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**DEPARTMENT OF INFORMATION TECHNOLOGY
INDIAN INSTITUTE OF ENGINEERING SCIENCE AND TECHNOLOGY,
SHIBPUR
(Formerly Bengal Engineering and Science University, Shibpur)**

P.O. Botanic Garden, Howrah – 711 103, West Bengal, India



BIDDING DOCUMENT

Advt. No. DE/D(AA)16/73 Date:23.12.2016

For Supply of

**Function Generator, Cathod Ray Oscilloscope, ASK/PSK/FSK
Modulation & Demodulation Kit, PAM Time Division Multiplexing Kit,
Delta / Adaptive Delta Modulation Kit and PAM / PPM / PWM
Modulation & Demodulation Kit**

SECTION-I: General Conditions and Important Instructions for Bidders

1. Bidders are to submit the original tender documents with technical specifications and price details in sealed envelope to **The Head, Department of Information Technology**, Indian Institute of Engineering Science and Technology, Shibpur, Howrah – 711103, West Bengal, India.
2. Bidders are to submit Technical Bid and Price Bids separately in two sealed envelopes. The contents of the envelop (Technical Bid / Price Bid) should be mentioned on its top. All the sealed envelopes should be placed in a common sealed envelop, superscribed with the Ref. Advertisement No. and date along with the bidders name and address.
3. Bidders are to submit this tender document in original after accepting the terms and conditions.
4. Last date of receipt of tender by IEST, Shibpur is **6th January, 2017 (Friday) at 2.00 pm**. Tenders received late will not be accepted under any circumstances. Tenders (ONLY THE TECHNICAL PARTS) will be opened in the Department of Information Technology, IEST, Shibpur on the same day at 4.00 pm. In case the Institute remains closed on the said date, tenders will be opened on next working day at 4.00 pm.
5. The Price Bid should clearly mention the following:
 - Ex Works Price
 - Packing and Forwarding Charges, if any
 - Freight and insurance, up to Indian Institute of Engineering Science and Technology, Shibpur, Howrah, including loading and unloading charges
 - All taxes, duties, levies applicable, in INR
 - Erection, Commissioning and testing charges at IEST, Shibpur site.
 - Installation charges.
 - Extended warranty and standard warranty
 - Any other terms and conditions.
6. The Institute will not issue any C or D form availing of concessional Sales Tax/ VAT. The Institute will issue Customs Duty Exemption Certificate or Excise Duty Exemption Certificate for foreign purchase, if required.
7. The equipments are to be supplied at the Department of Information Technology between 11.00 am and 4.00 pm from Monday to Friday except holidays. The bidders will be responsible for any breakage, damage or defect in the equipment detected subsequently.
8. Period of delivery is 6 to 8 weeks from the date of issue of Purchase Order. If the supply is not completed within the stipulated period as indicated in the Purchase Order a Liquidated Damage @ ½ % per week will be imposed on the value of purchase order.

9. Bills in triplicate should be presented for payment within 15 days of supply/ commissioning of work. No advance is paid for execution of the order. The Order No. is to be noted on both Challan and Bill. All bills are to be accompanied by order copies and Challan receipt.
10. Payment will be made on submission of Proper Bills, Challans etc, by A/C Payee Cheque and no cash payment will be made under any circumstances.
11. All payments are subjected to statutory deductions as and when applicable.
12. Tender is to be kept valid for acceptance for 6 months with effect from the last date of issue of the tender without any modifications in its terms and conditions. Failure to comply with the same will result in forfeiture of EMD. EMD of the successful bidder will be converted to Security Deposit (SD). E.M.D./S.D. will be refunded after successful commissioning of the equipment. No interests is payable on E.M.D./S.D. Bidders must submit one self-addressed envelope for release of E.M.D.
13. Documents to be submitted with the tender:
 - Tender Documents, General Conditions and Important Instruction in original duly signed by the Proprietor/ Partner/ Director of the company as a token of acceptance of Terms and Conditions of Tender.
 - Latest Income Tax, Sales Tax, Professional Tax clearance certificates and copy of valid Trade License.
 - Demand Draft for Earnest Money Deposit.
 - Technical Bid, Price Bid (Priced) separately in two sealed enveloped according to specifications.
14. All the equipment and accessories will carry a guarantee for a period of 36 months from the date of commissioning. Guarantee for all the items supplied will be on 'all comprehensive' basis, i.e., including repairs, replacements, maintenance etc. Calibration / Test Certificate must accompany along with the equipment. Supply of equipment shall include installation, erection, commissioning and demonstration. Indian Institute of Engineering Science and Technology, Shibpur, Howrah reserves the right to accept/ reject all or any of the bidders without assigning any reason whatsoever. License for the EDA tools must be permanent.

I/We accept the above terms and conditions.

Signature of the Bidders with date and seal

SECTION II: Technical Specifications of the items

Items to be supplied:

| SL. NO | NAME OF EQUIPMENT | SPECIFICATION OF THE ITEM |
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| 1 | FUNCTION GENERATOR | <ul style="list-style-type: none"> • Output frequency : 0.2Hz ~ 2MHz • Output waveforms : Sine, square, triangle, ramp pulse • Output impedance : $50\Omega \pm 10\%$ • Output amplitude : $\geq 20V_{pp}$ (1MΩ load); $>10V_{pp}$ (50MΩ load) • Output attenuation : 0dB / 20dB / 40dB / 60dB • DC offset : 0 ~ $\pm 10V$ (1MΩ load); 0 ~ $\pm 5V$ (50MΩ load) • Symmetry : 10% ~ 90% • Sine wave • Distortion factor : 20Hz ~ 20KHz $\leq 1\%$ • Frequency response : 2Hz ~ 2MHz $\leq \pm 1dB$ • Square wave • Rise or fall time : $\leq 30ns$ <ul style="list-style-type: none"> • Pulse Generator • TTL output • Rise or fall time : $\leq 50ns$ • Low level : $\leq 0.4V$ • 1 High level : $\geq 3.5V$ • Counter • Frequency range : 0.5Hz ~ 30MHz • Input impedance : 10K$\Omega \pm 10\%$ • Sensitivity : 200mVrms • Accuracy : 0.1Hz / 1Hz • Error : $\leq 0.1\% \pm 1$ digit • Maximum input voltage : 50Vpp • Power source : 220 ~ 240VAC $\pm 10\%$, 50Hz $\pm 2Hz$ |
| 2 | CATHOD RAY OSCILLOSCOPE | <p>Horizontal</p> <ul style="list-style-type: none"> • DC - 100MHz Bandwidth • 2 Channels • 20 MHz (-3dB) Bandwidth Limits • 1GS/s Sample Rate • Real Time Sample Mode • 40 K Sample Memory Dept • 4ns/div~80s/div Time base range • $\pm 50ppm$ Time base accuracy • 7 inch LCD color (800X 480 pixels) Display • English Input Display Language • Sample, peak detect, averaging Mode • DC, AC, GND, Input coupling • 1M$\Omega \pm 2\%$ in parallel with 20pF $\pm 3pF$ Input impedance • Probe attenuation factors: 1X, 10X, 100X, 1000X • Maximum input voltage: 300 VRMS (420V p-p - CAT I & CAT II) |

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| | | <p>Vertical</p> <ul style="list-style-type: none"> • 8 bits Vertical resolution • 2mV/div-5V/div (input to BNC)Vertical sensitivity • 3.5nSRising time(typical on BNC) • Accuracy:± 3% <ul style="list-style-type: none"> • Dual mode <p>Trigger</p> <ul style="list-style-type: none"> • Trigger Source : Ch1, CH2, Line, External • Trigger Modes : Auto, Normal, Single, Edge • Trigger Coupling : AC, DC, LF Reject, HF Reject • Trigger Sensitivity : DC to 100MHz: 200mV • Trigger Level Range : CH1,CH2 : ±8 Division from Center of Screen • USB Interface <p>Power Supply</p> <ul style="list-style-type: none"> • AC230V, 50Hz |
| 3 | ASK/PSK/FSK MODULATION & DEMODULATION KIT | <p>VLSI based design Separate component and operational area Acrylic cover for component safety Modular organization of circuit functions Test points to access signals at every stage of circuit operation Multimedia based interactive e-manual</p> <p>SPECIFICATIONS</p> <p>Data Simulator : Onboard 8-bit variable NRZ-L pattern</p> <p>Crystal Oscillator : 32.768 MHz</p> <p>Data Clock : 256 KHz</p> <p>Data Format : NRZ (L)</p> <p>Onboard Carrier Sine Waves : 1MHz (0°), 1MHz (180°), 500 KHz (0°)</p> <p>Carrier Modulation : ASK, FSK, PSK</p> <p>Carrier Demodulation : ASK, FSK, PSK</p> <p>Intermediate Signal : During demodulation</p> <p>Inter Connection : 2 mm banana socket</p> <p>Power Supply : +12V, -12V, +5V, GND</p> <p>Switch Banks : 1</p> <p>Reset Switch : 1</p> <p>Test Points : 17</p> |
| 4 | PAM TIME DIVISION MULTIPLEXING/ DEMULTIPLEXING KIT | <p>FEATURES:</p> <ul style="list-style-type: none"> • Separate component and operational area • Acrylic cover for component safety • Modular organization of circuit functions • Test points to access signals at every stage of circuit operation • Multimedia based interactive e-manual <p>SPECIFICATIONS:</p> <p>On-board signals</p> |

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| | | <p>Sane waves</p> <ul style="list-style-type: none"> • Frequency : 250Hz, 500Hz, 1 KHz, 2 KHz • Amplitude : 0 ~ 5 V p-p • DC signal : 0 ~ - 5 V <p>Input channels : 4</p> <p>Multiplexing : Time division multiplexing</p> <ul style="list-style-type: none"> • Sampling rate : 32 KHz <p>Modulation : Pulse amplitude modulation</p> <p>Receiver clock</p> <ul style="list-style-type: none"> • Phase lock loop generates receiver clock and channel information <p>Low pass filter</p> <ul style="list-style-type: none"> • 4th order butter worth filters (3.4 KHz cut off) <p>Switch faults</p> <ul style="list-style-type: none"> • 8 switch faults are provided on board to study different effects on circuit <p>Interconnection</p> <ul style="list-style-type: none"> • 2 mm banana socket • Two 4 pin connector for audio input / output kit <p>Test points</p> <ul style="list-style-type: none"> • 39 test points are provided to observe various intermediate signals <p>Power supply</p> <ul style="list-style-type: none"> • GND, +5V, +12V, -12V |
| 5 | DELTA/ ADAPTIVE DELTA MODULATION KIT | <p>This trainer kit should provide following techniques separately:</p> <ul style="list-style-type: none"> • Linear Delta Modulation and Demodulation. • Sigma Delta Modulation and Demodulation. • Adaptive Delta Modulation and demodulation • CVSD Modulation & Demodulation. <p>It should support μ-law Companding</p> <p>This trainer kit should provide Selectable Five different Sampling frequencies.</p> <p>It should consist of four different on board sine wave generator, and Variable D. C. Signal.</p> <p>It should provide the facility for interfacing external signals.</p> <p>It should consist of 2nd and 4th order Low Pass Butterworth Filter</p> <p>Various test and monitoring points should be provided on-board.</p> <p>It should indicate Switch Faults.</p> <p>Provision for external audio signals through Audio Input / Output Kit should be provided.</p> <p>Specifications:</p> <p>On Board Signals:</p> <ul style="list-style-type: none"> • Sine Wave: <ul style="list-style-type: none"> • Frequency : 250Hz, 500Hz, 1KHz, and 2KHz. • Amplitude : 0 to 5Vp-p. • D.C. : 0 to 5V. • Sampling: <ul style="list-style-type: none"> • Clock : 8KHz, 16KHz, 32KHz, 64KHz, and 128KHz. • Duty cycle : 50%. • Modulation Techniques: <ul style="list-style-type: none"> • Delta Modulation, • Sigma Delta Modulation. • Adaptive Delta modulation. • CVSD Modulation. • Compander : μ-law Compressor and Expander. • Voice Communication : Voice Link for above Modulation Techniques |

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| | | <p>using External Audio Input & Output Kit.</p> <ul style="list-style-type: none"> • Low Pass Butter worth Filter: 2nd Order and 4th Order Low Pass butter worth and filter with cut-off frequency of 3.4KHz. • Switch Faults:8 Switch Faults should be provided on board to study different effects on circuit. • Interconnection: <ul style="list-style-type: none"> • 2 mm Banana Socket. • Two 4 Pin Connectors for Audio Input / Output kit. • Test Points: 34 Nos. Test points should be provided to observe various intermediate signals. <ul style="list-style-type: none"> • Power Supply: GND, +5V, +12V, -12V. |
| 6 | <p>PAM/PPM/PWM MODULATION & DEMODULATION KIT</p> | <ul style="list-style-type: none"> • Separate component and operational area • Acrylic cover for component safety • Modular organization of circuit functions • Test points to access signals at every stage of circuit operation • Multimedia based interactive e-manual <p>SPECIFICATIONS:</p> <p>On-board signals</p> <p>Sine wave</p> <ul style="list-style-type: none"> • Variable frequency : 1Hz ~ 30Hz • Amplitude : 0 ~ 2 V p-p • Fixed frequency : 500Hz and 1 KHz • Amplitude : 0 ~ 4 V p-p <p>Sampling</p> <ul style="list-style-type: none"> • Internal sampling clock : 8 KHz and 16 KHz • Duty cycle : 50 % <p>Modulation techniques</p> <ul style="list-style-type: none"> • Pulse amplitude modulation (with variable clock 8KHz,16KHz) • Pulse width modulation (with variable clock 4KHz, 8KHz ,16KHz, 32 KHz) • Pulse position modulation (with variable clock 4KHz, 8KHz, 16KHz, 32KHz) <p>Voice communication</p> <ul style="list-style-type: none"> • Voice link for above modulation techniques using external audio input / output kit (optional) <p>Switch faults</p> <ul style="list-style-type: none"> • 8 switch faults are provided on board to study different effects on circuit <p>Interconnection</p> <ul style="list-style-type: none"> • 2 mm banana socket • Two 4 pin connector for audio input / output kit <p>Test points</p> <ul style="list-style-type: none"> • 29 test points are provided on board to observe intermediate signals <p>Power supply</p> <ul style="list-style-type: none"> • GND, +5V, +12V, -12V |

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