

**PUNJAB TECHNICAL UNIVERSITY
JALANDHAR**

[Website: www.ptu.ac.in]

TENDER DOCUMENT

**SUPPLY, INSTALLATION AND COMMISSIONING OF LABORATORY
EQUIPMENT(S) FOR MICROPROCESSOR & MICROCONTROLLER LAB**



Tender Notice No.: PTU/ELE/2014-01

Last Date & Time for Submission of the Tender: 18.12.2014 (04.00 P.M)

**Date & Time for Opening of the Tender: Technical Bid: 19.12.2014 (11.00 AM.) Financial
Bid: 22.12.2014 (04.00 PM)**

Price Rs. 1000/-


ਪੰਜਾਬ ਇੰਸਟੀਚਿਊਟ ਆਫ ਟੈਕਨਾਲੋਜੀ
ਰਾਜਪੁਰਾ ।

NOTICE INVITING TENDERS

Sub:--Supply, Installation & Commissioning of Laboratory Equipment(s)

The sealed tenders are invited from reputed manufacturers/ suppliers authorized by manufacturers for the supply, installation and commissioning of laboratory equipment(s) for Microprocessor & Microcontroller Lab at Punjab Institute of Technology, Rajpura, Camp office Mohali (Khunimajra) as per annexure – A & B.

Important Instructions:-

1. The Tenderers are advised to go through the tender document's terms & conditions thoroughly and must sign & stamp all the pages. Tender document must be submitted along with their financial bid, failing which the tender is liable to be rejected.
2. The Tender document should be submitted with company profile, Technical bid comprising specifications of equipment(s) in single sealed envelope and Financial bid in another sealed envelope and both envelopes be put in third envelope. All the three envelopes be marked as under:

Tender Notice No: PTU/ELE/2014-01

Tender for the supply of Laboratory Equipments as per details

Due date & time for submission of the Tender 18.12.2014 (04:00 PM)

Due date & time for opening of the Tender:

- (1) Technical Bid 19.12.2014 (11:00 AM)
- (2) Financial Bid 22.12.2014 (04:00 PM)

**Name & Address of the Tenderer (along with the contact no. & e-mail) Dr.Vijay Kumar,
Registrar, Punjab Institute of Technology, Kharar – Landran Road, Khunimajra, Mohali.
Ph.: 98887-54193, 94780-98072
E-mail ID: pitrajpura@yahoo.com**

Signature and Stamp of Bidder


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3. Technical Bid:

The bid sealed in separate covers & duly endorsed by authorised signatories must contain all the relevant technical specifications of the equipment as per tender document along with the relevant technical literature / brochures / pamphlets / drawings and alternate proposal, if any including the following:

1. Manufacturer authorization/Supplier authorization letter.
2. Detail of EMD submitted by way of Demand Draft.
3. Delivery of the material alongwith satisfactory installation be preferably with in 45 days.
4. Price should be F.O.R. destination basis i.e. Punjab Institute of Technology, Rajpura, Camp office Mohali (Khunimajra).
5. The parties/suppliers should provide the list of organisations where the said materials have been supplied and the committee may inspect its performance or seek performance report from them.
6. The decision of the technical evaluation committee would be final and no details shall be provided about the rejection/acceptance of the bid.

P.S. All documents should be numbered and signed. Any bid incomplete/lacking in the above details would be rejected.

4. Financial Bid:-

The financial bids also sealed in separate covers duly endorsed by authorised signatories should be submitted with rates per item and make of equipment(s) with model No., in the annexure- A & B enclosed with tender schedule (Separate sheet may be attached if required), the forms filled neatly & clearly without any over writing, inclusive of supply, installation and commissioning charges, as the case may be. The prices must be firm and final till the delivery of equipment(s) and inclusive of all taxes, Govt. levies and other duties on FOR destination basis. **Financial bid will be opened only of those tenderers who have qualified in technical bid.**

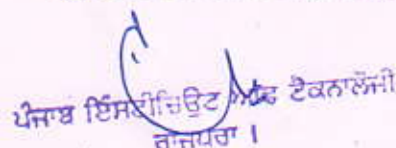
5. Tender Fee:

Tender document can be downloaded from university website or it can be obtained from the Registrar, Punjab Institute of Technology, Mohali (Khunimajra).

Tender fee of Rs. 1000/- should be submitted by Demand Draft of Rs. 1000/- drawn in favor of the Registrar, Punjab Technical University, payable at Jalandhar along with the filled tenders.

If the last date for issue of Tender document falls on any declared holiday in the University, the next working day will be considered as the last date for the same.


Signature and Stamp of Bidder


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ਮੋਹਾਲੀ

General Terms & Conditions:-

1. Only Manufacturers or Authorized Suppliers to bid: The Tenderer must clearly mention that the Tenderer is a manufacturer/authorized supplier and must give proof in support thereof. In case the Tenderer is quoting on behalf of some other manufacturer, the offer must be accompanied by an authority letter from the actual manufacturer, authorizing the Tenderer to quote on behalf of the manufacturer.
2. No advance payment will be given.
3. Tender Document should be type written; otherwise the same will be rejected. Telegraphic or Electronic offer will not be accepted.
4. Conditional tenders will not be accepted.
5. While quoting the rates it must be certified that the rates quoted are not more than the rates quoted to any other State/ Central Universities or Institutes in the same period.
6. The final bid (Financial bid) will be opened on the prescribed date and time in the presence of Bidders who may like to be present on the date and time of opening of tenders at their own expenses.
7. University management reserve(s) the right to delete any item. The quantity of items can be increased or decreased. In case additional quantities are needed, those will be charged at a rate not greater than the one quoted in the tender.
8. **Earnest Money:**
The Tenderer's shall have to deposit the earnest money which shall be 2% of the total offered value against each quoted equipment as per annexure- A,B&C in the form of demand draft drawn in favour of the "**Registrar, Punjab Technical University, Jalandhar**", payable at **Jalandhar**. The bids received without earnest money shall not be considered and are liable to be rejected.
9. **The EMD may be forfeited if a Tenderer withdraws its bids during the period of bid validity.**
10. The Tenderer submitting the tender should have minimum experience of five years in supply, installation and Commissioning of such type of equipment(s) as per annexure A, B & C in Universities/Institutions at Graduate and Post Graduate level in engineering&technology. Necessary proof should be attached with the tender.
11. The Tenderer should submit proof in favor of the annual turnover of the firm, which should not be less than one crore per annum in each of the last three financial years.

Signature and Stamp of Bidder


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12. The payment:

The 95 %of payment will be released after successful supply, installation and commissioning of equipment(s) at site while the balance will be released after submitting a bank guarantee towards its annual maintenance for a period of two years.

13. Prices:

The prices quoted should be firm till the delivery of the equipment(s). All charges such as packing, forwarding, insurance, freight, and cost of installation shall be included in the prices. The excise duty and sales tax if charged extra should clearly be indicated failing which the prices will be deemed to be inclusive of all these duties and taxes.

14. Delivery:

The timely delivery of the equipment(s) / materials is the essence of contract. The supply should be completed within the specified delivery period. Delivery and installation shall be completed within maximum four weeks from the date of placement of work order or as negotiated at the time of placing with a grace period of 15 days under unforeseen circumstances with the approval of the work order. **In the event of non-supply of equipment in the specified time as mentioned in work order from time to time , the university management reserve(s) the right to impose liquidated damages at the rate of Rs. 1000/- per day or may cancel the work order by forfeiting the EMD and place the work order to the next eligible party.**

15. Due Date(s) for submission and opening of Tender:

The Tenders received after the due date and time due to postal delay or any other reasons whatsoever will not be considered and no correspondence would be entertained in this regard. If the last date for submission/opening of Tender falls on any declared holiday in the University, the next working day will be considered as the last date for the same.

**LAST DATE & TIME FOR SUBMISSION OF TENDER: 18.12.2014 upto 4:00 PM
DATE & TIME FOR OPENING OF TENDER**

- (i) Technical Bid: 19.12.2014 at 11 AM
- (ii) Financial Bid: 22.12.2014 at 4 PM

16. During and after the entire process of procurement and execution of contract/order.

Signature and Stamp of Bidder


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17. Acceptance of Tender:

Authoritie(s) of the **Punjab Technical University, Jalandhar** reserve(s) the right to accept or reject any or wholly or partially received tender, without assigning any reason whatsoever. This office does not bind itself to accept the lowest tender.

18. Inspection:

Authoritie(s) of the **Punjab Technical University, Jalandhar**, at their discretion reserve(s) the right to inspect the firm's establishment/site and the equipment(s), prior to finalization and placement of the order. However, the authorized officer shall carry out the final inspection of the equipment(s) and materials at Punjab Institute of Technology, Mohali.

20. Product Range:

The suppliers may quote for the supply of all the equipment(s) and materials or partially in accordance with their product range and the availability of the equipment(s). Accordingly the university reserve(s) the right to place the order to the eligible tenderer item wise.

21. Guarantee:

The 95 %of payment will be released after successful supply, installation and commissioning of equipment(s) at site while the balance will be released after submitting a bank guarantee towards its annual maintenance for a period of two years.

22. Annual Maintenance Contract (AMC)

The 95 %of payment will be released after successful supply, installation and commissioning of equipment(s) at site while the balance will be released after submitting a bank guarantee towards its annual maintenance for a period of two years.

Signature and Stamp of Bidder

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23 Demonstration:

The demo piece of each quoted item is required to be shown by the tenderer/supplier in front of the Technical committee members if required.

24 Safety:

The suppliers shall be responsible for the safety of the material during transit and loading & unloading. This office does not own any responsibility if the material is damaged during transit, erection and commissioning, if any.

25 Refund of EMD

The EMD will be returned to the unsuccessful Tenderer only after the finalization of Tenders. **No interest will be paid on EMD.** In case of successful Tenderer, it will be retained till the complete and successful installation & commissioning of the equipment(s).

26 Infrastructure:

The Punjab Institute of Technology, Mohali will provide the labs with required work benches & single phase power supply with electricity outlets.

27. Special Discount:

Most of the Manufacturers / Suppliers offer educational discount while offering equipment(s) to Educational Institutes world over. As **Punjab Technical University, Jalandhar** is established under Punjab State Act, therefore it is desirable that Tenderer may offer a special discount, if any and should clearly indicate the same in their price bids.

28. Equipment(s) must be of high standards and new:

The items quoted as per specifications laid down in Tender Document must be of high standards and quality (Preference to Brand Name). University management reserve(s) the right to reject any bid on the basis of poor quality although the Tenderer has quoted minimum rates. The Tenderer must ensure that the equipment(s) being offered is a new one and not refurbished or repaired one.

Signature and Stamp of Bidder


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29. Training:

The successful bidders shall have to arrange free of cost training as working of their equipment(s) supplied against work order to our authorized officers/staff of the university at site.

30. No interim enquiry will be attended too.

31. Interpretation of any of the clauses or explanations of this tender document shall be given by the Vice Chancellor and will be binding on the tenderer

32. Arbitration:

Except where otherwise provided in the contract, all questions and disputes relating to the meaning of the specifications, claim, matter or things whatsoever in any way arising out of the works relating to the contract of execution or failure to execute the same whether arising during the progress of the contract or after the completion or abandonment thereof shall be referred to the sole arbitration of the person to be appointed by The Vice Chancellor, Punjab Technical University, Jalandhar. The proceedings of the arbitration shall be carried out in Jalandhar only. The decision of the arbitrator so appointed, will be final and binding on both the parties.

Authorized Signatory

Signature and Stamp of Bidder


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ANNEXURE - A

Technical Requirements for Microprocessor and Micro-Controller Lab

S.No	REQUIREMENTS	QUANTITY
1	FLOW CODE V6 FOR PIC 10 USER ACADEMIC LICENSE	1
2	FLOW CODE V6 FOR ARM 10 USER ACADEMIC LICENSE	1
3	PIC MICROCONTROLLER MULTIPROGRAMMER WITH POWER SUPPLY	8
4	ARM MICROCONTROLLER MULTIPROGRAMMER WITH POWER SUPPLY	4
5	SENSOR BOARD	6
6	LED BOARD	4
7	LCD BOARD	4
8	KEYPAD BOARD	4
9	a) ZIGBEE COORDINATOR BOARD b) ZIGBEE ROUTER BOARD	2 4
10	RFID BOARD	2
11	ACTUATOR TRAINING PANEL (COMPRISING OF ON BOARD DC MOTOR , SERVO MOTOR & STEPPER MOTOR)	2
12	GSM BOARD	1
13	GRAPHICAL LCD BOARD	4
14	THERMOCOUPLE	2
15	TEMPERATURE SENSOR	2
16	HEART RATE SENSOR (HAND HELD)	1
17	ECG SENSOR	1
18	GAS PRESSURE	1
19	CO2 SENSOR	1
20	RELATIVE HUMIDITY	1
21	LIGHT SENSOR	1
22	ALL IN One DSP EDUCATIONAL BOARD BASED ON TMS320C6748 Fixed/ Floating Point) Digital Signal Processor FOR AUDIO & VIDEO PROCESSING	1
23	USB JTAG EMULATOR FOR DSP KIT BASED ON TMS320C6748	1
24	COLOR CCD CAMERA	1
25	CODE COMPOSER STUDIO V5 (5 User Floating License)	1
26	DSP BASED MOTOR CONTROL SETUP CONSISTING OF FOLLOWING ITEMS A) Educational Practice Board for TMS320F28335 (1 Unit) B) USB JTAG Emulator for EPB28335 Compatible with Licensed CCS versions) (1 Unit) C) PWM Isolator Module (1 Unit) D) 3phase (1 HP) Inverter Stack Module (1 Unit) E) 1HP 3 Phase, 415V, 1500 RPM Induction Motor with	1

	+5V Encoder with 1024 PPR resolution (1 Unit) F) DC generator (1HP 1500 RPM) with Load Panel (1 Unit) G) Sensor Interfacing Kit – 28335 (With 3 Current Sensor) (1 Unit) H) Sensor Interfacing Kit – 28335 (With 3 Voltage Sensor) (1 Unit)	
27	DSP BASIC LAB CONSISTING OF THE FOLLOWING ITEMS: A) DSP Starter Kit for TMS30C6713 (1 Unit) B) Daughter Board Interfacing Kit C) LCD Keyboard Interface Kit D) MATALAB Tutor for TI 6000 DSP(10 USER) E) SIMULINK Tutor for TI 6000 DSP (10 USER) F) ARCHITECTURE & PROGRAMMING TUTOR(10 USER)	1
28	WIN CE DEVELOPMENT PLATFORM BASED ON ARM 11	2
29	A) 8085 Microprocessor based Training kit having on board 40x2 line LCD display On board USB connector B) Switch Mode power supply o/p in DC is +5v,+12v,-12v,+30v and Gnd. C) Cable and connector set with ASCII key-board	4 4 4
30	A) 8086 Microprocessor based Training kit having on board 40x2 line LCD display,on Board USB connector B) Switch Mode power supply o/p in DC is +5v,+12v,-12v,+30v and Gnd. C) Cable and connector set with ASCII key-Board	4 4 4
31	A) DC Motor control study card B) 8bit,1 channel A to D convertor card C) 8bit D to A convertor card D) Stepper motor control study card	2 2 2 2
32	12 V,2KG CM2 for STP-PIO Card	2

ANNEXURE – B
SPECIFICATIONS FOR MPMC LAB - PIT(R)

ITEM NO1.

FLOW CODE V6ADVANCED GRAPHICAL PROGRAMMING LANGUAGE FOR PIC
MICROCONTROLLERS
(10 USER NETWORK LICENSE)

Software should have the following specifications:

It should provide the facility to Drag and drop the flow chart icons to create a program.

The range of component supported from simple switches and LED's , LCD, sensors, ADC, internal EPROM, through to more advanced communication components like RS232, RS485 I2C, SPI Bluetooth, Internet TCP/IP, CAN, LIN master, LIN slave, Web server , USB, RFID, GSM, GPS, IrDA, RC5 and Zigbee voice codec , midi interface , sd/mmc card reader , Graphical LCD , Opto isolator , relay board , DSP Audio IN , DSP Audio OUT.and many more .

It should provide the facility to simulate the complex program icon by icon and see the effects on the components, microcontroller, watch variables change, or run the program in near – real time. Test the system's functionality by clicking on switches or altering sensor values, and see the effects on-screen.

Should be able to Compile and download the programs to microcontroller with one button click.

Provides In circuit Debug feature to verify the program's operation on the hardware whilst viewing the simulation on-screen. Provide facility to link with C code or assembly code libraries.

It should compile the code to C then ASM then Hex/bin and should allow students to view C and ASM codes.

It should have 3DModelling &Simulation .it should allow students to create their own components for more realistic design & simulation .

It should also support Virtual Measurement Instruments Like DSO , CRO , Spectrum Analyzer etc.

It should allow students to use Electro Mechanical components .

It should allow users to verify & record a system under test .

It should have built in feature for programming in C & ASM also.

Supports PIC 10 12, 16 and 18 series .

The Software should allow 10 users to program simultaneously .

The Software should allow 10 users to program PIC MICROCONTROLLERS simultaneously using 10 different PC's .

ITEM NO 2.

FLOW CODE V6 ADVANCED GRAPHICAL PROGRAMMING LANGUAGE FOR ARM MICROCONTROLLERS
(10 USER NETWORK LICENSE)

Software should have the following specifications:

It should provide the facility to Drag and drop the flow chart icons to create a program.

The range of component supported from simple switches and LED's , LCD, sensors, ADC, internal EPROM, through to more advanced communication components like RS232, RS485 I2C, SPI Bluetooth, Internet TCP/IP, CAN, LIN master, LIN slave, Web server , USB, RFID, GSM, GPS, IrDA, RC5 and Zigbee voice codec , midi interface , sd/mmc card reader , Graphical LCD , Opto isolator , relay board , DSP Audio IN , DSP Audio OUT.and many more .

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It should also support Virtual Measurement Instruments Like DSO , CRO , Spectrum Analyzer etc.

It should allow students to use Electro Mechanical components .

It should allow users to verify & record a system under test .

It should have built in feature for programming in C & ASM also.

SAM7 series of ARM Microcontrollers.

The Software should allow 10 users to program simultaneously.

The Software should allow 10 users to program ARM MICROCONTROLLERS simultaneously using 10 different PC's

ITEM NO 3.

PIC Microcontroller Multiprogrammer Board

The Board Should support GHOST Protocol for In - Circuit Debugging .

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The PICmicro microcontroller programmer should connect to the PC via USB

This board should be usable with Assembly, C or Flow Code programming utilities .

The board should program most 8,14, 18, 28 and 40 pin flash PICmicro microcontroller devices' using the flexible programming software to be provided –PPP compatible with Flow Code and mloader software compatible with Flow Code .

Should provide clean access to all I/O lines on the relevant PICmicro MCU devices.

Should be supplied with 16F877A device.

Should be compatible with all I/O devices listed below.

Should be usable as a programmer and as a development board

Should program a wide range of PICmicro MCU devices

Full suite of programming software should be available RC or Xtal operation

At least 5 I/O ports brought out on 9 pin DB9 connector

In-Circuit Debugging via MPLAB® ICD2

The GHOST Technology must allow programming device on the Multiprogrammer board monitors all the input output pins on the PIC target.

The GHOST Technology Must data to be displayed in the Flow Code Soft Scope, in the form of a voltage vs time trace, or the Flow Code console, in the form of scrolling interpreted data on a text box.

ITEM NO 4.

ARM Microcontroller MULTIPROGRAMMER Board :-

The development board should support the powerful AT91 SAM 7 32 bit RISC @ 80 MHz microcontroller from Atmel.

The board should be supported by Flow Code and provide 'clean' access to all I/O lines on the relevant Atmel ARM devices.

All I/O should be Terminated on a DB-9 Type connector for Easy Plug &Play .

It should have 128k ROM and 32K static RAM.

It should also have at least 2 USARTs, 4x 10 bit A/D converters and a native USB bus.

The board should be fully compatible with existing range of E-blocks.

The board should have at least 5 ports and the processor itself be housed on a removable daughter board Should be USB programmable with boot loader should offer both Native USB and SPI buses

Should support Removable crystal.

Should be programmable in C and ASM using FLOW Code programming Utilities

ITEM NO 5.

Sensor Board

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The board must support Flow Code Software & its Programming Utilities .

It must contain Variable resistor .

It should have a Light Sensor .

It must have 2 BTA sockets for interfacing both Analog & Digital Sensors .

ITEM NO 6.

LED BOARD

The Board must support Flow Code Software .

It must Contain 8 LEDS

It must be programmable by PIC , AVR ARM & dsPIC Multiprogrammer's separately .

ITEM NO 7.

LCD Board

The board must support Flow Code Software .

It must contain a 16 character 2 Line Alphanumeric Display.

It Must have Display on 5 Wire Serial Bus

ITEM NO 8.

KeyPad Board

It should support Flow Code software

It should have 4x3 Keypad buttons .

It must allow data entry on the bus based system .

It should be compatible with PIC , AVR , ARM & dsPIC Microcontrollers

ITEM NO 9A.

ZIGBEE COORDINATOR BOARD

The Board should be configurable to act as Coordinator by the Software .

The board must be supported/programmable by Flow Code Software

It should be able to initialize the network.

It must have a clean connection to microcontroller board via DB9 configuration.

It should be configurable at 2.4 MHz

It must have a through put of 0.03 Mbps

It must have a Max Transmission distance of upto 70 Meters .

It must transmit at 30mW of Power .

It should be able to go into sleep mode and save power consumption by passing control of network to Router & End Node .

It should be able to support various types of configurations /topologies like star ,meshetc .

ITEM NO 9B.

ZIGBEE ROUTER BOARD /END NODE

The Board should be configurable to act as Router/End Node by the Software .

The board must be supported/Programmable by Flow Code Software

It should be able to initialize the network.

It must have a clean connection to microcontroller board via DB9 configuration.

It should be configurable at 2.4 MHz

It must have a through put of 0.03 Mbps

It must have a Max Transmission distance of upto 70 Meters .

It must transmit at 30mW of Power .

It should be able to go into Active mode and save power consumption by taking complete control of network .

It should be able to support various types of configurations /topologies like star ,meshetc .

It should be able to transmit multimedia data/Sensor outputs values like Current /Voltage to other Routers as well as Coordinator

ITEM NO 10.

RFID BOARD

This board should allows students to develop RFID systems based on the Mifare, ICODE and Ultralight protocols.

It should include a built-in antenna .

It should be programmable by GUI based programmable utility and Flow Code

ITEM NO 11.

ACTUATORS TRAINING PANEL:

The board must be fully compatible with Flow Code and its utilitied and various microcontrollers like PIC/AVR/ARM/DSPIC.

It should include several types of motor which students are encouraged to write a range of programs for. The actuators on the panel must include: A 7.5 degree/step stepper motor, a 120 degree servo motor, and a bi-directional DC motor with gearbox and rotational feedback.

An E-blocks compatible port must be there on the board to facilitate connection with upstream boards.

The board must include 8 general purpose input outputs

The board must include 4 power outputs for driving connections with various devices like relay etc.

ITEM NO 12.

GSM BOARD

It should come complete with a SIM card socket and a small antenna.

It is fitted with 2.5mm jack sockets for microphone and headphone use.

It should be programmable by GUI based software and its programming Utilities .

ITEM NO 13.

GLCD BOARD

The board must be fully compatible with Flow Code and its Programming utilities.

This product must feature a TFT based graphical display designed for i/o BOARDS, which allows a large amount of data to be displayed to help reduce development time or to increase productivity in projects.

The display must feature 128 by 160 pixels totaling at 20480 individually addressable pixels.

There should be a maximum of 65,536 individual colours available for each pixel and a controllable backlight to provide maximum display visibility even in the dark.

Internally the display must has enough memory to automatically refresh the screen and provide a constant non-flickering display. Only the pixels that need changing must be written to the display, therefore decreasing write times and vastly improving refresh and animation performance.

This must allow users to incorporate the module into their own designs using a simple breadboard and veroboard compatible 2.54mm pitch interface and minimal set of 4 to 6 I/O pins.

The display must come fitted to the module circuit board and has an extra metal shield to help protect the display from damage.

The display module should also feature 5V tolerant inputs, allowing you to control the module from a 5V or 3V3 system.

Note that the module must be supplied with a 3V3 supply voltage.

The SIL headers on the display module must be mirrored allowing you to fit the display module either way on the E-block.

ITEM NO 14.

THERMOCOUPLE SENSOR .

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For measurement of extreme temperatures. Should be a type-K thermocouple wire to measure the difference in temperature between its two junctions.

It should be used over the range of -200°C to 1400°C ($\pm 10^{\circ}\text{C}$).

Should be Analogue sensor

Range: -200 to 1400°C when used with reference junction in ice bath

Typical accuracy: $\pm 10^{\circ}\text{C}$

Range: -200 to 0°C when used with probe junction in ice bath

Typical Accuracy: $\pm 20^{\circ}\text{C}$.

ITEM NO 15.

TEMPERATURE SENSOR

Temperature range: -40 to 135°C (-40 to 275°F)

Maximum temperature that the sensor can tolerate without damage: 150°C :

0.17°C (-40 to 0°C)

0.03°C (0 to 40°C)

0.1°C (40 to 100°C)

0.25°C (100 to 135°C)

Temperature sensor: $20\text{ k}\Omega$ NTC Thermistor

Accuracy: $\pm 0.2^{\circ}\text{C}$ at 0°C , $\pm 0.5^{\circ}\text{C}$ at 100°

Response time (time for 90% change in reading):

10 seconds (in water, with stirring)

400 seconds (in still air)

90 seconds (in moving air)

Probe dimensions:

Probe length (handle plus body): 15.5 cm

Stainless steel body: length 10.5cm, diameter 4.0 mm

Probe handle: length 5.0 cm, diameter 1.25 cm

ITEM NO 16.

HEART RATE SENSOR

Receiver range: 80–100 cm

Transmitter transmission frequency: $5\text{ kHz} \pm 10\%$

Receiver current consumption: 30–55 μA


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Transmitter operating temperature: 0–60 °C

ITEM NO 17.

ECG SENSOR

The ECG Sensor should measure electrical signals produced by the heart.

It should use disposable electrodes. An ECG graph should be displayed,

Demonstrating to students the contraction and repolarization of the heart's chambers.

A package of 100 disposable electrodes be included with the sensor.

Should be Analogue sensor.

ITEM NO 18.

GAS PRESSURE SENSOR

Should be Analogue sensor.

Range: 0 to 210 kPa (0 to 2.1 atm or 0 to 1600 mmHg)

Resolution: 0.2 kPa (0.002 atm or 1.6 mmHg)

ITEM NO 19.

CO2 SENSOR

The CO2 Gas Sensor should measure gaseous carbon dioxide levels in the range of 0 to 5000 ppm.

A chamber with probe attachment is included for running controlled experiments

Should be Analogue sensor

Range: 0-5000 ppm Output signal range: 2.5 V

ITEM NO 20.

RELATIVE HUMIDITY

Range: 0% to 95%

Power: 200 μ A @ 5 VDC


Response Time (time for a 90% change in reading):

In still air: 60 minutes (typical)

With vigorous air movement: 40 seconds (typical)

Resolution: 0.04% RH

Specifications for the IH-3602-L Integrated Circuit Humidity Sensor (at 25°C and 5.0 VDC) are given below:


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Total Accuracy (with saturated salt calibration): $\pm 2\%$ RH

Total Accuracy (with standard calibration): $\pm 10\%$ RH

Operating Temperature Range: 0 to 85°C

Temperature Effect

0%RH voltage: $\pm 0.007\%$ RH/°C (negligible)

50%RH voltage: -0.11% RH/°C

95%RH voltage: -0.22% RH/°C

ITEM NO 21.

LIGHT SENSOR

Resolution

0–600 lux: 0.2 lux

0–6000 lux: 2 lux

0–150000 lux: 50 lux

SHOULD HAVE A BTA CONNECTOR FOR PROGRAMMING .

ITEM NO 22.

DSP IMAGE & AUDIO PROCESSING LAB BASED ON TMS320C6748

. All in One DSP Educational Practice Board

A set of All in One DSP board capable of performing various experiments based for basic DSP lab, Image processing Lab, Video Processing Lab, Audio Processing Lab. The board should have following facilities as mentioned below.

TMS320C6748 – Fixed/ Floating Point Digital Signal Processor

DSP with up to 456 MHz performance.

On board 14 Pin (2x7 Pin) JTAG emulation connector

Boot mode selection switch ,On board 256 MB Flash memory

On board 128 MB DDR2 RAM memory

On board DB9 connector for UART-1 interface

On board 3 pin header for UART-2 interface

On board USB TYPE B Connector for UART-2 interface for Debug Console

LED indication for USB connection for Debug Console

On board Reset Switch with LED indication

On board USB Type A Connector for USB host interface

On board micro USB Type A Connector for USB OTG interface

On board RJ45 connector for 10/100 Ethernet interface

On board I2C based Temperature sensor

On board I2C based RTC interface with battery backup

On board SPI based micro SD card interface

- Provision for SATA connector
- On board Power-On LED indication
- On board 4 User LED at GPIO Pin as GPIO Test point
- On board 5 user push buttons for various applications
- Boot mode selection switch
- On board Video in port available
- On board VGA out connector
- Provision for composite video out connector
- On board Graphics LCD interface connector
- On board audio jack and speaker(Mic in) interface
- On board audio codec for speaker out
- Provision for CMOS sensor connector to interface CMOS camera
- On board Temperature sensor with interrupt out facility
- On board jumper selection to switch various video out options
- On board LED to indicate power surge
- On board LED to indicate high voltage input
- On board excessive voltage protection circuit with LED indication
- Various test points for various signals
- On board jumper selection to switch UART2 between USB connector and 3 pin connector
- A properly documented workbook featuring installation procedures, project creation steps, compilation steps for each project. The workbook should contain programs on basic DSP like signal generation (Sine wave, Square wave), audio examples like echo generation, noise cancellation, implementation of filters like FIR, IIR, moving average, etc. Image Processing examples like Edge detection, Image smoothing, Image Sharpening, Image restoration using median filter, thresholding using Image clipping, Video processing examples like video loopback, Face detection, text display on video, etc.

ITEM NO 23.

Specifications for USB JTAG Emulator for DSP Kit BASED ON 6748

The emulator provides JTAG access to Texas Instruments' JTAG based devices

It is compatible with Code Composer Studio™ development environment

TI creates the reference design and our 3rd party partners create the JTAG emulator products for end use

Debug features (Emulation Connect/Disconnect, Read/Write memory, Read registers, Load program, Run, Halt, Step, Software and Hardware Breakpoint support, Real-Time Mode)

Support for targets with 1.8v and 3.3v IO voltages

Support for USB High Speed (480 Mbit/s)

Supports cable-break detection

Supports target power loss detection

Support for multiple FTDI devices

Adaptive clocking

LED light to indicate active USB connection

Compatible with CCSv5 only


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The working of USB JTAG Emulator should be demonstrated with the above mentioned DSP kit

ITEM NO 25.

CODE COMPOSER STUDIO

TMS320 DSPs and OMAP Code Generation tools: C/C++ compiler, assembler and linker

Integrated Visual Project Manager with source control interface, multi-project support

Drag and Drop CCStudio setup utility supporting:

XDS560™ high speed emulation drivers

XDS510™ emulation drivers

Simulators for full devices, CPU only and CPU plus memory for optimal performance

Custom target board definition options

Fully integrated CodeWright Editor

Component manager support for multiple versions of DSP/BIOS and code generation tools within the IDE

Source Code Debugger common interface for both simulator and emulator targets featuring:

Debug Rewind: Simulation source code back stepping

Simple breakpoints

Advanced and Hardware breakpoints

Probe points for data injection/extraction

Pin Connect, Port Connect for simulating real world interfaces (Simulator target only)

Advanced Watch Window and Symbol Browser

Parallel Debug Manager to support multi-processor board debug and analysis

Internal and external scripting support

Resource Explorer

SYS/BIOS

- Linux/Android Debug
- C6EZFlo
- System Analyzer, Image Analyzer
- Hardware Debugging

ITEM NO 26

Specifications for DSP Based Motor Control Setup:
should have the following specifications

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26A. Educational Practice Board for TMS320F28335

Processor

- C2000 Delfino series TMS320F28335 Digital Signal Controller
- 150 Mhz. Max operating speed
- On chip 32-bit floating point unit
- 68K bytes on-chip RAM
- 512K bytes on-chip Flash memory
- On board IEEE 1149.1 JTAG emulation connector with LED indication
- 6 channel DMA controller (For ADC, McBSP, ePWM, XINTF, SARAM)

On-Board Memory

- 1M bytes (64kx16) off-chip SRAM memory
- 256K EEPROM interface
- USB for Flashing

On board Data Transfer Interfaces

- USB Connector for UART-A interface
- DB9 connector for UART-A interface
- LED indication for Transmit and Receive data at UART-A
- 3 pin header for UART-B interface
- DB9 connector for CAN-A interface with onboard hardware Loop back mode feature
- 4 pin header for CAN-B interface with onboard hardware Loop back mode feature
- SPI and I2C devices

Onboard Input/ Output Interfaces and other Facilities

- Power-On LED indication
- Connector for Watchdog timer output
- 20 Pin (10x2 header) Connector for 16 GPIO lines
- DB25 Connector for 8 Digital Input and 8 Digital Output interface with +5V compatibility
- Error + Trip +5V compatible connector for Inverter control module
- LED at GPIO Pin as GPIO Test point
- I2C based Off-Chip EEPROM interface
- I2C based Off-Chip RTC interface

Onboard Special functionality

- MATLAB/SIMULINK compatible
- DB9 connector for 6 channel capture interface
- DB25 connector for 12 channel PWM interface
- Two DB15 connector for 8 Channel On-Chip ADC-A interface and 8 Channel On-Chip ADC-B interface (with 3V protection using OpAmps with unity gain output)
- Potentiometer to test On-Chip ADC
- DB9 connector for 4 channels SPI based on board DAC interface
- Reset Switch with LED indication
- Switch for Run/Program mode switching with LED indication
- 4-way DIP Switch for 16 different boot mode selection
- Input Voltage - 9V DC
- Test points for All the PWM, ADC and Power
- Board to be supplied in a proper wooden box packing

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- A workbook featuring the case studies and working procedures on various on chip and off chip peripherals of Educational practice board for TMS320F28335. All the sample programs and codes for different peripherals to be provided along with the setup and demonstrated.

26B. USB JTAG Emulator for EPB28335 (Compatible with License CCS versions)

- Supports Texas Instruments C2000 Digital Signal Processors with JTAG interface: LF240xA F281x F280x F280xx F2833x F282xx
- Operates off PC/laptop USB port
- USB bus powered Supports USB 1.x and USB 2.0 (full speed)
- Advanced emulation controller provides high performance
- Compatible with the Full License of Code Composer Studio™ C2000 and Code Composer Studio™ Platinum Version 3.x and v4 from Texas Instruments (Not compatible with the DSK/eZdsp/EVM Tools versions of Code Composer Studio™)
- Supports Code Composer Studio™ C2000
- On-Chip flash Programmer
- Supports Spectrum Digital's "SDFlash" Programming Utility
- Compatible with SDConfig utility designed for emulator and target hardware verification
- Compatible with 'C' Language "XMLGUI" interface Compatible with Windows 2000 and XP
- Should be compatible with TMS320F28335 Educational Practice Board

26C. PWM Isolator Kit

- A pluggable General purpose PWM Isolator kit for direct connection with DSP board to generate fully isolated and amplified PWM signals
- It converts the 5V DC PWM signals generated from the DSP board to 15V DC level which can be further given to the power module under study.
- PWM isolator outputs 12 channel isolated +15 V PWM signals
- PWM input signal voltage is of +5 V
- Input Power supply range is from +9V DC to +36V DC
- Thermal Trip facility provided
- Capable to capture errors signal available from inverter module
- Microcontroller interface for Error signal and Thermal trip
- On board LED indication for Thermal Trip and Error signals
- On board Power On LED, test points for signal testing and fuse for protection
- Power supply to be provided with the board
- Board to be supplied in a proper wooden box packing

26D. 3-Phase Inverter Stack Module

Specifications

- The specifications can be configured based on the following parameters
- Stack: Rectifier + Inverter + Brake Chopper
- Voltage: Input AC Voltage, Output AC Voltage (controlled)
- Output Current: 30 A max
- Output Frequency : 50 Hz
- Switching Frequency: 20 kHz max
- Ambient Temperature: 40 deg C.
- Cooling Method: Forced Air Cooled

Features

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- Three/Four IGBT gate module (Inverter leg) made up of 2 IGBT with an anti parallel diode
- Optional Brake Chopper module made up of 1 IGBT with an anti parallel diode
- Optional three phase bridge rectifier module with Blocking voltage of 1600 V and high surge current carrying capability
- Gate Driver module to interfaces and isolates the Control Unit and to control the IGBT's dynamic behavior and its short - circuit protection with Input signal level of 0/15V and Interlocking time between the input signals of 3 μ s.
- The Gate Driver also monitors the errors: power supply under-voltage (below 13 V), short-circuit between Collector and Emitter and the error reset time is typically 9 μ s. On detection of error/fault, the Gate Driver switches off the IGBT.
- Optional DC capacitor bank and snubber capacitors
- The kit stack assembly is provided with forced air cooling
- IGBT modules are mounted on 250 mm heat sink along with the axial fan connected to it to dissipate the heat generated by the IGBTs.
- Normally Closed Thermal contact switch is provided for temperature protection
- Facility to be provided on the inverter stack so as to feed the PWM inputs directly from the PWM isolator module. Cable set to be provided along with the kit.

26E. Sensor Interfacing Kit (Current sensors only)

- It is current/voltage sensor interfacing kit and encoder interfacing kit
- The board is made for the 1HP Inverter stack and Motor control application
- Board consist 3 current sensor
- Three input facility for AC/DC current sensor from the input of the Inverter
- Current sensor range can be varied using jumper setting.
- Power supply: input supply for the sensor board is +15VDC, -15 VDC and +5VDC
- On-Board Power supply indication LEDs provided for +15VDC, -15 VDC and +5VDC
- DB15-Female connector is provided for output of the board from 0 to 3 V for all 3 sensors (It is provided to the DSP board)
- 0V to 3V is generated from the AC sensor output which can be fed to DSP kit. Proper connectors and cables to be provided with the kit
- Test points are provided for the sensor output at various stages and GND
- Encoder from the motor connection facility available
- Encoder output connector is provided to connect the board with the DSP/uC
- Power supply of +5VDC is provided to the encoder from the board
- LED indication is also provided for the Encoder power supply
- DB9-Female connector is provided as EQep/capture connector to interface encoder to the DSP board
- Test points are provided for the Encoder input and output signals (A, B, Index, Strobe, GND)
- Customization of board is possible for the different current range (0 Amp – 25 Amp)
- Current sensor [LA-25-NP]

Current Measurement range	: 5A, 6A, 8A, 12A, 25A
Fix Offset DC Bias voltage	: 1.5 V
Offset DC Bias voltage range	: 1.0V to 2.0V variable (Using Potentiometer)
Fix Offset AC output voltage	: 3V
Offset AC output voltage range	: 2.5V to 3.5V variable (Using Potentiometer)
Output Current waveform	: Sine wave (Input is pure sine wave is assumed)
- (Output sine wave will be above ground line)

26F. Sensor Interfacing Kit (Voltage sensors only)


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- It is voltage sensor interfacing kit and encoder interfacing kit
- The board is made for the 1HP Inverter stack and Motor control application
- Board consist 3 Voltage sensor
- Three input facility for AC/DC voltage sensor from the input of the Inverter
- Power supply: input supply for the sensor board is +15VDC, -15 VDC and +5VDC
- On-Board Power supply indication LEDs provided for +15VDC, -15 VDC and +5VDC
- DB15-Female connector is provided for output of the board from 0 to 3 V for all 3 sensors
(It is provided to the DSP board)
- 0V to 3V is generated from the AC sensor output which can be fed to DSP kit. Proper connectors and cables to be provided with the kit
- Test points are provided for the sensor output at various stages and GND
- Encoder from the motor connection facility available
- Encoder output connector is provided to connect the board with the DSP/uC
- Power supply of +5VDC is provided to the encoder from the board
- LED indication is also provided for the Encoder power supply
- DB9-Female connector is provided as EQep/capture connector to interface encoder to the DSP board
- Test points are provided for the Encoder input and output signals (A, B, Index, Strobe, GND)
- Customization of board is **NOT** possible for the different voltage range

- Voltage sensor [LV-25-P]

- Voltage Measurement range : 10V- 500V Fixed
 Fix Offset DC Bias voltage : 1.5 V
 Offset DC Bias voltage range : 1.0V to 2.0V variable (Using Potentiometer)
 Fix Offset AC output voltage : 3V
 Offset AC output voltage range : 2.5V to 3.5V variable (Using Potentiometer)
 Output Current waveform : Sine wave (Input is pure sine wave is assumed)
 (Output sine wave will be above ground line)

26G. DC generator (1HP 1500 RPM) with Load Panel

should have the following specifications

DC generator:

- Power Rating : 1 HP
- Phase : Single Phase
- RPM : 1500
- Field voltage : 230V DC
- Connection : It will be mechanically coupled with Induction motor

Load Panel:

- Power Rating : 1 HP
- Load arrangement : 25W, 50W, 100W, 150W, 200W (Using toggle switches)
- Supply input : 230 V AC input
- Meter : DC Voltage and DC current
- Meter Type : Digital
- Connection : It will be connected with DC generator
- Application : Using toggle switched load can be provided to DC generator and same load will be transferred to Induction motor

26H. Induction Motor with Encoder should have the following specifications

- Power Rating : 1 HP
- Phase : 3 Phase
- RPM : 1500

- Encoder : +5V encoder of 1024 PPR resolution
- Encoder assembly : inside motor assembly

ITEM NO 27.

DSP Lab FOR TI6000 PLATFORM

should have the following specifications :

A complete lab setup containing DSP Starter Kit featuring Texas Instrument's TMS320C6713 DSP operating at 225 MHz having on-board Embedded USB JTAG controller with plug and play drivers, TLV320AIC Codec, 2M x 32 on board SDRAM, 512K bytes of on board Flash ROM, On board IEEE 1149.1 JTAG connection for optional emulator debug, Four 3.5 mm. audio jacks (microphone, line-in, speaker, and line out), 4 user definable LEDs, 4 position dip switch user definable, a Code Composer Studio software compatible with the kit, with a pluggable daughter board which can be directly connected to the DSK6713 featuring I/O lines for interfacing devices like LCD, matrix keyboard, etc. two DB9 connectors, for UART communication, a LCD matrix keyboard interfacing kit featuring 5X5 matrix keyboard.

A set of self learning interactive tutors with animation, graphics and audio to be installed on laboratory PCs containing Architecture tutors for TI6000, programming tutor for TI6000, MATLAB tutor for DSP, and SIMULINK tutor for DSP along with the above mentioned DSP kit

A laboratory workbook covering various experiments like signal generation, filter designing, amplitude modulation, Echo generation on the input sound signal to be performed on the DSP kit. Necessary cable set to be provided to perform above mentioned experiments and kit to be provided in a proper wooden box packing.

ITEM NO 28.

WIN CE BASED DEVELOPMENT PLATFORM

should have the following specifications :-

Processor: Samsung ARM S3C6410, ARM1176JZF-S, up to 667MHz.

128MB DDR SDRAM, 166MHz

256MB NAND Flash, 16bit

2MB NOR Flash

Two kinds of LCD/Touch Screen interface. Supporting 4.3 inch TFT LCD and 7 inch TFT LCD.

50-Pin GPIO connector, 50-Pin data and address BUS connector

S-Video display interface

One TVOUT

One VGA interface

One 10-pin A/D interface

Two 20-pin SPI interface, it can connect WIFI,DTV Module

One audio input interface (3.5mm audio jack)

One 2-channel audio output interface (3.5mm audio jack)

One 10/100M Ethernet interface (RJ45)

One High-speed USB2.0 OTG port (Mini USB type interface)

Four serial ports (Two are five-wire RS-232 DB9 interface, another two are three-wire TTL serial port led out from a 20-pin expansion connector)

SD/MMC interface (supports 3.3V and 1.8V logic voltage)

Two camera interfaces (30-pin FPC connector, support CCD or CMOS camera)

One 20-pin JTAG interface, one 10-pin CPLD JTAG interface

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Eight buttons (Reset, Boot, User defined, On/Off)

Power supply: +12V

Optional module: GPS, WIFI, Camera, Bluetooth, USB HUB and Matrix Keyboard Module and 3G Modem

Modular Design: carrier board-200mm x 140mm; CPU board- 81.2mm x 55.8mm

Should be compatible with WinCE6.0, Linux2.6.28, Android2.3 and Ubuntu are available for the Kit

ITEM NO. 29

Microprocessor 8085 Trainer Kit WITH LCD DISPLAY :

High performance 8085A CPU @ 3 MHz

On board 40x2 LCD display, with optional 16X2 or 16X4 instead of 40X2 LCD.

Operates on 5V, @1Amp. external power supply On Boards 5v Adapter Jack.

16 K powerful monitor FIRMWARE .Including all standard commands, codes, functions and utility subroutines with Assembler and disassembler. 4K has been used for system firmware.

32 K user RAM 62256.

Three 28 pin sockets provided for memory expansion up to a maximum of 56 K

Versatile Keyboard/Display controller using 8279 brought out on separate FRC connector.

46 parallel I/O lines, 22 from 8155 and 24 from 8255 are brought out on separate FRC connector.

On Board USB interface hardware.

Serial I/O through auto adjusting type RS-232 channel. This connector is conveniently brought on the rear using SID-SOD lines or Jumper selectable USB connector.

On board PS2 connector for 104 Key standard PC-compatible keyboard.

Three 16 bit Timer/Counter channels are available on-board, using 8253. These Channels are available on a 10 pin FRC connector

All address, data and control and hardware interrupt lines are brought out on a 50 pin FRC connector for system interfacing and expansion.

RAM sockets are provided with battery back up using 3.6V Ni-Cad battery.

On board power supply screw terminal is provided for PIO interface.

External Power Supply +5v 3Amp, +12v 1Amp, -12v 0.5Amp

Supplied in attractive wooden enclosure.

46 parallel I/O lines, 22 from 8155 and 24 from 8255 are brought out on separate FRC connector.

On Board USB interface hardware.

ITEM NO. 30

Microprocessor 8086 Trainer Kit WITH LCD DISPLAY:

8086 CPU

Two on-board crystal : 1) 24Mhz & 2) 11.0592 Mhz.

Socket provision for co-processor.

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8284A clock generator.
 8288A bus controller.
 Can be operated on Adpater.
 Display : 40 Character X 2 Line LCD.
 PC Interface : On board RS-232 & On board USB INTERFACE.
 With Keyboard Interface.
 Powerful monitor firmware in two 27256 EPROMs(64 KB) organized as 16 bit words.
 Monitor EPROMs expandable to 128 KB using two 27512 EPROMs.
 64 KB Static RAM in two 62256 RAM's organized as 16 bit words with battery back-up for data retention.
 3.6 V NI-Cad battery back-up circuit for static RAMs.
 On-board 8254 timer/counter chip. Out of 3 channels of timer/counter to the user through a 7pin relimate connector.
 48 TTL I/O lines using two 8255 PPI chips and all signals terminated on two 26 pin FRC connectors.
 The PIO Cards can be interfaced through one 26 pin FRC connector.
 Printer interface provided through another 26 pin FRC connector.
 RS-232C compatible serial port using 8251 and all serial signals terminated on 9 pin D-type male connector.
 On-board 8259 PIC. Out of 8 interrupts, 3 are available on 50 pin FRC bus.
 All 8086 bus signals terminated on 50 and 20 pin FRC connectors.
 The peripheral Study Cards can be interface on 50 pin FRC bus.
 Facility for upload & download the program to & from PC.
 In built Line Assembler.
 Two modes of operation :
 a) Keyboard mode : User interaction through Keyboard
 b) Serial Mode : Through RS-232 serial port with a terminal
 Attractive light weight wooden enclosure.

ITEM NO 31

Interfacing cards to be interface with the 8085 and 8086 Microprocessor kits

DC MOTOR CONTROLLER CARD

Distinct coloured LED indicators provided for every required signal of the peripheral

A TO D CONVERTER CARD

Based on ADC-0809 monolithic CMOS A to D converter IC. The IC has provision for 8 ADC channels of multiplexed input, out of which only one channel is used as input.

D TO A CONVERTER CARD

Based on DAC-0800 monolithic 8 bit high speed current output DAC. Experiments like Waveform Generation, Negative Ramp A-D Conversion, Programmable Power Supply, Successive Approximation A-D Conversion, Temperature Sensing using a TTL Monoshot, etc. can be carried out using this card.

Stepper Motor with stepper motor controller card

Suitable for driving 12Vdc stepper motor with 5 Amp/phase rating.


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