INDIAN INSTITUTE OF TECHNOLOGY GOA

At Goa Engineering College Campus
Farmagudi, Ponda, Goa 403401
E-mail: purchase@iitgoa.ac.in

Enquiry No: IITGOA/2018-19/038 **Date: 11/12/2018**

IIT Goa invites sealed quotations in two bid format for the supply of below mentioned items.

Sl. No.	Description of Item	Qty
1.	**Communication Laboratory Items** (Detailed specification attached)	As per attached list (Annexure – A)

Terms and conditions:

1. Quotation must be valid for at least 60 days.
2. The GSTIN should invariably be mentioned in your offer.
3. Kindly attach a compliance certificate along with the technical quote.
4. Prices should be quoted in Indian Rupees inclusive of taxes and any shipping charges.
5. Delivery should be made within 4 weeks of getting a confirmed order.
6. Payment: Within 30 days after the delivery of the items at IIT GOA.
7. The suppliers shall provide the banking details along with their quote on their letterhead duly signed and stamped.
8. The order will be placed with the supplier having the aggregate lowest quote for the items and not for individual item.
9. IIT Goa reserves the right to accept and/or reject any/all bids without assigning any reason.
10. Quotations shall be submitted in two parts;
    1) **Part – I (Technical)** should contain all the technical details and specification of the product. It should contain unpriced bid along with terms and conditions, compliance certificates any other certificates/details etc. This envelope should be marked as "Technical Bid"
    2) **Part -II (Financial)** The financial bid of the above item should be in a sealed envelope marked as "Financial Bid" and should contain financial terms and conditions.
11. For any clarification, you may kindly contact Dr. R. Neelakandan (e-mail: neelakandan@iitgoa.ac.in) and Stores & Purchase section (e-mail: purchase@iitgoa.ac.in) till 21/12/2018.
12. All sealed quotations must reach to the Assistant Registrar (Stores & Purchase), IIT Goa, at Goa College of Engineering Campus, Farmagudi, Ponda, Goa by 17.00 Hrs on or before 31st December, 2018".

Sd/-

Asst. Registrar (S&P)

Serial No	Item	No. of units
1	Digital Storage Oscilloscope (50MHz, 4 Channel)	15
2	Arbirtrary function generator (25MHz)	15
3	Regulated power supply	15
4	Digital Multimeter	15
5	Bread Board	15
6	DSB/SSB AM Transmitter trainer kit	1
7	DSB/SSB AM Receiver trainer kit	1
8	Frequency Modulation/Demodulation trainer kit	1
9	Armstrong Frequency Modulator & Demodulator trainer kit	1
10	Sampling & Reconstruction trainer kit	1
11	PAM, PPM, PWM and Line trainer kit	1
12	TDM Pulse Amplitude Modulation trainer kit	1
13	TDM-PCM Transmitter and Receiver trainer kit	1
14	PCM, DPCM, CVSD Modulator and Demodulator trainer kit	1
15	Delta, Adaptive Delta and Delta Sigma Modulation/ Demodulation trainer kit	1
16	Data Reformatting & Carrier Demodulation Receiver trainer kit	1
17	QPSK, OQPSK, DQPSK Modulator &Demodulator trainer kit	1
18	MSK, GMSK, FSK, GFSK MSK, GMSK, FSK, GFSK modulator and demodulator with AWGN Channel Noise and BER trainer kit	1
19	OFDM Modulator and Demodulator trainer kit	1
20	Block Code Encoder and decoder trainer kit	1
21	Convolutional Encoder and decoder trainer kit	1
22	*Digital Storage Oscilloscope (100MHz, 4 Channel)	1
23	^^Spectrum Analyzer, 1.5 GHz	1

Specifications

MULTIOUTPUT DC POWER SUPPLY		
TECHNICAL SPECIFICATIONS		
1	Output Voltage	0-32V, 5V, ±12V to ±15v
2	Load Current	0-2A, 5A
3	Ripple and Noise	below 1mV
4	Standard 5 year warranty	
DIGITAL STORAGE OSCILLOSCOPE		
TECHNICAL SPECIFICATIONS		
1	Bandwidth	50MHz
2	Max Sample Rate	2 GSa/s
3	Channels	4
4	USB Connector	
5	MemoryCard	
6	Standard 5 year warranty	
DIGITAL STORAGE OSCILLOSCOPE		
TECHNICAL SPECIFICATIONS		
1	Bandwidth	100MHz
2	Max Sample Rate	2 GSa/s
3	Channels	4
4	USB Connector	
5	MemoryCard	
6	Standard 5 year warranty	
AFG		
TECHNICAL SPECIFICATIONS		
1	Dual-channel, 25MHz bandwidth with 1mVpp to 10Vpp output; 14-bit vertical resolution and 1uHz frequency resolution	
2	50 built-in arbitrary waveforms with continuous, modulation, sweep and burst modes	
3	Dedicated 3.95” TFT LCD display, easy-to-navigate front panel and menu	
4	Supported by TekSmartLab™	

5	Built-in 200MHz, 6-digit frequency counter	
6	Standard 5 year warranty	

DSB/SSB AM Transmitter

TECHNICAL SPECIFICATIONS		
	Audio Output	Amplifier with speaker
	Carrier Frequency	1 MHz (Oscillator controlled)
	Audio Oscillator	With adjustable Amplitude & Frequency (300 Hz - 3.4 KHz)

DSB/SSB AM Receiver

	Audio Output	Amplifier with speaker
	Frequency Range	980 KHz to 2060 KHz
	Receiving media	Telescopic antenna / Cable

Frequency Modulation/Demodulation

	Audio Oscillator	Sine wave (10Vpp adjustable) Frequency (300 Hz - 3.4 KHz)
	(FM MODULATOR) Reactance Modulator Varactor Modulator VCO Based Modulator:	Carrier Frequency - 455 KHz (± 3KHz) Carrier Frequency - 455 KHz (± 2KHz) Carrier Frequency - (IC XR2206 based)
	(FM DEMODULATOR) Detuned Resonant DetectorQuadrature DetectorFoster-Seeley Detector Ratio Detector	

Armstrong Frequency Modulator & Demodulator

	Audio Oscillator	(Message Signal)
	Output	0-10 VPP
	OutputF requency	200Hz - 10 KHz
	Carrier Output Frequency	2KHz- 100 KHz
	Output Amplifier	1 No. with adjustable Gain

Sampling & Reconstruction		
	Crystal Frequency Sampling Frequency On-board Generator Low Pass Filters :	8 Mhz 20, 50, 80, 100, 200 & 400 KHz (switch selectable) Synchronized 1 KHz sine wave(5 V)ppDuty cycle: 0 - 90% in Decade steps (switchselectable)ndth 2 & 4 order Butterworth filt
PAM, PPM, PWM and Line		
	Internal Signal Generator	Direct Digital Synthesizer
	Types of Signal	Sine, Square, Triangle, Arbitrary signals.
	Frequency	500Hz, 1KHz, 2KHz, 3KHz
	External Signal	
	Types of Signal	Sine, Square, Triangle, Arbitrary signals
	Maximum Input Voltage:	3Vpp (Max.) +1.5V DC offset
	Frequency	:500Hz to 3.5KHz
	Sampling/Ramp Frequencies	:1.25KHz, 2.50KHz, 5KHz, 9.80KHz,19.53KHz, 39.06KHz, 78.13KHz
	Crystal Frequency:	20MHz
TDM Pulse Amplitude Modulation		
	Crystal Frequency:	8 MHz
	Sampling Rate	:Four sampling signals 32, 40, 50 & 80 KHz/ channel (switch selectable)
	Sampling Pulse	: With duty cycle variable from 0-90% in decade steps.
TDM-PCM Transmitter and Receiver		
	Crystal Frequency:	8 MHz
	On Board Analog Signal :	500 Hz, 1 KHz, 2 KHz and 4 KHz (Sine wave synchronized to sampling pulse) Adjustable amplitude and separate variable DC level
	Sampling Rate	:Four sampling signals 32, 40, 50 & 80 KHz/ channel (switch selectable)
	Sampling Pulse:	With duty cycle variable from 0-90% in decade steps

PCM, DPCM, CVSD Modulator and Demodulator		
	Internal Signal Generator	Direct Digital Synthesizer
	Types of Signal	Sine, Square, Triangle, Arbitrary signals.
	Frequency	500Hz, 1KHz, 2KHz, 3KHz
	External Signal	
	Types of Signal	Sine, Square, Triangle, Arbitrary signals
	Maximum Input Voltage:	3Vpp (Max.) +1.5V DC offset
	Frequency	:500Hz to 3.5KHz
	Sampling/Ramp Frequencies	:1.25KHz, 2.50KHz, 5KHz, 9.80KHz,19.53KHz, 39.06KHz, 78.13KHz
Delta, Adaptive Delta and Delta Sigma Modulation/ Demodulation		
	Internal Signal Generator	Direct Digital Synthesizer
	Types of Signal	Sine, Square, Triangle, Arbitrary signals.
	Frequency	500Hz, 1KHz, 2KHz, 3KHz
	External Signal	
	Types of Signal	Sine, Square, Triangle, Arbitrary signals
	Maximum Input Voltage:	3Vpp (Max.) +1.5V DC offset
	Frequency	:500Hz to 3.5KHz
	Sampling/Ramp Frequencies	:1.25KHz, 2.50KHz, 5KHz, 9.80KHz,19.53KHz, 39.06KHz, 78.13KHz
QPSK, OQPSK, DQPSK Modulator &Demodulator		
	Crystal Frequency	:8MHz
	Internal Carrier Generator	:Direct Digital Synthesized
	Carrier Signal	:Sine, Cosine
	Data Pattern :	8-Bit , 16-Bit , 32-Bit , 64-Bit
OFDM Modulator and Demodulator		
	Technique :	OFDM with QPSK modulation & Demodulation
		Built in real-time data acquisition system with time domain signal analysis
		Buit in Two channel Additive White Gaussian Noise Generator
		I & Q Channel DACs-10 bit
		Anti aliasing low pass filter with 3dB bandwidth of I & Q channel filter: Sallen Key 6-pole Butterworth.

Block Code Encoder and decoder		
	Crystal Frequency :	11.059 MHz
	Word Length:	4 bits
	Codeword Length	:7 bits code
	Data Format :	NRZ (Not Return to Zero
Convolutional Encoder and decoder		
	Word Length:	4 bits
	Selactable Rate	1/2 and 3/4
	Data Format :	NRZ (Not Return to Zero
^^Spectrum Analyzer, 1.5 GHz		