WOMEN'S POLYTECHNIC COLLEGE (PIPMATE - A GOVERNMENT OF PUDUCHERRY UNDERTAKING) LAWSPET, PUDUCHERRY – 605 008 Phone No. 0413-2252833

TENDER SCHEDULE–V: Supply of Equipment/ Machineries/ Laboratory Articles for Department of Electronics and Communication Engineering of Women's Polytechnic College, Puducherry under Centrally Sponsored Scheme of MHRD - Up-gradation of Existing Polytechnics.

TERMS AND CONDITIONS

Bidders intending to offer rates for <u>Supply of Equipment/ Machineries/ Laboratory Articles</u> to Women's Polytechnic College, Puducherryshould observe the Terms and Conditions given below:

- Each Bidder must go through the Terms and Conditions containing the Description and Specification of the Equipment/ Machineries/ Laboratory Articles, carefully and understand them before submitting their tender on-line. No excuse that the Terms and Conditions have not been read or misunderstood will be entertained later.
- 2. The Bidders shall either be the Manufacturer or an Authorized dealer / Supplier of the quoted Equipment/ Machineries/ Laboratory Articles.
- 3. The Bidders shall submit their Tenders for the Equipment/ Machineries/ Laboratory Articles as per the specifications, supported with necessary Technical details and pamphlets/ catalogues. The Technical details and pamphlets/ catalogues of the Equipment/ Machineries/ Laboratory Articles quoted shall be submitted along with other documents required for Technical Bid.
- 4. The Bidders shall submit their Tender on-line before the last date for submission. Bidders are requested to stick to the date and time limit specified in the e-Tender notice. Tenders will be accepted only if they are submitted in the prescribed manner.
- 5. Each tender must be accompanied by an Earnest Money Deposit (E.M.D.) of ₹13,960/-(Rupees Thirteen thousand nine hundred and sixty only) as mentioned in the e-tender notice. The E.M.D. amount should be in the form of demand draft drawn on any of the nationalized banks, in favour of "The Principal, Women's Polytechnic College, Puducherry", payable at Puducherry. Bank guarantee or payment in any other form will not be accepted.

- 6. The tenders submitted without the requisite E.M.D. amount will be summarily rejected and no request for exemption will be entertained except from the firms registered as Industrial Co-operative Society / Small Scale Industries with Government of Puducherry / N.S.I.C./ D.G.S. & D. as applicable. In such cases, a copy of the valid certificate for exemption of E.M.D. should be furnished along with the tender.
- 7. The E.M.D. amount will be returned to the unsuccessful bidders, but retained in the case of successful bidders and will be refunded only after execution of the supply order.
- 8. The bidder withdrawing the tender once submitted / not executing the supply order will lose the entire E.M.D. amount paid.
- The rates should be quoted in whole Rupee and paisa only. The rates for each Equipment/ Machineries/ Laboratory Articles should be independent of other Equipment/ Machineries/ Laboratory Articles.
- 10. The rates quoted should be exclusive of all taxes, duties and all incidental charges such as loading, unloading, packing, forwarding, installation, insurance and stocking charges etc. The taxes applicable per unit may be entered in the appropriate columns of BoQ.
- 11. If artificially low rates are quoted in the tender, this institution will not consider any subsequent claim for compensation. The Bidders are advised to satisfy themselves that the rates quoted are only for the readily available Equipment/ Machineries/ Laboratory Articles, for which the tenders have been invited.
- 12. No representation for upward revision of rates will be allowed. Ex-Godown rates offered by the firm are not acceptable and such tenders will be summarily rejected. The rates quoted should be "FOR destination" basis, the destination being the Women's Polytechnic College, Puducherry.
- 13. The rates quoted should be in Indian currency only for the units specified against the Equipment/ Machineries/ Laboratory Articles and payment will be made in Indian currency only.
- 14. Government of India, DGS&D and Government of Puducherry rate contracts are to be compared with lowest price offered by the supplier through tender.

- 15. Installation and demonstration of Equipment/ Machineries/ Laboratory Articles should be done by the successful bidder at Institution premises at free of cost. Technical Reference and User Manuals are to be supplied for the Equipment/ Machineries/ Laboratory Articles on free of cost.
- 16. The Equipment/ Machineries/ Laboratory Articles supplied shall be guaranteed for satisfactory working performance for a period of at least 12 months from the date of supply/ commissioning. Any defects noticed during this period shall be rectified at free of cost to the complete satisfaction of the Institution. If the damage is more and the Equipment/ Machineries/ Laboratory Articles is not functioning properly at the time of installation, then the entire Equipment/ Machineries/ Laboratory Articles must be replaced with a new one.
- 17. The requirements of Equipment/ Machineries/ Laboratory Articles found in this Tender Schedule are only approximate. The bidder should undertake to supply those requirements in excess or lesser to those specified in the schedule, as per the actual requirement of the Institution.
- 18. The order will be placed with the successful bidders for the supply of Equipment/ Machineries/ Laboratory Articles. The supply should be made at the supplier's own risk. In case of damages and breakages, if found in transit, the Equipment/ Machineries/ Laboratory Articles, thereof should be replaced.
- 19. Acceptance of the tender will rest with the Principal, Women's Polytechnic College, Puducherry, who does not bind herself to accept the lowest tender and reserves to herself the authority to reject any or all the tenders received without assigning any reasons. The Principal has the power to accept the Equipment/ Machineries/ Laboratory Articles of higher cost, if they are of reputed make and are as per the specifications. The decision of the Principal, Women's Polytechnic College, Puducherry in all matters relating to this Tender Schedule shall be final and conclusive. In case of any dispute, Puducherry shall be the place of jurisdiction.
- 20. The tender shall be submitted only if the bidder is agreeable to all the Terms and Conditions of this Tender Schedule, which includes the Description and Specifications of the Equipment/ Machineries/ Laboratory Articles mentioned therein. Irrespective of the Terms and Conditions that may have been specified by the bidder, only the Terms and Conditions

specified in this Tender Document will be binding on the Bidder and the Tendering Authority.

- 21. The Technical Bid Cover, is to be submitted to "The Principal, Women's Polytechnic College, Puducherry", with the following documents:
 - a. Annexure-I, as per the format enclosed.
 - b. Demand drafts towards tender fee ₹525/-and E.M.D. amount of ₹13,960/-(Rupees Thirteen thousand nine hundred and sixty only), drawn in favour of the Principal, Women's Polytechnic College, Puducherry.
 - c. Declaration as given in the next para 22.
 - d. Technical details of Equipment/ Machineries/ Laboratory Articles with Make and Model No., supported by pamphlets and catalogues etc.

It is mandatory for the Bidder to upload the scanned copies of the above documents.

22. The bidders shall furnish a declaration as given below in token of acceptance of all the Terms and Conditions of this tender. Otherwise, the tender will be rejected.

DECLARATION



SIGNATURE OF THE BIDDER (AUTHORIZED SIGNATORY)

- 23. The Financial Bid shall contain the Tender offer form (BoQ). This bid shall contain only the price list. Any discrepancy in this regard will cause the rejection of the price list.
- 24. If the bidder is not willing to quote for any item, the appropriate columns shall be left blank. Financial Bid (Bill of quantities –BoQ) of the qualified bidders will be opened on the prescribed date. The qualified bidders in Technical bid will be informed through e-mail.

- 25. The rates quoted should be only as per the unit printed in the schedule and should be valid for a period of one year from the date of opening of the tender.
- 26. The bid validity period is 180 days and the successful bidder must supply the materials within a period of 30 days from the date of the supply order.
- 27. In case any Equipment/ Machineries/ Laboratory Articles present in the list are found to be covered under DGS&D rate contract or in the quoting of the Government of India/ Government of India Undertaking firms, such Equipment/ Machineries/ Laboratory Articles will not be considered through this tender.
- 28. Copies of any document submitted along with tender including Xerox copies, should be clear and legible. If the required certificates are in a language other than English, attested copy of English version should be furnished for verification and record.
- 29. Entry to participate in the Tender Opening Committee Meeting is restricted only to bonafide bidders or one of their Authorized Representatives. The bidders or their Authorized Representative who are present shall produce the authorization letter and sign in the Attendance register evidencing their presence during the opening of the tenders.
- 30. The bidder or their Authorized Representative who are present shall not bring mobile phones to the venue of tender opening.
- 31. In the event of tender opening date, being declared as a holiday for the office of the tendering authority, the due date for submission of tender and opening of tender will be the next working day at the same time.
- 32. The bidder shall bear all costs associated with the preparation and submission of tender and this institution will in no case be responsible or liable for these costs, regardless of the outcome of the tendering process.
- 33. Specification and requirements of Equipment/ Machineries/ Laboratory Articles is available in **Annexure-II.** The quantity of stores (Equipment/ Machineries/ Laboratory Articles) indicated in the schedule is only tentative and approximate. This institution has the right to increase or decrease the quantity required of any Equipment/ Machineries/ Laboratory Articles.

- 34. The Principal, Women's Polytechnic College, Puducherry is vested with powers to cancel or revoke the Supply order without assigning any reason therefor, if the Supplier fails to effect the supply in conformity with the terms and conditions mentioned in this tender schedule and supply order.
- 35. The Equipment/ Machineries/ Laboratory Articles should be delivered to Women's Polytechnic College, Puducherry on receipt of supply order or as per the delivery schedule in the supply order. The Bidder/ Supplier shall take back rejected Equipment/ Machineries/ Laboratory Articles within 7 days from the date of communication. If the Bidder/ Supplier fail to remove the rejected stores within the specified period, the same will be disposed off by the Principal, Women's Polytechnic College, Puducherry.
- 36. The bidder shall submit the bill of cost in triplicate along with an advanced stamped receipt immediately after execution of the supply order for arranging payment. The payment will be made on receipt of said Equipment/ Machineries/ Laboratory Articles at site, in good condition subject to fulfillment of all other terms and conditions.
- 37. Payment shall be made only after executing the supply order to the entire satisfaction of the Institution. No advance payment will be made under any circumstances.
- 38. The Bidder shall mention the Address for Communication with Landline/ Mobile Phone number and E-mail I.D. for informing the status of Technical bid.

G. RANI PRINCIPAL

ANNEXURE-I TECHNICAL BID

From		
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Phone No.:	•••••	
Mobile Phone No).:	
E-mail I.D		

То

The Principal, Women's Polytechnic College, Lawspet, Puducherry – 605 008.

Sir,

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Sub: Technical Bid for the "Tender Schedule-V: Supply of Equipment/ Machineries/ Laboratory Articles for Department of Electronics and Communication Engineering of Women's Polytechnic College, Puducherry, under Centrally Sponsored Scheme of MHRD - Up-gradation of Existing Polytechnics" – Submitted – Reg.

I/ We submit herewith the Technical Bid through on-line for the "Tender Schedule-V: Supply of Equipment/ Machineries/ Laboratory Articles for Department of Electronics and Communication Engineering of Women's Polytechnic College, Puducherry, under Centrally Sponsored Scheme of MHRD - Up-gradation of Existing Polytechnics" with the following documents for consideration.

- 1. Scanned Copy of D.D. towards tender fee for ₹525/-.
- 2. Scanned Copy of D.D. towards E.M.D. amount of ₹13,960/-.
- 3. Declaration of the Bidder.
- 4. Scanned copies of Catalogues/ Technical pamphlets of items to be supplied with make and model details.

Yours faithfully,

(AUTHORIZED SIGNATORY)

Encl. as above.

[N. B. The Bidder should submit the copy of the Technical Bid as per Annexure-I and copies of proof for payment of tender fee and E.M.D. amount etc. to the Principal, Women's Polytechnic College, Puducherry before 26-4-2016@12.00 noon]

ANNEXURE-II

Tender Schedule-V: Supply of Equipment/ Machineries/ Laboratory Articles for Department of Electronics and Communication Engineering of Women's Polytechnic College, Puducherry, under Centrally Sponsored Scheme of MHRD - Up-gradation of Existing Polytechnics

SL.	ITEM WITH SPECIFICATION	QUANTITY
No.		
1	FUNCTION/ SIGNAL GENERATOR WITH THE FOLLOWING	7 Nos.
	SPECIFICATION:	
	Wide frequency range from 0.01Hz to 3MHz in 8 decade ranges with output	
	impedance of $\pm 1\% \pm 1$ digit; Provided with coarse and fine controls for quick	
	adjustments; With sine, triangle, square (square wave rise/ fall time <75ns),	
	ramp, pulse, TTL sync and DC outputs; Low distortion (<1%) with high	
	resolution on low frequency; With output attenuation variable up to 80dB with	
	two step attenuation of 20dB and 40dB and fine attenuation of 20dB through	
	vernier control; Variable DC offset control; 4 digit digital display with	
	irrequency indication in Hz, KHz, MHz with indication accuracy of $\pm 1\%\pm 1$ digit with frequency stability (50) of act frequency 100 to 000 particula data and	
	10Vice mensioner entruit victors into 50 shares 20Vice mensioner entruit victors	
	into onen einevit. 2 digit geven gegment englitude indigation with 50% with	
	flatness of ± 0.5 dB up to 100 KHz range $/\pm 1.0$ dB for 1MHz range: ± 100 kHz	
	(DC + AC peak) in open circuit +5V +5% (DC + AC peak) in 50 obms of	
	attenuator accuracy: Operating on 230V acc Should be supplied with instruction	
	manual BNC to alligator clip and required accessories	
	manual, bive to unigator cip and required accessories.	
2	LCR-O METER WITH THE FOLLOWING SPECIFICATION: Should be	2 Nos.
	fully automatic for L, C, R and Q measurement with auto-ranging facility; Series	
	and parallel measurement modes; with user selectable measurement frequency	
	of 100Hz / 1KHz; with +/-0.25% of normal accuracy of measurement frequency;	
	0.285Vrms maximum voltage across component; with 1 second as the maximum	
	time for valid reading after connecting the components; with 4 digit, 7-segment	
	12.5mm high, bright LED; with 4 terminal integral test jig for connecting the	
	component under test; Inductance measurement range 0.1microH to 9999H;	
	Capacitance measurement range of 0.1picoF to 9999microF; Resistance	
	measurement range of 0.0010hm to 100Mohm; Quality factor measurement	
	range of 0.1 to 99; Dissipation factor of 0.1 to 99; with basic accuracy of +/-	
	0.25% of reading +/-1 digit valid for I, C, R measurements; with ultimate	
	100Uz of massurement frequency, the range of massurement of L shall be 1H to	
	2000H (series mode). C shall be imicroE to 2000microE (series mode): For	
	1KHz the range of measurement of L shall be 200microf to 1H (series mode).	
	C shall be 200pF to 1microF (parallel mode): Range of resistance with $O<0.1$	
	shall be 10hm to 2Mohm (up to 10K series mode and >10K parallel mode);	
	Range of quality factor shall be 0.25 to 4; with input protection against	
	connection of capacitors of up to 10mF charged to not more than 50V; Shall	
	operate on 230V ac; Shall be provided with all accessories and Instruction	
	manual.	

3	FIBRE OPTIC COMMUNICATION TRAINER KIT	2 Nos.
	Specification: Should be suitable to study the concepts of fibre optic	
	communications with Analog and Digital signal transmission, TDM, Data	
	coding/ decoding and serial data transmission; should be suitable for study of	
	TDM, measurement of losses in optical fiber, measurement of numerical	
	aperture, Manchester coding and decoding etc.;	
	Onboard programmable odd / even marker generator for synchronization; On	
	board programmable 8-bit data generator; 16 channel TDM system; 2.048 kbps	
	data rate for Manchester coding; 4 nos. of Expansion Channel; Onboard Optical	
	Analog & Digital Transmitter and Receiver; Reset switch; on panel Mimic	
	diagram; All relevant test points should be provided on board; On-board voice	
	link with two telephone sets: Transmitter optical wave length : 660 nm & 950	
	nm: Intensity modulation with analog bandwidth of 150KHz and digital	
	bandwidth of 2MHz; Self-locking cap and screw type optical connectors at	
	transmitter and receiver: PIN photodiode operating at 660 nm & 950 nm optical	
	wavelength: provision for clock recovery:	•
	Should operate on 230 V ac mains: Should be supplied with 1000-micron plastic	
	step index multimode PMMA fiber of lengths 1m and 3m; refractive index of	
	the core 1.492 and cladding 1.406 with numerical aperture better than 0.5 and	
	Acceptance angle of 60°. The trainer kit should be supplied with Numerical	
	aperture measurement set up, patch chords, with all required accessories and	
	instruction manual.	
4	PCM TRAINER KIT:	1 No.
4	PCM TRAINER KIT: PULSE CODE MODULATION/ DEMODULATION TRAINER KITwith	1 No.
4	<u>PCM TRAINER KIT:</u> <u>PULSE CODE MODULATION/ DEMODULATION TRAINER KIT</u> with the following features: Shall have a built in 1KHz sine wave generator with amplitude	1 No.
4	<u>PCM TRAINER KIT:</u> <u>PULSE CODE MODULATION/ DEMODULATION TRAINER KIT</u> with the following features: Shall have a built in 1KHz sine wave generator with amplitude ranging from 0 to 3Vpp, built in DC power supply -1.5V to +1.5V and sufficient test	1 No.
4	<u>PCM TRAINER KIT:</u> <u>PULSE CODE MODULATION/ DEMODULATION TRAINER KIT with the following features: Shall have a built in 1KHz sine wave generator with amplitude ranging from 0 to 3Vpp, built in DC power supply -1.5V to +1.5V and sufficient test points for studying different waveforms; Shall have a crystal based clock generator</u>	1 No.
4	PCM TRAINER KIT: PULSE CODE MODULATION/ DEMODULATION TRAINER KIT with the following features: Shall have a built in 1KHz sine wave generator with amplitude ranging from 0 to 3Vpp, built in DC power supply -1.5V to +1.5V and sufficient test points for studying different waveforms; Shall have a crystal based clock generator operating on 4.096MHz; Data rate at 64kbps for 8KHz sampling rate and 128kbps for	1 No.
4	PCM TRAINER KIT: PULSE CODE MODULATION/ DEMODULATION TRAINER KIT with the following features: Shall have a built in IKHz sine wave generator with amplitude ranging from 0 to 3Vpp, built in DC power supply -1.5V to +1.5V and sufficient test points for studying different waveforms; Shall have a crystal based clock generator operating on 4.096MHz; Data rate at 64kbps for 8KHz sampling rate and 128kbps for 16KHz sampling rate; with Butterworth low pass filter demodulator filter; Shall be	1 No.
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4	PCM TRAINER KIT: PULSE CODE MODULATION/ DEMODULATION TRAINER KIT with the following features: Shall have a built in 1KHz sine wave generator with amplitude ranging from 0 to 3Vpp, built in DC power supply -1.5V to +1.5V and sufficient test points for studying different waveforms; Shall have a crystal based clock generator operating on 4.096MHz; Data rate at 64kbps for 8KHz sampling rate and 128kbps for 16KHz sampling rate; with Butterworth low pass filter demodulator filter; Shall be provided with a transistor based microphone pre-amplifier supporting a system bandwidth of 3.4KHz; The kit shall be suitable for studying the functions of ADC, PCM	1 No.
4	PCM TRAINER KIT: PULSE CODE MODULATION/ DEMODULATION TRAINER KIT with the following features: Shall have a built in 1KHz sine wave generator with amplitude ranging from 0 to 3Vpp, built in DC power supply -1.5V to +1.5V and sufficient test points for studying different waveforms; Shall have a crystal based clock generator operating on 4.096MHz; Data rate at 64kbps for 8KHz sampling rate and 128kbps for 16KHz sampling rate; with Butterworth low pass filter demodulator filter; Shall be provided with a transistor based microphone pre-amplifier supporting a system bandwidth of 3.4KHz; The kit shall be suitable for studying the functions of ADC, PCM modulation and demodulation, measurement of dynamic range of SNR of PCM system.	1 No.
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4	PCM TRAINER KIT: PULSE CODE MODULATION/ DEMODULATION TRAINER KIT with the following features: Shall have a built in IKHz sine wave generator with amplitude ranging from 0 to 3Vpp, built in DC power supply -1.5V to +1.5V and sufficient test points for studying different waveforms; Shall have a crystal based clock generator operating on 4.096MHz; Data rate at 64kbps for 8KHz sampling rate and 128kbps for 16KHz sampling rate; with Butterworth low pass filter demodulator filter; Shall be provided with a transistor based microphone pre-amplifier supporting a system bandwidth of 3.4KHz; The kit shall be suitable for studying the functions of ADC, PCM modulation and demodulation, measurement of dynamic range of SNR of PCM system. Companding, voice communication etc., Shall be provided with instruction manual and suitable patch cords. FSK TRANSMITTER AND RECEIVER KIT Should be suitable for study of FSK modulation and demodulation; should operate on 230V ac mains; should be supplied with instruction manual and suitable number of connectors to plug into the test points, with the following	1 No. 1 No.
4	 PCM TRAINER KIT: PULSE CODE MODULATION/ DEMODULATION TRAINER KIT with the following features: Shall have a built in IKHz sine wave generator with amplitude ranging from 0 to 3Vpp, built in DC power supply -1.5V to +1.5V and sufficient test points for studying different waveforms; Shall have a crystal based clock generator operating on 4.096MHz; Data rate at 64kbps for 8KHz sampling rate and 128kbps for 16KHz sampling rate; with Butterworth low pass filter demodulator filter; Shall be provided with a transistor based microphone pre-amplifier supporting a system bandwidth of 3.4KHz; The kit shall be suitable for studying the functions of ADC, PCM modulation and demodulation, measurement of dynamic range of SNR of PCM system. Companding, voice communication etc., Shall be provided with instruction manual and suitable patch cords. FSK TRANSMITTER AND RECEIVER KIT Should be suitable for study of FSK modulation and demodulation; should operate on 230V ac mains; should be supplied with instruction manual and suitable number of connectors to plug into the test points, with the following specifications 	1 No. 1 No.
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4	 PCM TRAINER KIT: PULSE CODE MODULATION/ DEMODULATION TRAINER KIT with the following features: Shall have a built in 1KHz sine wave generator with amplitude ranging from 0 to 3Vpp, built in DC power supply -1.5V to +1.5V and sufficient test points for studying different waveforms; Shall have a crystal based clock generator operating on 4.096MHz; Data rate at 64kbps for 8KHz sampling rate and 128kbps for 16KHz sampling rate; with Butterworth low pass filter demodulator filter; Shall be provided with a transistor based microphone pre-amplifier supporting a system bandwidth of 3.4KHz; The kit shall be suitable for studying the functions of ADC, PCM modulation and demodulation, measurement of dynamic range of SNR of PCM system. Companding, voice communication etc., Shall be provided with instruction manual and suitable patch cords. FSK TRANSMITTER AND RECEIVER KIT Should be suitable for study of FSK modulation and demodulation; should operate on 230V ac mains; should be supplied with instruction manual and suitable number of connectors to plug into the test points, with the following specifications. Inbuilt power supply; square wave generator of frequency 22Hz and 5V amplitude and de-bounce logic; Carrier generator of 1070Hz and 1270Hz of 	1 No. 1 No.
4	 PCM TRAINER KIT: PULSE CODE MODULATION/ DEMODULATION TRAINER KIT with the following features: Shall have a built in 1KHz sine wave generator with amplitude ranging from 0 to 3Vpp, built in DC power supply -1.5V to +1.5V and sufficient test points for studying different waveforms; Shall have a crystal based clock generator operating on 4.096MHz; Data rate at 64kbps for 8KHz sampling rate and 128kbps for 16KHz sampling rate; with Butterworth low pass filter demodulator filter; Shall be provided with a transistor based microphone pre-amplifier supporting a system bandwidth of 3.4KHz; The kit shall be suitable for studying the functions of ADC, PCM modulation and demodulation, measurement of dynamic range of SNR of PCM system. Companding, voice communication etc., Shall be provided with instruction manual and suitable patch cords. FSK TRANSMITTER AND RECEIVER KIT Should be suitable for study of FSK modulation and demodulation; should operate on 230V ac mains; should be supplied with instruction manual and suitable number of connectors to plug into the test points, with the following specifications. Inbuilt power supply; square wave generator of frequency 22Hz and 5V amplitude and de-bounce logic; Carrier generator of 1070Hz and 1270Hz of amplitude 5Vpn for FSK modulation; PL based FM demodulator: JED 	1 No.
4	PCM TRAINER KIT: PULSE CODE MODULATION/ DEMODULATION TRAINER KIT with the following features: Shall have a built in 1KHz sine wave generator with amplitude ranging from 0 to 3Vpp, built in DC power supply -1.5V to +1.5V and sufficient test points for studying different waveforms; Shall have a crystal based clock generator operating on 4.096MHz; Data rate at 64kbps for 8KHz sampling rate and 128kbps for 16KHz sampling rate; with Butterworth low pass filter demodulator filter; Shall be provided with a transistor based microphone pre-amplifier supporting a system bandwidth of 3.4KHz; The kit shall be suitable for studying the functions of ADC, PCM modulation and demodulation, measurement of dynamic range of SNR of PCM system. Companding, voice communication etc., Shall be provided with instruction manual and suitable patch cords. FSK TRANSMITTER AND RECEIVER KIT Should be suitable for study of FSK modulation and demodulation; should operate on 230V ac mains; should be supplied with instruction manual and suitable number of connectors to plug into the test points, with the following specifications. Inbuilt power supply; square wave generator of frequency 22Hz and 5V amplitude and de-bounce logic; Carrier generator of 1070Hz and 1270Hz of amplitude 5Vpp for FSK modulation; PLL based FM demodulator; LED indication for Data transmission: 9 nin serial port provision for serial data	1 No.
4	 PCM TRAINER KIT: PULSE CODE MODULATION/ DEMODULATION TRAINER KIT with the following features: Shall have a built in IKHz sine wave generator with amplitude ranging from 0 to 3Vpp, built in DC power supply -1.5V to +1.5V and sufficient test points for studying different waveforms; Shall have a crystal based clock generator operating on 4.096MHz; Data rate at 64kbps for 8KHz sampling rate and 128kbps for 16KHz sampling rate; with Butterworth low pass filter demodulator filter; Shall be provided with a transistor based microphone pre-amplifier supporting a system bandwidth of 3.4KHz; The kit shall be suitable for studying the functions of ADC, PCM modulation and demodulation, measurement of dynamic range of SNR of PCM system. Companding, voice communication etc., Shall be provided with instruction manual and suitable patch cords. FSK TRANSMITTER AND RECEIVER KIT Should be suitable for study of FSK modulation and demodulation; should operate on 230V ac mains; should be supplied with instruction manual and suitable number of connectors to plug into the test points, with the following specifications. Inbuilt power supply; square wave generator of 1070Hz and 1270Hz of amplitude 5Vpp for FSK modulation; PLL based FM demodulator; LED indication for Data transmission; 9 pin serial port provision for serial data transmission 	1 No.

8051 MICROCONTROLLER TRAINER KIT – 12 nos. and Interface	1 SET
<u>Cards – Each 2 nos.</u>	
Specification of Microcontroller Trainer Kit: The microcontroller shall be	
based on 89C51 microcontroller operating on 12MHz clock speed with 32KB	
RAM program memory, 32KB RAM for data memory, 32KB Program memory	
EPROM; Provided with 10X2 LCD display and IBM PC keyboard with USB	
connectivity; Provision for Reset and Interrupt functions; Capable of Parallel I/O	
expansion with 1 no. of 8255 connections terminated in one 26-pin FRC header	
(24 I/O lines), one VXT-bus (50 pin FRC connector) for interfacing VBMB	
series of experiment board and bus expansion: Microcontroller port lines	
terminated on one 40-pin FRC header: On-board 8-digital inputs through 8-way	
dip switch: On-board 8-digit outputs can be visible through SMD LEDs: With	
special features such as software single stepping for debugging. On chip serial	
port terminated in 9-pin D male connector: housed in a sleek plastic cabinet:	•
operating on 230V AC: Provision for battery backup : Shall be supplied with	
user manual and technical reference manual. The microcontroller trainer kit	
should be compatible with the following interface cards -12 Nos.	
SPECIFICATION OF INTERFACE CARDS:	
A) DIGITAL I/O INTERFACE CARD: Shall have 8 nos, of high quality	
toggle switches and 8 nos. of LEDs; 4 nos. of different input devices like LDR,	
Reed relay, push button and opto interrupter; 4 nos, of different output devices	
like relay, opto coupler, piezo buzzer and speaker; suitable for real time	
applications: shall be supplied with manual -2 Nos.	
B) KEYBOARD INTERFACE BOARD: Based on Intel 8279 keyboard/	
display interface with 6 digit display and 18 keys keyboard: With provisions for	
control and shift keys: Shall have the facility for Interrupt I/O transfer: The	
interface board shall be provided with test points and fault analysis points: Shall	
have the provision to connect IRO, output line of 8279 to any one of interrupts	
RST 5.5, 6.5 or 7.5; All address, data and control lines shall be terminated on a	
50 pin male connector for interfacing with VXT bus: Shall be provided with 50	
core cable and manual. -2 Nos.	
C) TRAFFIC LIGHT CONTROLLER INTERFACE CARD: Shall have the	
provision for connection to parallel port of the microcontroller trainer kit: shall	
be provided with 32 LEDs for simulating the traffic light control system: The	
card shall be provided with buffers for individual LEDs: Shall be supplied with	
26 core cable -2 Nos	
D) 8.BIT ADC AND 8.BIT DAC. Shall have one channel 8-bit DAC 0800. 8	
channel 8-bit ADC 0809: Start of conversion shall be through manual switch or	
software: End of conversion monitored through interrunt / polling: Display of	
digital data shall be through I EDs: All the 8 channel analog inputs shall be	
terminated on a screw type connector. Shall have the provision for test and fault	
analysis points: Shall have AD 500 circuit for temporature or input; shall have	
analysis points, Shall have AD 550 circuit for temperature of input, shall be provided with one VXT bus extender for interfacing with microprocessor kits:	
The DAC and ADC subsute shall be terminated at suitable connectors 2	
The DAC and ADC outputs shall be terminated at suitable connectors 2	
NUS. E) CTEDDED MOTOD INTEDEACE CARD, Chall be and the for	
E) SIEFFEK WOTOK INTEKFACE CAKD: Shall be suitable for	
connocting supper motor ranging from 2 kg to 20 kg ; Shall have the provision for connecting external power supply of 6 V 12 V or 24 V solectable by immerse	
connecting external power supply of 0° , 12° of 24° , selectable by jumpers, Shall be supplied with one 2K g/12V stepper motor. All address, data and control	
shan be supplied with one $2Ng/12v$ stepped motor. All address, data and control 1	

	lines shall be terminated on a 50-pin male connector for interfacing with VXT	
	bus: Shall be supplied with 50 core cable. – 2 Nos.	
	F) DC MOTOR CONTROLLER INTERFACE CARD: Shall have a 8-bit	
	DAC to control the speed and direction of DC motor: Shall be supplied with a	
	6V DC motor with slotted disk: The card shall have the necessary circuitry for	
	speed sensing with optical pick up through 8253. Channel 0 of the counter is	
	used for measuring the speed of the DC motor by decrement operation by using	
	the pulses generated by the opto-coupled DC motor shaft for a known time and	
	calibrating the count value to RPM: Channel 1 and 2 of 8253 shall be available	
	for the user. Shall be provided with drivers for interfacing the DC motor:	
	Suitable for teaching DC motor fundamentals to students: All address data and	
	control lines shall be terminated on a 50 pin male connector for interfacing with	
	VXT bus: Shall be provided with 50 core cable -2 Nos	
7	DIGITAL IC TRAINER KITS suitable for verification of truth tables of logic	20
/	gates construction and testing of combinational and sequential circuits with the	20
	following features: Should have a built in power supply for providing regulated	
	dc voltage of $\pm/.5V@2A$ and $\pm/.12V@500mA$ with single pulse output 16 pin	
	ZIE socket TTL outputs at different frequencies of 1Hz 10Hz 10Hz 1KHz	
	10KHz and 100KHz 16 LEDs for indication of logic status 16 switches for	
	providing logic inputs clock generator for 1Hz to 100kHz and 7 segment LED	
	display with BCD decoder. The kit shall be provided with a bread board for	
	construction of logic circuits: The kit shall be supplied with required number of	
	patch chords for making connections. The input and output connectors provided	
	in the trainer kit should be banana type. The LED indicators should be fixed	
	with holders.	
8	PROGRAMMABLE LOGIC CONTROLLER (PLC) KIT-2 Nos., LIFT	1 SET
Ũ	CONTROL MODULE-1 No.&CONVEYOR CONTROL MODULE-1	1 521
	No.:	
	Specifications - General: The trainer should be suitable for studying the	
	programming concepts of a PLC. The trainer kit should be suitable for obtaining	
	the ladder diagram for any application and download it to PLC for checking the	
	result; It should be suitable for interfacing with LIFT CONTROL MODULE	
	and CONVEYOR CONTROL MODULE.	
	SPECIFICATIONS FOR PLC KIT: Allen Bradley Make PLC; Built in power supply	
	SPECIFICATIONS FOR PLC KIT: Allen Bradley Make PLC; Built in power supply +24V DC;6 digital inputs for input interface and 4 relay outputs for output interface;	
	SPECIFICATIONS FOR PLC KIT: Allen Bradley Make PLC; Built in power supply +24V DC;6 digital inputs for input interface and 4 relay outputs for output interface; Contacts AC/ DC 230V; Short circuit protection to protect the PLC; Demonstration	
	SPECIFICATIONS FOR PLC KIT: Allen Bradley Make PLC; Built in power supply +24V DC;6 digital inputs for input interface and 4 relay outputs for output interface; Contacts AC/ DC 230V, Short circuit protection to protect the PLC; Demonstration panel with 6 SPDT switches for simulating digital inputs, 4 LEDs with fuse protection to circuit protection to protect the PLC; Demonstration panel with 6 SPDT switches for simulating digital inputs, 4 LEDs with fuse protection to circuit protection to protect the PLC; Demonstration panel with 6 SPDT switches for simulating digital inputs, 4 LEDs with fuse protection to circuit protection to protect the PLC; Demonstration panel with 6 SPDT switches for simulating digital inputs, 4 LEDs with fuse protection to circuit protection to protect the PLC; Demonstration panel with 6 SPDT switches for simulating digital inputs, 4 LEDs with fuse protection to circuit protection to protect the PLC; Demonstration panel with 6 SPDT switches for simulating digital inputs, 4 LEDs with fuse protection to circuit protection to protect the PLC; Demonstration panel with 6 SPDT switches for simulating digital inputs, 4 LEDs with fuse protection to circuit protection to protect the PLC; Demonstration panel with 6 SPDT switches for simulating digital inputs, 4 LEDs with fuse protection to circuit protection to protect the PLC; Demonstration panel with 6 SPDT switches for simulating digital inputs, 4 LEDs with fuse protection to circuit protection to protect the PLC; Demonstration panel with 6 SPDT switches for simulating digital inputs, 4 LEDs with fuse protection to circuit protection to protect the PLC; Demonstration panel with 6 SPDT switches for simulating digital inputs, 4 LEDs with fuse protection to circuit protection to protect the PLC; Demonstration panel with 6 SPDT switches for simulating digital inputs, 4 LEDs with fuse protection to protect the PLC; Demonstration panel with 6 SPDT switches for simulating digital inputs, 4 LEDs with fuse protection to protect the PLC; Demonstration	
	SPECIFICATIONS FOR PLC KIT: Allen Bradley Make PLC; Built in power supply +24V DC;6 digital inputs for input interface and 4 relay outputs for output interface; Contacts AC/ DC 230V, Short circuit protection to protect the PLC; Demonstration panel with 6 SPDT switches for simulating digital inputs, 4 LEDs with fuse protection to simulate digital outputs, one PWM connector, one 24V DC source for internal patching, One HSC connectors for external interface application and all components.	
	SPECIFICATIONS FOR PLC KIT: Allen Bradley Make PLC; Built in power supply +24V DC;6 digital inputs for input interface and 4 relay outputs for output interface; Contacts AC/ DC 230V, Short circuit protection to protect the PLC; Demonstration panel with 6 SPDT switches for simulating digital inputs, 4 LEDs with fuse protection to simulate digital outputs, one PWM connector, one 24V DC source for internal patching, One HSC counter, Connectors for external interface application and all components mounted on panel with a mimic diagram: PLC programming software should be	
	SPECIFICATIONS FOR PLC KIT: Allen Bradley Make PLC; Built in power supply +24V DC;6 digital inputs for input interface and 4 relay outputs for output interface; Contacts AC/ DC 230V, Short circuit protection to protect the PLC; Demonstration panel with 6 SPDT switches for simulating digital inputs, 4 LEDs with fuse protection to simulate digital outputs, one PWM connector, one 24V DC source for internal patching, One HSC counter, Connectors for external interface application and all components mounted on panel with a mimic diagram; PLC programming software should be windows based; Should be complete in all respects and supplied with instruction	
	SPECIFICATIONS FOR PLC KIT: Allen Bradley Make PLC; Built in power supply +24V DC;6 digital inputs for input interface and 4 relay outputs for output interface; Contacts AC/ DC 230V, Short circuit protection to protect the PLC; Demonstration panel with 6 SPDT switches for simulating digital inputs, 4 LEDs with fuse protection to simulate digital outputs, one PWM connector, one 24V DC source for internal patching, One HSC counter, Connectors for external interface application and all components mounted on panel with a mimic diagram; PLC programming software should be windows based; Should be complete in all respects and supplied with instruction manual, sufficient number of patch chords and required accessories.	
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	SPECIFICATIONS FOR PLC KIT: Allen Bradley Make PLC; Built in power supply +24V DC;6 digital inputs for input interface and 4 relay outputs for output interface; Contacts AC/ DC 230V, Short circuit protection to protect the PLC; Demonstration panel with 6 SPDT switches for simulating digital inputs, 4 LEDs with fuse protection to simulate digital outputs, one PWM connector, one 24V DC source for internal patching, One HSC counter, Connectors for external interface application and all components mounted on panel with a mimic diagram; PLC programming software should be windows based; Should be complete in all respects and supplied with instruction manual, sufficient number of patch chords and required accessories. SPECIFICATION FOR LIFT CONTROL MODULE: This module should be compatible with the PLC unit avoid interface problems. This trainer kit module should be suitable for LIFT function demonstration. Should have three floors with lead screw mechanism to move the lift up/ down vertically; Stepper motor to rotate the gear mechanism with MOSEET based driver: Provision for simulating the user request by	
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	SPECIFICATIONS FOR PLC KIT: Allen Bradley Make PLC; Built in power supply +24V DC;6 digital inputs for input interface and 4 relay outputs for output interface; Contacts AC/ DC 230V, Short circuit protection to protect the PLC; Demonstration panel with 6 SPDT switches for simulating digital inputs, 4 LEDs with fuse protection to simulate digital outputs, one PWM connector, one 24V DC source for internal patching, One HSC counter, Connectors for external interface application and all components mounted on panel with a mimic diagram; PLC programming software should be windows based; Should be complete in all respects and supplied with instruction manual, sufficient number of patch chords and required accessories. SPECIFICATION FOR LIFT CONTROL MODULE: This module should be compatible with the PLC unit avoid interface problems. This trainer kit module should be suitable for LIFT function demonstration. Should have three floors with lead screw mechanism to move the lift up/ down vertically; Stepper motor to rotate the gear mechanism with MOSFET based driver; Provision for simulating the user request by using 3 switches; Status of the lift indication through LED's; With built in switched mode power supply; Should be supplied with instruction manual and required	
	SPECIFICATIONS FOR PLC KIT: Allen Bradley Make PLC; Built in power supply +24V DC;6 digital inputs for input interface and 4 relay outputs for output interface; Contacts AC/ DC 230V, Short circuit protection to protect the PLC; Demonstration panel with 6 SPDT switches for simulating digital inputs, 4 LEDs with fuse protection to simulate digital outputs, one PWM connector, one 24V DC source for internal patching, One HSC counter, Connectors for external interface application and all components mounted on panel with a mimic diagram; PLC programming software should be windows based; Should be complete in all respects and supplied with instruction manual, sufficient number of patch chords and required accessories. SPECIFICATION FOR LIFT CONTROL MODULE: This module should be compatible with the PLC unit avoid interface problems. This trainer kit module should be suitable for LIFT function demonstration. Should have three floors with lead screw mechanism to move the lift up/ down vertically; Stepper motor to rotate the gear mechanism with MOSFET based driver; Provision for simulating the user request by using 3 switches; Status of the lift indication through LED's; With built in switched mode power supply; Should be supplied with instruction manual and required accessories.	
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should be suitable for demonstration of working of Conveyor belt. The module shall	
have One stepper motor (2Kg) for conveyor control; proximity sensor switch to detect	
the presence of material; Belt for conveyor movement; 3 digital inputs, 4 digital outputs	1
are available with trainer; Should be supplied with instruction manual and required	1
accessories.	1

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