤ Control of Motor direction, speed and step operations though PS2 mouse/keyboard interfaces. ➤ Keypad of should be provided to enter control commands without computer. ➤ USB interface should be provided for programming the trainer/robotic assembly as per requirement. ➤ Light & Temperature sensors should be provided to configure the robotic assembly for over temperature and over light conditions. ➤ Infrared Optical sensors & RS-232 Interface should be provided, ➤ Buzzer should be provided to keep indication of any alarm condition. ➤ IR remote control option should be provided to control the robotic motion using IR remote. 	1
52	<p>Colored/ BW Pattern Generation on TV/ VGA</p> <p>Hardware Features</p> <ul style="list-style-type: none"> ➤ ESAT - ISP connector. ➤ VGA colored- black and white generator. ➤ SD card. ➤ IR detection. ➤ Tactile Switches and Buzzer. ➤ Temperature, NTC and LDR. ➤ PS2 Mouse connector. 	1

53	<p>DTMF Pulse Decoding and Call recorder using FAT-FS 16 format.</p> <p>Hardware Features</p> <ul style="list-style-type: none"> ➤ CM8870 DTMF Receiver with Ring and off hook detector. ➤ SD Card. ➤ RS - 232 interface to PC. ➤ ULN - 2803 Output Driver. ➤ Real Time Clock DS1307. ➤ PS2 Mouse. ➤ Buzzer and Speaker Connector. ➤ One wire Temperature Sensor - DS18B20 ➤ Relay. ➤ IR Object Detection Sensor. 	1
54	<p>Traffic Light Controller.</p> <p>Hardware Features</p> <ul style="list-style-type: none"> ➤ Multiple 7 Segment LED Displays. ➤ Controlling BCD to Seven Segment Diver IC. ➤ Controlling Multiplexers Ics ➤ Red, Orange, Green LEDs for signal operation of Traffic light. ➤ MAX232 for Serial Interface. 	1
55	<p>Voice Recognition Kit.</p> <p>Hardware Features</p> <ul style="list-style-type: none"> ➤ Voice Detection Circuit using MIC. ➤ Xbee with RS - 232. ➤ Interfacing with Alphanumeric LCD. ➤ ISP Connector for programming. ➤ Interfacing Software and Hardware for LEDs and Relay Control. ➤ Stepper Motor. ➤ 4 Relays (5Amp.) ➤ 3 Tecktile Switches. ➤ Power Supply. <p>Software Features</p> <p>To make a bot which can listen and respond to sounds is very tough for AVR 8-bit architecture devices but through Voice Recognition Kit Student can now understand principles of Voice Recognition and control their appliances or bots accordingly.</p> <p>Practical Hardware &Software Principles Learned</p> <ul style="list-style-type: none"> ➤ Voice Recognition. ➤ Voice Pattern Recognitions. ➤ Background Voice Cancellation and Offset. <p>Projects in Workshop</p> <ul style="list-style-type: none"> ➤ Voice Activated Appliance On/Off control. ➤ Automated Clap Count detection. <p>Industrial Project</p> <ul style="list-style-type: none"> ➤ Automated Wireless Appliances control based on Voice Recognition. ➤ Addition Skill Set gained - Wireless Interfacing Xbee with RS-232. 	1
56	<p>Automatic Voltage Stabilizer Control Kit.</p> <p>Automatic voltage stabilizer should automatically regulate Voltage which should have following four functionalities.</p> <ul style="list-style-type: none"> ➤ Selection of Appropriate Tapping. ➤ Voltage Interruption Protection. ➤ Over Temperature protection. ➤ Input Monitoring. <p>Specification</p> <p>Power Capacity : 0.5 4 KVA Input Voltage Range : 100-290 Volts Output Voltage Range : 210-235 Volts Input Frequency Range : 47-63 Hz}</p>	1

	Efficiency : Greater than 95% Metering : Digital Alphanumeric Temp Range : 0-50 degree Celsius	
57	Zigbee Wireless Network Kit Hardware Features <ul style="list-style-type: none"> ➤ LDR Sensor for Light Sensing Application. ➤ Potentiometers for Application requiring level control. ➤ Switch for On/Off application. ➤ Relay for HVAC Application. ➤ Temperature Sensor for Heating & Temperature Control. ➤ LED Remote Status monitoring Application. ➤ COM PORT to control the network through a centralized computer. 	1
58	Capacitive Sensing Trainer Hardware Features <ul style="list-style-type: none"> ➤ Should demonstrate how to create a capacitive touch sensor. ➤ Should demonstrate multi touch function. ➤ Integrated temperature sensor. ➤ Integrated Light Sensor for automatic dimming. ➤ Buzzer for status feedback. ➤ RGB Back light. 	1
59	8X8 Bar Graph Moving Message Display. Hardware Features <ul style="list-style-type: none"> ➤ Relay for HVAC Application. ➤ Two digit Seven Segment Display. ➤ Alphanumeric LCD. ➤ IR receiver for remote control application. ➤ Constant current source variable (10mA). ➤ Inbuilt driver for stepper motor 5V & provision for external driver. 	1
60	GPS Recorded and Map generation using AVR. Hardware Features <ul style="list-style-type: none"> ➤ LCD Display. ➤ GPS - Time / Speed / Positioning. ➤ SD Card - For Music and Mapping. ➤ Reed Switch (Distance Sensor). ➤ Provision for Additional Sensor Inputs. ➤ Computer Interface - Configure GPS and Debugging. 	1
61	USB HID Gamepad with Joystick and Accelerometer. Hardware Features <ul style="list-style-type: none"> ➤ USB HID Gamepad ➤ Development board for USB based devices. ➤ Firmware only USB stack (based on open-source V-USB stack) used. ➤ Example source codes of USB-HID mouse and USB-HID keyboard provided as starting points. ➤ Capable of being used as USB 1.1 specification low speed device. ➤ 3-axis accelerometer (ADXL). ➤ 2 joysticks and 4 tactile switches. ➤ ATmega 16 at 12Mhz. 	1
62	8255 Interfacing Board. Hardware Features <ul style="list-style-type: none"> ➤ 16x2 Alpha numeric LCD ➤ 2 Digit Seven Segment Display ➤ RS-232 PC Interface ➤ IR Remote ➤ 4x4 Keypad 	1

	<ul style="list-style-type: none"> ➤ 4 Individual Switches ➤ 8 LEDs / Stepper Motor Connector ➤ Relay, RTC & Memory ➤ ISP Connector for Programming ➤ Reset Switch and Prog / Run Switch ➤ Power Supply (DC 12V to 5V) 	
Training and Services		
63	Quarterly Industrial Project Training in a Year with 3 Weeks per project (100 Hours)	

Advanced Embedded System lab-II

S.No.	Specification	Qty.
1.	<p>Multi Meter Specification</p> <p>DCV 200mV / 2V / 20V / 200V / 1000V ± (0.5% + 3)</p> <p>ACV 2V / 20V / 200V / 750V ± (0.8% + 5)</p> <p>DCA 20mA / 200mA / 20A ± (0.8% + 4)</p> <p>ACA 20mA / 200mA / 20A ± (1.0% + 5)</p> <p>Resistance 200\square / 2k\square / 20k\square / 200k\square / 2M\square / 200M\square ± (0.8% + 3)</p> <p>Capacitance 20nF / 2uF / 200uF ± (2.5% + 20)</p> <p>Frequency 2kHz / 200kHz ± (3.0% + 15)</p> <p>Celsius (-20 ~ 1000)$^{\circ}$C ± (1.0% + 3)</p> <p>Input impedance 10MW</p> <p> 3 times/s</p> <p>Sampling rate (40 - 400)Hz response</p> <p>AC Freq. Manual range</p> <p>Operation 1999</p> <p>Way 65 x 45mm</p> <p>Max. display 9V (6F22)</p> <p>LCD size</p> <p>Battery</p>	6
2	<p>Power Supply (Multioutput 15V/30V 2ampwith CC/CV)</p> <p>Specification</p> <p>Power Supply with dual tracking mode</p> <p>Output DC Voltage 0-30V / 2Amp. / Fixed +5V</p> <p>Output Voltage Coarse and fine control</p> <p>Control</p> <p>Output DC Current 2A Max</p> <p>Output Current Single control</p> <p>Control</p> <p>Over Load LED Provided</p> <p>Indication</p> <p>Load regulation CV - 0.1% \pm 5mV / +.1% \pm5mV</p> <p>Line Regulation for 10% CV - 0.1% \pm5mV / +.1% \pm5mV</p> <p>Protection overload & short circuit for momentary short circuit protection is provided</p> <p>Special features CV/CC operation at +1% accuracy / Variable current limit</p> <p>Power supply 220V +10% 50Hz</p>	6
3	<p>Storage Scope Oscilloscope - 4 Scope dual trace Specifications</p> <p>Bandwidth 30MHz</p> <p>Sample rate 250MS/s</p> <p>Horizontal 4ns/div ~ 100s/div, step by 1~2~4</p>	2

	<p>Scale(S/ div)</p> <p>Rise time $\leq 14\text{ns}$</p> <p>Display 8" Color LCD,TFT display, 800x600 pixels, 65535 colors</p> <p>Channel 2 + 1 (External)</p> <p>Record length Max 10K</p> <p>Input coupling DC, AC , Ground</p> <p>Input impedance $1\text{M}\Omega \pm 2\%$, in parallel with $15\text{pF} \pm 5\text{pF}$</p> <p>Channels 50MHz: 100 : 1, 10MHz: 40 : 1</p> <p>Isolation</p> <p>Max. input voltage 400V (PK-PK) (DC + AC PK-PK)</p> <p>DC gain accuracy $\pm 3\%$</p> <p>DC accuracy Average ≥ 16: $\pm (3\% \text{ reading} + 0.05 \text{ div})$ for V</p> <p>Probe attenuation factor 1X, 10X, 100X, 1000X</p> <p>LF respond (AC, -3dB) $\geq 5\text{Hz}$ (at input, AC coupling, -3dB)</p> <p>Sampling rate / relay time accuracy $\pm 100\text{ppm}$</p> <p>Interpolation $(\sin x)/x$</p> <p>Interval (T) accuracy (full bandwidth) Single : $\pm (1 \text{ interval time} + 100\text{ppm} \times \text{reading} + 0.6\text{ns})$; Average > 16 : $\pm (1 \text{ interval time} + 100\text{ppm} \times \text{reading} + 0.4\text{ns})$</p> <p>Vertical resolution(A/D) 8 bits resolution (2 Channels simultaneously)</p> <p>vertical sensitivity 5mV/ div~5V/ div</p> <p>Trigger type Edge, Pulse, Video, Slope</p> <p>Trigger mode Auto, Normal, Single</p> <p>Trigger Level Divisions from screen center</p> <p>Line/field frequency(Video) Support standard NTSC, PAL and SECAM broadcast systems</p> <p>Cursor V and T between cursors</p> <p>Measurement Automatic V_{pp}, V_{max}, V_{min}, V_{top}, V_{base}, V_{amp}, V_{avg}, V_{rms}, Overshoot, Preshoot, Freq, Period, Rise Time, Fall Time, Delay A→B↑ , Delay A→B↓ , +Width, -Width, +Duty, -Duty</p> <p>Waveform Math +, -, ×, / ,FFT</p> <p>Waveform storage 15 waveforms</p> <p>Lissajous figure Full bandwidth / ± 3 degrees</p> <p>Communication interface USB, USB flash disk storage, Pass/Fail, LAN, VGA (optional)</p> <p>Cymometer Available</p> <p>Power supply 100V-240V AC, 50/60HZ,CAT II</p> <p>Power consumption $< 18\text{W}$</p> <p>Fuse 2A, T class, 250V</p>	
4	<p>AC Power Meter : Single phase AC power meter digital to display the following parameters:</p> <p>AC voltage : 300V Max.</p> <p>AC current : 20Amp. Max.</p> <p>Frequency : 99.99Hz Max.</p> <p>Power : 5kW Max.</p> <p>Power factor</p>	1
5	<p>Load Bank (3 Phase)</p> <p>Single phase 5kw LCR type mounted with digital multi parameter, digital meter and power factor</p> <p>Resistive load : variable upto 2000W</p>	1

	Inductive load : switch selectable Capacitive : switch selectable	
6	Function Generator	1
	<p>Channel dual</p> <p>Frequency Output 25MHz</p> <p>Sample Rate 125MS/s</p> <p>Vertical Resolution 14 bits</p> <p>Waveform</p> <p>Standard Waveform Sine, Square, Pulse, Ramp, and Noise Exponential Rise, Exponential Fall, Sin(x)/x, Step Wave, and others,</p> <p>Arbitrary Waveform total 26 built-in waveforms, and other user-defined arbitrary waveforms</p> <p>Frequency (resolution 32 bits)</p> <p>Sine 1μHz - 25MHz</p> <p>Square 1μHz - 5MHz</p> <p>Pulse 1μHz - 5MHz</p> <p>Ramp 1μHz - 1MHz</p> <p>Noise 25MHz (-3dB) (typical)</p> <p>Arb 1μHz - 10MHz</p> <p>Amplitude</p> <p>Amplitude 1m Vpp - 10 Vpp (50Ω), 1m Vpp - 20 Vpp (high impedance)</p> <p>Resolution 1m Vpp or 14 bits</p> <p>DC Offset Range (AD+DC) ±5V (50Ω), ±10V (high impedance)</p> <p>DC Offset Range 1mV</p> <p>Load Impedance 50Ω (typical)</p> <p>Arbitrary Waveform</p> <p>Wave Length 2 pts to 8K pts</p> <p>Sample Rate 125MS/s</p> <p>Vertical Resolution 14 bits</p> <p>Non-volatile Memory 26 waveforms</p> <p>Modulation</p> <p>Modulation Waveform AM, FM, PM, FSK, Sweep, and Burst</p> <p>Modulation Frequency 2mHz to 20.00KHz (FSK 1μHz - 100KHz)</p> <p>Counter</p> <p>Function Frequency Period</p> <p>Frequency Range 100mHz - 200MHz</p> <p>Frequency Resolution 6 digits/s</p> <p>Input / Output</p> <p>Display 3.9 inch (480 × 320 pixels) TFT LCD</p> <p>Type counter, external modulation input / output, external trigger input / output, external reference clock input / output</p> <p>Communication Interface USB host, USB device, RS232</p>	
	<p>Features</p> <ul style="list-style-type: none"> ➤ Advanced DDS technology, 25MHz frequency output ➤ 125MSa/s sample rate, and 32 bits frequency resolution ➤ Vertical Resolution : 14 bits, 8K arb waveform length ➤ Comprehensive waveform output : ➤ 5 basic waveforms, and 26 built-in arbitrary waveforms ➤ Comprehensive modulation functions : ➤ AM, FM, PM, FSK, PWM, Sweep, and Burst ➤ Newly supported SCPI 	

	<ul style="list-style-type: none"> ➤ Newly added frequency counter function ➤ 3.9 inch high resolution (480 × 320 pixels) TFT LCD display 																							
7	<p>Lux Meter</p> <ul style="list-style-type: none"> ➤ Range : 0 to 5000 Lux in 3 ranges of 0 to 2000, 0 to 20000 and 0 to 50000 Lux. Range selection if provided with front panel control. ➤ Accuracy : $\pm 5\% \pm 2$ least count. ➤ Resolution : <ul style="list-style-type: none"> • 1 in the range of 0 to 2000 lux. • 10 in the range of 0 to 20000 lux. • 100 in the range of 0 to 5000 lux. ➤ Data Hold : Data hold facility is provided. ➤ Display : <ul style="list-style-type: none"> • 3 ½ digit, 7 segment LCD type of 12.5mm height. • X, X100, data hold and low battery indications are provided ➤ Sensor : Separately attached light sensor allows user to take measurement at an optimum position. ➤ Power Requirements : 9 volts battery. ➤ Size & Weight : 23mm (H) x 73mm (W) x 1408mm (L). 160gms. 	1																						
8	<p>Frequency Countern-1Ghz</p> <p>Specification</p> <p>The instrument should be able to measure frequency up to 2.4GHz. It should have 8 digit display with dual Channel Signal Input.</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Frequency measurement</td> <td>CH A : Measuring range : 0.01Hz ~ 50MHz, Basic accuracy : $\pm(2*10^{-5}+3)$</td> </tr> <tr> <td>Cyclic measurement</td> <td>CH B : Measuring range B : 50MHz ~ 2.4GHz, Basic accuracy : $\pm(2*10^{-5}+3)$</td> </tr> <tr> <td>Cyclic measurement range</td> <td>CH A : Measuring range : 0.02us ~ 10s, Sensitivity 80mVrms>1S</td> </tr> <tr> <td>Gate adjustment range</td> <td>CH B : Measuring range : 0.5ns ~ 0.02us, Sensitivity 500mVrms<1S</td> </tr> <tr> <td>Attenuation</td> <td>0.5ns ~ 10s</td> </tr> <tr> <td>Input impedance</td> <td>100ms ~ 10s Continuous adjustable</td> </tr> <tr> <td>Dimension</td> <td>20dB</td> </tr> <tr> <td>Weight</td> <td>CH A : 1M ohm; CH B : 50 ohm</td> </tr> <tr> <td>Power</td> <td>270*215*100mm</td> </tr> <tr> <td></td> <td>Approx. 1.6kgs</td> </tr> <tr> <td></td> <td>220V / 110V$\pm 10\%$, 50Hz / 60Hz$\pm 5\%$</td> </tr> </table>	Frequency measurement	CH A : Measuring range : 0.01Hz ~ 50MHz, Basic accuracy : $\pm(2*10^{-5}+3)$	Cyclic measurement	CH B : Measuring range B : 50MHz ~ 2.4GHz, Basic accuracy : $\pm(2*10^{-5}+3)$	Cyclic measurement range	CH A : Measuring range : 0.02us ~ 10s, Sensitivity 80mVrms>1S	Gate adjustment range	CH B : Measuring range : 0.5ns ~ 0.02us, Sensitivity 500mVrms<1S	Attenuation	0.5ns ~ 10s	Input impedance	100ms ~ 10s Continuous adjustable	Dimension	20dB	Weight	CH A : 1M ohm; CH B : 50 ohm	Power	270*215*100mm		Approx. 1.6kgs		220V / 110V $\pm 10\%$, 50Hz / 60Hz $\pm 5\%$	1
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	Approx. 1.6kgs																							
	220V / 110V $\pm 10\%$, 50Hz / 60Hz $\pm 5\%$																							

(TO BE SUBMITTED ALONG WITH TECHNICAL BID)

TENDER NOTIFICATION NO: -----

Phone No:- 27871018

UNDERTAKING

The Registrar,
Delhi Technological University,
Bawana Road,
Delhi-110042

We the undersigned (herein after called as Contractor/Vendors/Suppliers) hereby offer to execute supply of items as per specification against which we have quoted over rates and for which this tender may be accepted at the rates stated there in and subject to the terms & conditions set forth for such items as may be ordered by the Registrar, Delhi Technological University or officer acting on his behalf.

Date this _____ Day of _____

Signature of Contractor _____

Address _____

(TO BE SUBMITTED ALONG WITH TECHNICAL BID)

TENDER NOTIFICATION NO: -----

Phone No:- 27871018

UNDERTAKING

The Registrar,
Delhi Technological University,
Bawana Road,
Delhi-110042

We the undersigned (herein after called as Contractor/Vendors/Suppliers) hereby offer to execute supply of items as per specification against which we have quoted over rates and for which this tender may be accepted at the rates stated there in and subject to the terms & conditions set forth for such items as may be ordered by the Registrar, Delhi Technological University or officer acting on his behalf.

Date this _____ **Day of** _____

Signature of Contractor _____

Address _____

Guidelines/Procedure to be followed in introduction of 'e'-procurement solution:

1. Payment of cost of Tender documents: The collection of cost of Tender documents is dispensed away with, as there is no physical supply of tender documents and also to have absolute anonymity of bidder participating in e-procurement solution. The bidders can view/download the tender documents from the: <https://govtprocurement.delhi.gov.in>.

2. Submission of bids: The bidders who are desirous of participating in 'e'- procurement shall submit their price bids in the standard formats prescribed in the Tender documents, displayed at : <https://govtprocurement.delhi.gov.in>. The bidder should upload the scanned copies of all the relevant certificates, documents etc. in the: <https://govtprocurement.delhi.gov.in>. in support of their price bids. The bidder shall sign on all the statements, documents, certificates, uploaded by him, owning responsibility for their correctness/authenticity and copies thereof may also be submitted in the office of the Officer In-charge (S&P), DTU along with original EMD before the specified date & time. In the event of the specified date for physical submission of EMD along with copies of bid documents is declared a holiday, the same will be received up to the appointed time on the very next working day. However, documents of the bidders downloaded online or requisitioned subsequently only will form the basis for deciding the tender.

3. Payment of Bid Security (Earnest Money Deposit): The EMD shall be in the form of the **DD/BG/Fixed Deposit Receipt only** of a scheduled bank issued in favour of Registrar, Delhi Technological University, Delhi and the zerox copy thereof is to be scanned and uploaded along with the bid, and the original shall be sent to DTU so as to reach before the date & time of closing of the bids; failing which bid will be rejected. The Bid Security (EMD) of unsuccessful bidders will be discharged immediately after finalization of the order/contract without any interest. However, firms registered with NSIC etc., are exempted from submitting EMD provided such registration includes the item(s) they are offering are manufactured by them and not for selling products manufactured by other companies.

4. Price Bid Opening: The Price Bids of only technically qualified bidders (whose bids satisfy the prescribed technical specifications/parameters and have also submitted all requisitioned documents & EMD) will be opened online at the specified date & time and will subsequently be evaluated to determine the lowest bidder. The result will be displayed on the: <https://govtprocurement.delhi.gov.in>. which can be seen by all the bidders who participated in the tenders. There shall not be any negotiation normally. However, in exceptional cases, negotiations can be held with the lowest evaluated responsive bidder only. Counter offers tantamount to negotiations and shall be treated at par with negotiations.

5. Processing of Tenders: The concerned officer/officers will evaluate and process the tenders as done in the conventional tenders and will communicate the decision to the bidder online.

6. Payment of Performance Security: The successful tenderer shall furnish a Bank Guarantee/FDR of the value of 05% of the basic cost of the item for a period of 14 months beyond the warranty period from a nationalized bank to ensure the satisfactory performance of item supplied. The performance guarantee is to be submitted at the time of installation / demonstration of equipments. In case the performance of the item is not found satisfactory, the amount of Performance Security will be forfeited & credited in university account.

7. Participation of Bidders at the time of opening of bids: Bidders have two options to participate in tendering process at the time of opening of Bids:

(i). Bidders can come at the place of opening of bids (electronically) as done in the conventional tender process.

(ii). Bidders can visualize the process online.

8. Participation Financial Rules for e-procurement: The e-procurement system would be applicable for purchase of goods, outsourcing of services and execution of work as prescribed in GFRs.

OFFICER IN-CHARGE (S&P)
DELHI TECHNOLOGICAL UNIVERSITY,
SHAHBAD DAULATPUR, BAWANA ROAD, DELHI - 110 042

TERMS AND CONDITIONS

Procedure for submission of bids: The bidders who are desirous of participating in 'e'- procurement shall submit their technical and price bids in the standard formats prescribed in the Tender documents, displayed at: <https://govtprocurement.delhi.gov.in>. The bidder should upload the scanned copies of all the relevant certificates, documents etc. after page-numbering all documents and tender document and prepare an index thereof in the: <https://govtprocurement.delhi.gov.in>. in support of their price bids. The bidder shall sign on all the statements, documents, certificates, uploaded by him, owning responsibility for their correctness/authenticity and copies thereof may also be submitted in the office of the Officer In-charge (S&P), DTU along with original EMD. However, documents of the bidders downloaded online or requisitioned subsequently only will form the basis for deciding the tender.

1. Manufacturers (OEMs) or their Authorized Distributors/Suppliers /Agents/Channel Partners only should submit their bids.
2. ALTERATION IN THE SPECIFICATION.
 - (i) The specifications mentioned/issued with this form of tender must not be altered by the Suppliers.
3. INCOMPLETE TENDERS
4. The Bidder is expected to examine all instructions, forms, terms and specifications in the bidding documents. Failure to furnish all information/documents, as asked for in the NIT, or submission of a bid not substantially responsive to the NIT in every respect, will be at the Bidder's risk and may result in rejection of its bid.
5. CANCELLATION OF TENDER/ CONTRACT/ IN PART OR IN FULL IN CASE OF DEFAULT IN CONTRACT/SUPPLY:

If the Supplier, in the opinion of the Institute, fails or neglects to comply with any of the terms & conditions forming, part of the order issued, the head of institute shall without prejudice to any other right or remedies under the contract, has the right to cancel the contract /order by giving 15 days notice in writing to the Suppliers/firms without being liable to pay compensation for such cancellation.
6. Tender shall be uploaded as per guidelines indicated for e-procurement solution.
7. Demonstration of equipments has to be arranged by the suppliers, if desired by the institute. The technical committee may visit production facility if so desired for sample verification.
8. **The quotation should be valid for a period of one year from the date of opening of the tender.**
9. Rates are to be quoted in INR (Rupee terms) only and any revision thereof is not allowed after the tenders have been opened.
10. The delivery period should be clearly mentioned against each item, incase, the items are not readily available, ex-stock offer will be preferred.
11. Rates should be quoted F.O.R Institution. Taxes and Duties namely Sales tax/VAT/Custom Duty (against Custom Duty Exemption Certificate)/Excise Duty should be mentioned clearly.
12. Consignment will not be insured at the Institute/University Cost.
13. **Bidder, if is not the Original Equipment Manufacturer (OEM), must submit OEM's or their Distributor's Authorization to quote/sell the product(s).** Preference will be given to quotation pertaining to indigenous products. However, where suitable substitutes are not available and item need to be imported the following clarification/information should be given.
 - o Whether the item will be imported by the intended tenderers against its own import license or university will have to provide Custom Duty Exemption Certificate (CDEC).
 - o Name and address of the foreign supplier, make & model of the offered product and authorization to sell from OEM or their Distributor/ Authorized Chanel Partner.
 - o Delivery period including information about mode of dispatch and possible duration (after dispatch) for receipt of item at the port.
 - o Whether the item required any special preparation for installation. In case yes, full details should be given regarding operation maintenance of the items.
 - o In case of costly/sophisticated items whether the tenderers will arrange any special training regarding operation / maintenance of the items.
 - o Nature of assurance for the supply of spares after the warranty period.
14. The payment will be made within 30 days after the successful demonstration/installation of the equipment and fulfilling of other obligations (like training etc., if any) as per the purchase/work

- order, against a Bill/Invoice; containing therein details of goods delivered/services performed. Rejected items/goods should also be removed within 30 days after which no responsibility will be accepted by University.
15. In the event of the item(s) being imported product(s), Custom Duty Exemption Certificate (CDEC) will be issued by the University on the written request of the supplier; who, in turn, will furnish copies of relevant Customs Related Documents namely Airways Bill, Packing List, TR-6 challan etc. along with Bill/Invoice.
 16. Conditional quotations and/or incomplete quotations in any respect will be rejected.
 17. In case you cannot quote for one or more of the items asked for in the tender the word "NOT QUOTED" (in the rate column) should be indicated.
 18. The specification of the item quoted by the firm should confirm to the University specifications. Confirmation, in this respect should be specifically mentioned in the tender. Where the tenderer feels that the specification of the item not fully given or differ, from the specification of the item mentioned by the university, the exact specification of such item should be attached with the tender indicating the item quoted.
 19. The Firm is required to link the University specifications with catalogues & leaflets/literature and also **mention Make and the Model for each item**. Detailed features, for compliance of specification should be provided on specification sheet & appropriate reference i.e. page no. & para of literature, leaflet wherefrom the relevant information has been checked, should be indicated.
 20. **EARNEST MONEY:-** EMD should be attached with the technical bid. The EMD shall be in the form of the **DD/BG/Fixed Deposit Receipt** of a scheduled bank issued in favour of Registrar, Delhi Technological University, Delhi. Zerox copy thereof is to be scanned and uploaded along with the bid, and the original instruments shall be sent to DTU so as to reach before the date of closing of the bids. Failure to furnish the original instrument before the closing of the bid, will entail rejection of bid and blacklisting. **If the tenderer after acceptance of the tender refused to take up the purchase order, his Earnest Money will be forfeited.** Any tender received without / less Earnest Money deposit shall be summarily rejected.
 21. The Purchase Order/Contract will be awarded to the successful Bidder whose bid has been determined to be responsive and has been determined to be the lowest evaluated bid, provided further the Bidder is determined to be qualified to execute the Order/Contract satisfactorily.
 22. There shall not be any negotiation normally. However, in exceptional cases, negotiations can be held with the lowest evaluated responsive bidder only. Counter offers tantamount to negotiations and shall be treated at par with negotiations.
 23. The Competent Authority reserves the right to reject any or all the tenders and annual the bidding process at any time prior to award of Contract, without assigning any reason, without thereby incurring any liability to the affected Bidder or Bidders, and his decision will be final.
 24. The supplies shall have to be made within the period specified in the purchase order failing which the order shall be cancelled and the Earnest Money will be forfeited. However, in exceptional circumstance and, on written request, from the supplier/tenderer, extension of date for supply of the material will be considered. Extension in supply period is at the sole discretion of the competent authority.
 25. Service manuals, wherever available/ required, should be provided along-with the Equipments.
 26. The University reserves the right at the time of award of PO/Contract to increase or decrease the quantity of goods and services originally specified in the Schedule of Requirements without any change in unit price or other terms and conditions. Further, the quantities in the PO/Contract may be enhanced by 30% within the delivery period.
 27. In the case of purchase of may items against one tender, which are not inter-dependent or where compatibility is not a consideration, comparison would be made on the basis of prices quoted by the firms for identifying the lowest quoting for each item.
 28. **WARRANTY: All products must have a minimum of One Year Warranty.** A Warranty Certificate should invariably be supplied along with the item at the time of delivery. If after delivery, acceptance and installation and within the guarantee and warranty period, the operation or use of the goods proves to be unsatisfactory, the supplier shall rectify the defects, errors or omissions by repair or by partial or complete replacement on free of cost basis.
 29. The Competent Authority reserves the right to levy liquidated damages up to 2% of the value of the order for delayed supply. If the supply is delayed beyond the extended period, the University reserves the right even to cancel the order and forfeit the EMD of the firm/ tenderer.
 30. **PERFOMANCE SECURITY DEPOSIT:-** The successful tenderer shall furnish Performance Security Deposit of the value of 05% of the basic cost of the item in the shape of Bank Guarantee/FDR etc.

- from a nationalized bank pledged to Registrar, DTU, for a period of 14 months beyond the warranty period to ensure the satisfactory performance of item supplied. The performance guarantee is to be submitted at the time of installation / demonstration of equipments. In case the performance of the item is not found satisfactory and/or the Supplier fails to complete its obligation under the contract/purchase order, the amount of Performance Security will be credited in University account.
31. DEFAULT: - In the event of default and unsatisfactory service of the contractor/Supplier firm, the DTU will be at liberty to repair/get the item serviced from other party at the cost of supplier/contractor/ tenderer.
 32. In case of software items, the suppliers should ensure that:-
 - o Legal software is supplied in original sealed pouches / P. K. T.
 - o A license agreement is enclosed with it.
 - o A registration card is available for software.
 33. FAILURE AND TERMINATION: - If the Contractor / Supplier fails to deliver the stores or any installment thereof within the period fixed for such delivery or at any time repudiates the contract before the expiry of such period, DTU may without prejudice to the right of the purchaser recover damages for breach of the contract.
 34. The technical & financial bids of only those bidders will be opened who fulfill the eligibility criteria and whose documents are found in order. If any of the date earmarked for opening of technical or financial bids happens to be a holiday, the bids will be opened on the very next working day.
 35. Notwithstanding the provisions relating to extension of time, penalty and cancellation of tender/contract for default, the vendor shall not be liable for forfeiture of its performance security/ liquidated damages or termination for default, if and to the extent that, its delay in performance or other failure to perform its obligations under the contract is the result of an event of Force Majeure (i.e. an event or situation beyond the control of the vendor that is not foreseeable, is unavoidable, and its origin is not due to negligence or lack of care on the part of the vendor; such as wars or revolutions, fires, floods, epidemics, quarantine restrictions and freight embargoes etc.). If the performance in whole or in part or any obligation under the contract is prevented or delayed by any reason of force-majeure for a period exceeding 60 days, either party may at its option terminate the contract by sending a written notice without any financial repercussions on either side.
 36. For any query/clarification in r/o technical aspect of the enquiry, **HOD (Electrical Engg. Department)**, DTU may be contacted.
 37. Prof of VAT/Sale Tax Registration no. and VAT Return copy of fourth quarter for last three financial year date of tender.
 38. PAN No (Copy PAN no. Attached)
 39. P.Os Copies /rate having executed similar items/order copy with at least 03 financial year date of tender.
 40. Authorization certificate from Original equipment Manufacturer (OEM) or their Distributor to quote/sell the product, in case the bidder is not the OEM.
 41. Disputes, if any, arising out of this tender shall be subject to exclusive jurisdiction of Courts of Delhi/New Delhi only.

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CHECK LIST OF DOCUMENTS TO BE SENT WITH TECHNICAL BID.

S.No.	Particulars of documents	Page no.	No. of pages
1.	Proof of EMD (mention amount with instrument number and date)		
2.	Proof of PAN no. (mention no.....)		
3.	Proof of VAT/Sales Tax Registration No and VAT Return copy of fourth quarter (January to March) for last three financial year date of tender.		
4.	Brochure/Leaflets/Technical Information, including Make & Model, Imported/Indian of the item(s)		
5.	UNDERTAKING as per page no. 23 of Tender Document, duly signed.		
6.	Technical specifications, terms & conditions and delivery period etc. to be submitted on firm's letter head		
7.	Warranty Certificate from manufacturer or authorized dealer of manufacturer		
8.	P.Os Copies having executed similar items/order copy only With at least 3 financial years date of tender.(minimum one purchase order copy Per financial year)		
9.	Authorization Certificate from Original Equipment Manufacturer (OEM) or their Distributor to quote/sell the product, in case the Bidder is not the OEM		
10.	The bidder has submit an undertaking in firm letter pad that it has not been blacklisted by any Govt. /Istt./autonomous body		

Note: All copies of above documents should be duly signed and stamped by the tenderer before uploading.

Signature of tenderer:

Name:

Name of firm:

Telephone No.....

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S.No.	Particulars of documents	No. of pages

Pagination must be completed properly .