Annexure-A

Embedded System Lab

S.No.	Description	Qty
01	**8051 Microcontroller Development Board with programmer** Core 8051MCU clocked at 11.0592 MHz. Facility to enter op code using on board 20 keys Hex Keypad Facility to enter large programme using PC based USB programmer On board LCD should be provided for both programming mode and run mode Every Pin should be marked Input/Output& test points should be provided on board. Communication: USB Programming mode: Through PC and 20 keys Hex keypad. MCU: 8051 core ; crystal frequency: 11.0592 MHz. DC power supplies: + 12V, -12V, +5V & -5V. Programmer: ready to run programmer will programme 8051 devices Interconnection for modules: 2mm patch cords and FRC cables Power supply: 110V-260V AC, 50Hz. **Included accessories**: USB cable, main cord, patch cords. 20 pin FRC cable and & External power supply. Cabinet Housing: Enclosed in plastic Box in Laptop shap with cover to protect it from dust. NOTE: No component on top of the trainer only block diagram to be provided on the top of the trainer on Legend PCB	10
02	**PIC Microcontroller Development Board with programmer** PIC16F877A MCU clocked at 4 MHz Expansion connector for plug in modules and prototyping area on the board programmer USB interface to PC for programming Every Pin is marked in order to make work easier Master reset/restart Key for hardware reset Input/output test points provided on board On board breadboard for connecting external components Self-contained trainer with on board DC power supply CD with sample project code, programmer software & useful documents Communication: USB port MCU: PIC16F877A ; crystal frequency: 4 MHZ Size of breadboard: 175 X 67 X 8 mm. On board DC supply: +12V, -12V, +5V & - 5V. Test points: 41Nos; Interconnections: 2mm patch cords and FRC cables Programmer unit: Ready to run programmer will programmer PIC Devices Power supply: 110V-260V AC, 50Hz. **Included Accessories:** USB cables, SMPS, Mains cords. 20 PIN FRC cable, 10 PIN FRC cable, ICSP connector cable (female) Cabinet Housing: Enclosed in plastic Box in Laptop shapewith cover to protect it from dust. Note: no component on the top of the trainer only block diagram to be provided on the top of trainer on legend PCB	05
03	**ARM 7 32 bit microcontroller development board with programmer**	05

	LPC2148 (ARM 7 TDMI 32 bit) MCU clocked at 12 MHz expansion connecters for plug in module and prototyping area 8kb to 40kb of on-chip static RAM and 32 kb to 512 kb of on-chip flash. Memory: 128 bit wide interface/accelerator enables high speed 60MHz operation On board flash download utility/ programmer for Philips microcontroller USB & RS232 both interfaces should be provided for programming USB2.0 Full speed compliant device controller with 2kB of endpoint RAM In addition: the LPC2146/48 provides 8KB of on-chip RAM accessible to USB by DMA Every pin in market to make work easier Master Reset /Restart key for hardware reset On board UART0 and UART1 interface On board ADC 10 Bit Interface On board 10 Bit DAC provides variable analog output On board PWM Interface On board facility to connect JTG debugger On board GPIO connectors 60Hz Maximum CPU Clock available from programmable on-chip PLL with Settling time of 100 micro second On chip integrated oscillator operates with in external crystal from 1MHZ to 25 MHz Power saving mode include ideal and power down Input/output and test point should be provided on board On board four external interrupts interface On board DC power Supply CD with sample project code, Programmer software and useful documents Technical Specifications: MCU:LPC2148; crystal frequency;: 12 MHz; LED 8 Nos ADC: 2 internal 10 bit ADC; DAC: 10bit internal DAC Interrupts: 4 external interrupts on board RTC 3.3V, CMOS battery, PWM 3 Nos. on board GPIO: all GPIO pins on board Communications interface: USB 2.0 full speed device control Serial communications: two RS232 port. Programmer USB/serial port Programmer: mode selection run ISP switch Bode rate: 9600 bps (for both USB/Serial Ports) Interconnections: 2mm patch cords with FRC cables Power supply 230V ±10%, 50Hz. Cabinet Housing enclosed in plastic box in laptop shape with covered to protect it from dust	
04	**Input Interface card for Microcontrollers** 4 X 4 Matrix Keypad Interface ASCII keypad interface 4 input sensing switch interface Experiment trainer board that contains PC based programming Expansion connectors for plug in with microcontroller unit and prototyping area Various test points 20 PIN FRC cables; connecting patch cords	04
05	**ADC & DAC module for Microcontroller** ADC 0808, DAC 0808 ADC input and reference voltage range 0-5V DC (variable) Power supply from Microcontroller development with programmer trainer	04

	Interface: 20 PIN FRC cable and set of patch cords Expansion connectors for plugin with microcontroller unit and prototyping area	
06	**Computer interface module for microcontroller** Serial communications: RS232 port (DB09) USB communications FT232 (USB port) Bode rate 9600 bps Power supply from Microcontroller development with programmer trainer Interface trainer Interface: 20 PIN FRC cable, test points 2 Accessories include: 20 Pin FRC cable, RS232 serial cable & printer cable Expansion connectors for plugin with microcontroller unit and prototyping area	04
07	**Display module for microcontroller** Display 16 X 2 Characters LCD Contrast control 0-5V (variable) Backlight control 0-5V (variable) 7-segmetn display 4 LED, Bar Graph 1 Power supply from microcontroller development board Interface: 20 Pin FRC cable Test point 32 Accessories include 20 Pin FRC cable Expansion connectors for plugin with microcontroller unit and prototyping area	04
08	**Motor drive module for drivers** Stepper motor: +12V DC motor: +12V Servo motor: +5V Power supply from microcontroller development board interface 20Pin FRC cable Expansion connectors for plugin with microcontroller unit and prototyping area	04
09	**Elevator control module for microcontroller** LED 6 Nos. 2 switches 9 Nos. Power supply from microcontroller development boeard Interface: 20 Pin FRC cable and 3 pin FRC connector Accessories include: 20 Pin FRC cable Expansion connectors for plugin with microcontroller unit and prototyping area	10
10	**TTL I/O interface module for microcontroller** Input voltage: TTL in Output voltage: TTL out LED 12 Nos Switches 12 Nos. Power supply from microcontroller development board interface 20Pin FRC cable Expansion connectors for plugin with microcontroller unit and prototyping area	04
11	**Graphical Display module for Microcontroller** Display: 128 X 64 Graphical LCD display Power supple Power supply from microcontroller development board interface 20Pin FRC cable Test points 15 Nos. LCD outline dimensions (mm): W 93 X D 13.5 X H 70	04

	Expansion connectors for plugin with microcontroller unit and prototyping area	
12	**RFID card Reader** Communication: TTL UART interface, wiegand interface Power supply: +4.5V to +6.0V Operating current: <60mA Baud Rate: 9600 bps (default) Read frequency: 125 KHZ Digital output: 1/0 Bit Read Range: 50-60mm TTL data format: 10 Byte data (card no) Wiegand data format: 26 Bit Antenna: in-built antenna Buzzer and LED: +5V	04
13	**Display and Switch module for microcontroller** Switches: DIP switches (8 Switches) Display: 16 X 2 LCD Seven Segment Display: Four Keypad: 4X4 Matrix Keypad Buzzer: +5V DC Relay: +5V DC Power Supply: from Microcontroller Development Board Interface: 20 Pin FRC cable Expansion connectors for plugin with microcontroller unit and prototyping area	04
14	**Multi Interface Module for Microcontroller** Temperature Sensor: LM35 0 - 100°C (Analog output) I2C Memory: 128 K EEPROM SPI Memory: 128 K EEPROM Stepper Motor: +5V DC Power Supply: From microcontroller board Interface: 20 Pin FRC cable & patch cords 2 mm Expansion connectors for plugin with microcontroller unit and prototyping area	04
15	**Infrared Module for Microcontroller** Infrared transmitter: IR LED Infrared Receiver: Direct TTL output PC communication: RS232; Baud Rate: 2400 bps Carrier Frequency: 38 KHz; Test points: 02 nos Power supply: from microcontrollertrainer Interface: 20 Pin FRC cable Accessories include: 20 Pin FRC cable & set of patch cords Expansion connectors for plugin with microcontroller unit and prototyping area	04
16	**PWM Based Voltage regulator Module for Microcontroller** Onboard amplifier to amplify voltage Input and reference Voltage range: 0-5V DC (variable) Amplifier Gain: 1 to 2 Power Supply: from microcontroller trainer Interface: 20 Pin FRC cable Test points: 9 Expansion connectors for plugin with microcontroller unit and prototyping area	04