GOVERNEMNT COLLEGE OF ENGINEERING, KARAD
(An Autonomous Institute of Government of Maharashtra)

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No. CEK/ ENTC/ADC /2019-2020/ 3814   DATE – 12 /11/2019

To,

Subject – Quotation for Digital Communication Trainer System

Dear Sir,

     With reference to above, I have to request you to kindly quote your rates for below mentioned material for **Electronics and Telecommunication Engineering Department** "of this Institute so as to reach this office on or before 23 /11/2019 till 5.00 pm, the details are as given below –

Sr. No.	Description	Qty.
1	**Digital Communication Training System**	04 sets

     Your quotation should be valid for at least 30 days from the date of opening. The quotation should be sent to **"The Principal, Governmnt College of Engineering, Karad"** in sealed envelope superscripted with word **"Quotation of Digital Communication Lab for Electronics and Telecommunication Engineering Department"** due on 12 /11/2019. The Institute does not bind itself to accept or reject the quotation. Please note that if there is any over-writing in the quotation, the said term will not be taken into consideration.

Terms and Conditions:
1. Quotation validity for at least 90 days from the date of opening.
2. Delivery period 4 weeks from date of supply order.
3. Payment 100% after delivery and satisfactory acceptance.
4. Warranty 12 months or more.
5. Total amount will be considered for final call for quotation.

The quotation will be opened on 25 /11/2019 at 03.00 p.m.
Specifications are as enclosed.

Thanking you.

for Principal,
Govt. College of Engineering, Karad.

Detailed Specification of **Digital Communication Trainer System.**

Digital Communication Training System

VLSI based Digital Communication System should be a single board system based on VLSI technology for the study of basic digital communication techniques.
The Board should have various test points for the students to view intermediate signals on an Oscilloscope.
It should be accompanied with a Learning Resource Software consisting of Animations explaining various Digital Modulation Techniques like Sampling, PCM, ASK,FSK,PSK etc and Experiments for the Students to understand the basic concepts of Digital Communication.

Specifications:

Clock & Signal generation section:

- ssine wave:
  - Fixed Frequency : 250Hz, 500Hz, 1 KHz, 2khz
  - Variable Frequency : 1Hz to 30Hz, 0 - 2 Vpp
  - **Sampling clock:**
    - Frequency : 2 KHz, 4 KHz, 8 KHz, 16 KHz, 32 KHz, 64 KHz, 128 KHz
    - Duty Cycle : 10 - 90% Selectable in steps of 10%
    - D.C. Signal : 0 - 5 V
    - Tx Clock Frequency : 240 KHz Fast Mode
  - Tx Frame Frequency : 8 KHz
  - Carrier Sine Waves : 500 KHz (0 deg), 1 MHz (0 deg), 1 MHz(180 deg)
  - Data Pattern : 8 bit variable NRZ-L pattern
  - PRBS generator : 14 bit

Transmitter Section:
- Analog signal sampling: Sample & Hold ,Natural Sampling ,Flat-top Sampling
- 4-Channel Analog Time Division Multiplexing
- Odd, Even Parity & Hamming Code Generator
- Pulse Code Modulation
- Data Encoding NRZ(L), NRZ(M), NRZ(S), Bi-phase (Manchester), Bi-phase (Mark), Bi-phase (Space), URZ, Alternate Mark Inversion (AMI), Unipolar to Bipolar & Bipolar to Unipolar
- ASK, FSK, PSK Modulation
- Delta / Adaptive Delta /Sigma Delta / CVSD Modulation
- PAM / PPM / PWM Modulation
- Audio Preamplifier with microphone interface.

Receiver Section:
- 2nd order and 4th order Low Pass Butterworth Filter
- 4-Channel Time Division De-multiplexing
- Odd, Even Parity & Hamming Code Recovery
- Pulse Code Demodulation
- Data Decoding NRZ(L), NRZ(M), NRZ(S), Biphase (Manchester), Biphase (Mark),Biphase (Space), URZ.
- Alternate Mark Inversion (AMI)
- ASK, FSK, PSK Demodulation
- Delta / Adaptive Delta / Sigma Delta / CVSD Demodulation
- PAM / PPM / PWM Demodulation
- Audio Amplifier with headphone / speaker interface