

BID INSTRUCTIONS:

- 01.** Quotations will have to be submitted in TWO Bids. The address of the firm submitting the quotation and the officer to whom the quotation is addressed must appear distinctly on sealed covers. Further, on sealed cover, the following are to be written:
QUOTATION FOR SUPPLY & INSTALLATION OF MACHINES, TOOLS & EQUIPMENTS ON TURNKEY BASIS TO ASSAM ENGINEERING COLLEGE UNDER NEQIP PROGRAM .
NIQ REF NO. AEC / NEQIP /2017-18/003/E&T/ , Dt.23-03-17
- 02 Submission of Compliance Certificate:** Duly filled and signed Compliance Certificates (as per formats at **Annexure-I(A & B)** are must with the Technical bid.
- 03. Bid not transferable:** The bid documents are not transferable and the seal and signature of the authorized official of the firm's must appear on all the papers and envelopes submitted.

QUALIFICATION REQUIREMENTS

1. The Bidder should be a firm of reputation having sufficient expertise and experience in the subject tender with sound warranty / service support capability and authorization from manufacturers.
2. The Bidder has to quote for all the items in the NIT. Bidders who do not quote for all the items are subject to be disqualified.
3. The Bidder should have experience of executing at least One Purchase Order of equipments/machines etc of value of Rupee Twenty Five Lacs (INR 25, 00,000.00) or higher within the last 3 Years from any IIT /NITs/ Govt. Institutions of North East Region of India.
4. Free trainers' training on the supplied machines & equipments will have to be arranged by the suppliers/ manufacturers through concerned experts.

NIT TERMS & CONDITIONS:

01. **Rates:** Rates quoted in the **Price Bid** should be on **DOOR DELIVERY AEC, Guwahati basis, including installation and commissioning if necessary**, as per details below:

Sl. No.	Particulars	Rate
I	Basic Price (INR ,per unit)	
	Total(INR)	
	Taxes(pl. give break up)	
	Grand Total for the item up to AEC Premises including installation and commissioning in all respect.	

Bidders shall indicate their rates in clear/visible figures as well as in words and shall not alter/overwrite/make cutting in the quotation. In case of a mismatch, the rates written in words will prevail.

02. **Validity of Quotation:** Quoted rates must be valid for **90 days** from the date of quotation.
03. **Warranty:** The quoted equipment and components must be warranted for a minimum of one Year or period specified against the item.
04. **Literature a must:** All the quotations must be supported by the printed technical leaflet/literature and the specifications mentioned in the quotation must be reflected/ supported by such printed technical leaflet/literature. The model and specifications quoted should **invariably be highlighted** in the leaflet/literature for easy reference.
05. **After Sales Service:** Vendors should clearly state the available nearest after sales service facilities in the region, without which their offers will be rejected.
06. **Dealership Certificate:** Dealers or Agents quoting on behalf of Manufacturer must enclose valid dealership certificate for the Machines & Furniture's.
07. **Earnest Money:**
Refundable earnest money deposit (EMD) of Rs 50,000.00 (Rupees Fifty Thousand only) through demand draft drawn in favour of “The Principal, Assam, Engineering College”, payable at Guwahati, will have to accompany the technical Bid. The EMD of unsuccessful bidders shall be returned after award of contract. EMD of the successful bidder will be released on submission of the Performance. Offers received without Earnest Money or valid Certificate shall be summarily rejected.

08. **Performance Bank Guarantee (PBG):** In case of items with order value of Rupees five lakhs (INR 5,00,000/-) and above, the successful bidder shall furnish an unconditional PBG (as per format at **Annexure II**) for 5% of the Purchase Order value from a scheduled Bank of India, after receiving the purchase order. Where the PBG is obtained by a foreign bank, it shall be got confirmed by a Schedule Indian bank and shall be governed by Indian Laws and be subject to the jurisdiction of courts at Guwahati. The PBG shall guarantee that,

- (a) The Vendor guarantees satisfactory operation of the Equipment & components against poor workmanship, bad quality of materials used, faulty designs and poor performance.
- (b) The Vendor shall, at his own cost, rectify the defects/replace the items supplied, for defects identified during the period of guarantee.
- (c) This guarantee shall be operative from the date of installation till 60 days after the warranty period.

09. **Delivery:**

- a) **Time Limit:** Maximum within 6 Weeks from the date of issue of this supply order.
- b) **Safe Delivery:** All aspects of safe delivery shall be the exclusive responsibility of the vendor. At the destination site, the package will be opened only in the presence of AEC user/representative and vendor's representative. The intact condition of the package and the seal/indicators for not being tampered with shall form the basis for certifying the receipt in good condition.
- c) **Insurance:** The supplier is to establish 'All Risk Transit Insurance' coverage till door delivery at AEC, Guwahati, Assam.
- d) **Part Delivery:** Acceptance of part delivery shall be a prerogative of the institute.

10. **Conditional tenders not acceptable:** All the terms and conditions mentioned herein must be strictly adhered to by all the vendors. Conditional tenders shall not be accepted on any ground and shall be rejected straightway. Conditions mentioned in the tender bids submitted by vendors will not be binding on Assam Engineering College, Guwahati.

11. **Road Permit:** Assam Engineering College will not provide any Road Permit to the Vendors.

12. **VAT deduction at source:** In case of suppliers within Assam, VAT deduction at source, as per order/ notifications of the Govt. of Assam will be applicable.

13. **Late and delayed tender:** Late and delayed tender will not be considered. In case any unscheduled holiday occurs on the prescribed closing/opening date the next working day shall be the prescribed date of closing/opening.

14. **Payment:**

(a) 100% payment within 30(thirty) days from date of delivery, installation, commissioning and acceptance.

15. **Enquiry during the course of evaluation not allowed:** No enquiry from the bidder(s) shall be entertained during the course of evaluation of the tender till final decision is conveyed to the successful bidder(s). However, the Purchase Committee or its authorized representative may make enquiries/seek clarification from the bidders. In such a case, the bidder must extend full co-operation. The bidders may also be asked to arrange demonstration of the offered items, in a short period of notice.

16. The acceptance of the quotation will rest solely with the Principal, AEC, who in the interest of the Institute is not bound to accept the lowest quotation and reserves the right to himself to reject or partially accept any or all the quotations received without assigning any reasons. The number of items to be included in the supply order will be also rest solely with the principal, AEC.

17. **Force Majeure:**

If the performance of the obligation of either party is rendered commercially impossible by any of the events hereafter mentioned that party shall be under no obligation to perform the agreement under order after giving notice of 15 days from the date of such an event in writing to the other party, and the events referred to are as follows:

- i. Any law, statute or ordinance, order action or regulations of the Government of India,
- ii. Any kind of natural disaster, and
- iii. Strikes, acts of the Public enemy, war, insurrections, riots, lockouts, sabotage.

18. **Applicable Law:**

- (a) The contract shall be governed by the laws and procedures established by Govt. of India and subject to exclusive jurisdiction of Competent Court and Forum in Guwahati/Assam.
- (b) Any dispute arising out of this purchase shall be referred to The Principal, Assam Engineering College, Guwahati, Assam and if either of the parties hereto is dissatisfied with the decision, the dispute shall be referred to the decision of an arbitrator, who should be acceptable to both the parties, to be appointed by the Head of the Institute. The decision of such arbitrator shall be final and binding on both the parties.

**Principal,
Assam engineering College,
Guwahati 781013**

Encl.: ANNEXURE-I, ANNEXURE-II, ANNEXURE-III & ANNEXURE-IV

Annexure -I

**A. COMPLIANCE CERTIFICATE FOR NIT TERMS
(To be enclosed in the Technical bid)**

Sl. No.	NIT Terms and Conditions	Yes/No
01	Rate quoted as per instruction	
02	Validity of quoted rate for 90 days agreed	
03	EMD submitted (appropriate certificate enclosed)	
04	PBG term agreed	
05	Payment term agreed	
06	Delivery terms agreed	
07	Warranty period agreed	
08	Literature: Printed Literature provided	
09	Dealership / distributorship certificate (in case of dealers/agents) provided	
10	Sales Service: address of after Sales Service centre in India (for imported goods)/ in the region provided	
11	Applicable law terms agreed	

Signature with Seal:.....

Vendor: M/s.....

**B. COMPLIANCE CERTIFICATE FOR SPECIFICATIONS
(One for each item must to be enclosed in the Technical bid)**

Item Sl. No.	Specifications as per Annexure-IV	Quoted Item Specs.*	Complied (Yes/No)

Signature with Seal:.....

Vendor: M/s.....

*** Vendor must quote the parameter specification of the quoted product in this column and not just copy the specification from the tender call document. Failure to do so will lead to rejection of the tender.**

Annexure -II
PERFORMANCE BANK GUARANTEE

To:

The Principal , Assam Engineering College,
Guwahati, Assam

WHEREAS (Name of Supplier)
hereinafter called "the Supplier" has undertaken, in pursuance of Contract No.....
dated,..... 20... to supply..... (Description of Goods
and Services) hereinafter called "the order".

AND WHEREAS it has been stipulated by you in the said order that the Supplier shall furnish
you with a Bank Guarantee by a recognized bank for the sum specified therein as security for
compliance with the Supplier's performance obligations in accordance with the order.

AND WHEREAS we have agreed to give the Supplier a Guarantee:

THEREFORE WE hereby affirm that we are Guarantors and responsible to you, on behalf of
the Supplier, up to a total of (Amount of the
Guarantee in Words and Figures) and we undertake to pay you, upon your first written demand
declaring the Supplier to be in default under the order and without cavil or argument, any sum or
sums within the limit of (Amount of Guarantee) as aforesaid, without your
needing to prove or to show grounds or reasons for your demand or the sum specified therein.

This guarantee is valid until theday of.....20.....

Signature and Seal of Guarantors

.....
.....
.....

Date.....20....

Address:.....

.....
.....

All correspondence with reference to this guarantee shall be made at the following address:

The Principal , Assam Engineering College, Guwahati, Assam

Annexure -III

MANUFACTURERS' AUTHORIZATION FORM

No.

Dated _____

The Principal , Assam Engineering College,
Guwahati, Assam

Dear Sir,

We..... who are established and
reputable
manufacturers ofhaving
factories at-----

(address of factory) do hereby certify
that.....

.....(Name of the Authorized Dealer)is our authorized dealer to quote
against your tender enquiry no

.....
.. ,Last Date of Submission is:

Yours faithfully,
(Name)
(Name of manufacturers)

	<p>5. Meter Resolution : 10 mV (0–20 V), 100 mV (> 20 V) Current 1 mA</p> <p>6. Ripple and Noise : (20 Hz to 20 MHz)</p> <p>7. Normal mode voltage : < 350 μVrms, < 1.5 mVpp</p> <p>8. Transient Response time : < 50 μsec following a change in output current from full load to half load for output to recover within</p> <p>9. Meter Accuracy : $\pm 0.5\% + 2$ counts at 25 °C ± 5 °C</p>	
04.	<p>Digital Multimeter 3 $\frac{3}{4}$ Auto Range Digital Multimeter True RMS Large LCD with backlight CAT-IV Metallic screen board with stronger antimagnetic and anti-interferential function. Full function protection, anti-high voltage circuit design. DC Voltage : 400mV/4V/40V/400V/1000V Accuracy: $\pm(0.5\%+4)$ AC Voltage : 400mV/4V/40V/400V/750V Accuracy: $\pm(0.8\%+10)$ DC Current : 400uA/4000uA/40mA/400mA/10A Accuracy: $\pm(1\%+10)$ AC Current : 400uA/4000uA/40mA/400mA/10A Accuracy: $\pm(1.5\%+10)$ Resistance : 400Ω/4kΩ/40kΩ/400kΩ/4MΩ/40MΩ Accuracy: $\pm(0.8\%+4)$ Capacitance : 4nF/40nF/400nF/4uF/40uF/200uF Accuracy: $\pm(2.5\%+20)$ Frequency : 100/1000/10k/100k/1M/30MHz Accuracy: $\pm(0.5\%+10)$ Celsius : -20 to 1000 \square Accuracy: $\pm(1.0\%+5)$</p>	20
05.	<p>Altys Spartan6 FPGA Board FPGA : XC6SLX45-3CSG324C I/O Interfaces</p> <ul style="list-style-type: none"> • USB-UART for serial communication • One 10/100/1000 Ethernet • USB port for Configuration and data • 2 HDMI In • 2 HDMI Out • AC97 CODEC • Audio Line-In, Line-Out, headphone, microphone • USB HID Host for mice, keyboards and memory sticks <p>Memory</p> <ul style="list-style-type: none"> • 128 MByte DDR2 • 16 Mbyte SPI Flash (x4) <p>Displays</p> <ul style="list-style-type: none"> • None Switches and LEDs • 8 Slide switches • 8 LEDs 	4

	<ul style="list-style-type: none"> • 1 RESET button • 5 Push-buttons <p>Clocks</p> <ul style="list-style-type: none"> • One 100 MHz oscillator <p>Expansion ports</p> <ul style="list-style-type: none"> • 1 Pmod port • 40 pin High-Speed Expansion port 	
06.	<p>Communication Systems Lab- Communication systems Laboratory with hardware and software platform to teach the concepts of communication systems. The hardware is consist of a Digital to Analog Converter (DAC) for transmission and an Analog to Digital Converter (ADC) for reception. Transmitter & receiver is connected through patch cord to form a complete communication system. Teaches the communication system concepts from fundamental to advanced level Interface with MATLAB through Hi-Speed USB 2.0. Experiments is implemented using MATLAB Source codes is available to understand the implementation Codes is modified by the students for trying out other options Outputs should be monitored using oscilloscopes Single training kit to cover wide range of communication concepts Parameters for different experiments is varied at ease using MATLAB is Bring the flexibility, cost efficiency and power to drive communication study forward Reusability, re-configurability and enhanced functionality Performance consistency</p> <p>Experiments Topics Covered by a single unit- Signal sampling and reconstruction Effect of under sampling, nyquist sampling and over sampling on the signal Amplitude modulation and demodulation technique Double side band Total carrier, Suppressed carrier Single side band suppressed carrier Frequency modulation and demodulation technique Varieties of modulation / demodulation techniques Study of Frequency Division multiplexing Delta, Adaptive Delta modulation and demodulation Effect of various step sizes on the modulation and demodulation technique Study of Amplitude Shift Keying Study of Frequency Shift Keying Study of Binary Phase Shift Keying Study of Line coding and decoding techniques Unipolar, Polar and Bi-polar line coding methods BER comparison of different line coding techniques Study of Error control coding and decoding One bit error correction and two bit error detection technique Study of Time division multiplexing</p>	03
07.	<p>1 channel Sampling & Reconstruction, 4 Channel TDM/PAM & PPM, PWM, PFM Expt. Panel Crystal Freq.-10 MHz Switched faults : - 4 Nos. 1 channel Sampling/ Reconstruction & 4 Channel TDM/PAM & demodulation: -</p>	02

	<p>a) Modulator : Analog i/p channel: - 4 Nos, 10 Vpp, Bipolar. Settable Sampling Freq. (1of 7) : 64 / 32 / 16 / 8 / 4 / 2 / 1 KHz With Settable Duty Cycle 10-90 % in decade steps.</p> <p>b) De-Modulator : Clock Regeneration using PLL, LPF, 1/2/3 Wire Communications PWM / PPM</p> <p>a) Modulator : I/P freq Audio range (Sine) @ 0-8 Vpp , Carrier Freq - 64KHz (TRG) @ 8 Vpp O/P TTL.</p> <p>b) De-Modulator : LPF (MU), PPM is converter into PWM then Demodulated. PFM</p> <p>a) Modulator : Center Freq (64KHz / TTL) from Function Generator (MU) is FM modulated by audio signal generating PFM pulse train.</p> <p>b) De-Modulator : PLLDetector followed by LPF from MU.</p> <p>List of Experiments: Single channel PAM Sampling [1CH Signal Sampling & Reconstruction (1 CH SSRC)] i) Natural Sampling, ii) Flat Top Sampling (Sample Hold), Multichannel [4 CH] PAM Sampling, multiplexing of data over single wire & demultiplexing of data at receiver to reconstruct 4 channels by various method 3 \ 2 \ 1 wires [mode 1, 2, 3 respectively., PWM \ PFM \ PPM Pulse modulation & demodulation as a methods of digital communication</p>	
08.	<p>2 channel Pulse Code Modulation [PCM]/ Demodulation with frame and bit Error detection and Synchronization & Correction Experiment Panel</p> <p>Technical specifications:</p> <ul style="list-style-type: none"> • Switched faults: - 4 Nos. + 2 No Switches for bit error simulation • 1 & 2 Ch TDM / PCM Mod - Demod: - 1/2/3 Wire Communications <p>a) Modulator : Analog i/p : - 2 Nos, 10 Vpp , onboard Two adjustable variable DC source, Sampling Freq. 16KHz per Channel for Fast mode & 0.106 Hz per Channel for Slow Mode, use of PRBS to generate frame marker useful to establish syc. in receiver during 1/2 wire communications.</p> <p>b) De-Modulator :Synchronization is established by using Pseudo Random Binary Sequence, Clock Regeneration using PLL.</p> <p>c) Frame & bit Error Detection :Use of PRBS for synchronization. Selectable Even, Odd parity (Binary cyclic) & Hamming (Linear Block code)</p> <p>d) Error Correction :Single or Double Data bit error correction using Hamming code.</p> <ul style="list-style-type: none"> • Voice communication using wired PCM. • Voice communication using Fiber optics & PCM. <p>List of experiments (8) : Single channel Pulse Code Modulation & Demodulation by various method 3/2/1 wires [mode 1, 2, 3 respectively], Two channel TDM, PCM Modulation & Demodulation by various method 3/2/1 wires [mode 1, 2, 3 respectively],Use of PRBS for frame synchronization by adding a Bit (Marker) in 2 / 1 Wire (Mode 2, 3 respectively), Study of Error Code Check such as Even Parity, Odd Parity and 1 bit / 2 bit error simulation & correction by Hamming Code, Voice and Radio communication using PCM, Study of ADC / DAC [CODEC] by observing on Leds & by applying DC Levels at single or both i/ps, Switched Faults, Study of eye diagram, PC Communication using PCM.</p>	02
09.	<p>DPCM/ADPCM Modulation Trainer</p> <p>Operation mode : Switch selectable - DPCM OR ADPCM</p> <p>Number of data bits in data frame switch selectable 3/4/5 bits.</p> <p>On-board Clock source @ 660 KHz.</p> <p>a) Modulator Function Blocks : - 1 Analog Input- 10Vpp & Audio upto 2KHz, Onboard adjustable DC signal source, ADC Sampling Frequency @8.5 KHz, 7 Bit Comparator, Subtractor, Signed Adder, Parallel to Serial Converter.</p> <p>b) Demodulator Function Blocks : - 1 Analog Output- 10Vpp & Audio upto 2KHz, Demodulated DPCM / ADPCM signal reconstructed using 7- bit DAC followed by passing through 2P/4P Butterworth filter on</p>	02

	<p>NGLPF Panel (MU), Serial to Parallel Converter, 7 Bit Signed Adder</p> <p>List of experiments</p> <p>DPCM - Modulation - Demodulation, ADPCM - Modulation - Demodulation, Slope Overload Error, Voice Communication using DPCM / ADPCM, Study of Eye Diagram.</p>	
10.	<p>Data formatting trainer kit</p> <p>Data Formatting and Reformatting Option NRZ (L), NRZ (M), Polar RZ (AMI) & NRZ, Bipolar RZ & NRZ, Bi-phase Manchester, Bi-phase Mark, Differential Encoded Dibit (For use with QPSK).] -8 Nos. of encoders & 3 Nos. of bit decoders & 1 No. of dibit decoders.</p> <p>Bi phase Clock Recovery - By using Phase Lock Loop (PLL) with center frequency 250KHz & 32KHz selectable</p> <p>List of Experiments:</p> <p>Study of RZ, NRZ-L [Non Return To Zero – Level], NRZ-M [Non Return to Zero – Mark], Bi phase Mark, NRZ S, Bi phase Manchester encoders & decoders) Study of RZ – AMI [Return To Zero – Alternate Mark Inversion] encoder & decoder, Study of differential DIBIT [MSB / LSB] Encoder & Decoder</p>	01
11.	<p>COMMUNICATION SYSTEM TRAINER</p> <p>Technical specifications:</p> <p>Built in DC Power Supply : 5V/1A, $\pm 12V/500mA$, 0 to -15V DC (Variable) / 100mA, 0 to 15V DC (Variable)/100mA.</p> <p>WAVEFORM Generator :</p> <ol style="list-style-type: none"> Carrier Generator: <ul style="list-style-type: none"> Waveform : SINE / TRG / TTL / CMOS (settable) Output Frequency : 1 Hz to 1 MHz Output Voltage : 0-20 Vpp Controls : Frequency & Amplitude control pots Modulation : AM (std) -I/P volt - $\pm 5V$, 0V-No modulation AM (DSBSC)-I/P volt. 0-9.8 Vpp, o/p volt. 0- 2.7, FM I/P volt. 400mV ($\pm 50\%$ modulation), ASK- I/P upto 500Hz, $\pm 5V$ Square wave, FSK-I/P upto 500Hz, $\pm 4.5V$ Square wave. Audio Oscillator: <ul style="list-style-type: none"> Waveform : SINE / TRG / SQUARE Output Frequency : 50 Hz to 5KHz Output Voltage : Sine 0-2Vpp, Sq. 0-9 Vpp, TRG. 0-3Vpp Controls : Freq & Amplitude control pots. Synchronized Sine Wave Generator : <ul style="list-style-type: none"> Input : 32 KHz TTL I/P to Generate 4 nos. of sync. sine O/P Waveform : SINE Output Frequency : 250 / 500 / 1000 / 2000 Hz Output Voltage : 0-10 Vpp Controls : Amplitude control pot Mic with Pre-Amp. Hand held Electret / dynamic microphone with preamplifier for audio range. Audio Amplifier : Variable Gain upto 20 for Audio range, Built in Loudspeaker - 8 ohm/500mW / earphone. Pink Noise Gen. : Frequency response of filter for audio range. Buffer/AC amplifier : NIV gain amplifier 2 Nos, Gain- 0-20, For Non sinusoidal Signal Generator cum INV buffer. BNC TO Banana Converter : Converts 1 BNC Socket to 2 Banana Sockets (4mm) & Vice Versa. Butter Worth Filter [LPF]: 4 Nos - 2 pole/4 pole butter worth filter cutoff freq 3.4 KHz Audio range. Pseudo Random Binary Sequence generator : Switch settable for on/off fix 15 bit PRBS Generator, 	05

	<p>will also function as input digital data stream generator.</p> <p>Wireless Communication :</p> <p>1a. FM Transmitter (Transistorized) :</p> <ul style="list-style-type: none"> • Carrier Tunable from 88 MHz to 108 MHz with built in FM [VCD] • Modulating Signal : Amplitude - 5Vpp, Freq. - Audio Range • Tx Power O/P : 50 to 100mW • 1b. FM Receiver : External 5 BS5 to connect to antenna, 2nd IF Input, 2nd IF Output, speaker & Audio amplifier, AM/FM Select switch, L/S impedance 8 ohm / 0.5 W. • Controls (Manually) : Settable 88 to 108 MHz. • Antenna / Transmission: Telescopic antenna [3 branch antenna] optional. <p>2a. AM Transmitter (Transistorized):</p> <ul style="list-style-type: none"> • Carrier : 500KHz to 1.5MHz • Modulating Signal: Amplitude - 5Vpp, Freq.- Audio Range. • Tx Power Output : 50 to 100mW. <p>2b. AM Receiver : External 5 BS5 to connect to antenna, 2nd IF Input, 2nd IF O/P, speaker & Audio amplifier, AM/FM Select switch, L/S impedance 8 ohm / 0.5 W.</p> <ul style="list-style-type: none"> • Controls (Manually) : Gain control settable from 0 to 4.5V. <p>3a. Fibre Optics Transmitter :</p> <ul style="list-style-type: none"> • Data Input Bandwidth : 500KHz to 1.5MHz. • Modulating Signal : Amplitude - 5Vpp, Freq.- Audio Range. • Tx Power Output : 50 to 100mW. • 3b. FO Receiver : Detector (tr=8ms) separate BS5 socket for digital, AC coupled & TTL o/ps. • Controls (Manually) : Transmitter bias control. • Antenna / Transmission: 1m plastic fiber cable, CRT-1.492, NA- 0.5, λ- 660nm, step index, terminated with SMA connector. <p>Mechanical Dimensions :</p> <p>(A) Master Unit : 460mm(W), 160mm(H), 350mm(D) Net weight : 5 Kg. Gross Wt.: 7 Kg.</p> <p>(B) Panel : 215mm(W), 165mm(H), 40mm(D) Net weight : 700 gm approx.</p> <p>(C) Operating Voltage : 220/240Vac switch settable \pm10%, 50Hz/35VA.</p> <p>List of Experiment on Master Unit (9):</p> <p>1) Voice link using mic & LS amplifier, 2) Study of AM Xmitter / Receiver, 3) Study of FM Xmitter / Receiver, 4) Band determination of PLL as FM Detector 5) A) PLL as FM Detector B) FSK (Frequency Shift Keying) Mod / Demod [Wired] C) FSK (Frequency Shift Keying) Mod / Demod [Through FO] 6) A) Diode as AM Detector B) ASK (Amplitude Shift Keying) Mod / Demod [Wired] C) ASK (Amplitude Shift Keying) Mod / Demod [Through FO]</p> <p>7) Fiber Optics Transmitter / Receiver 7.1) Analog Bandwidth. 7.2) Digital Bandwidth. 7.3) Voice Communication using mic, speaker & Fiber optics 7.4) Listening to AM/FM Radio through Fiber Optics link</p> <p>8) Pseudo Random Binary Sequence Generator [PRBS] 9) Study of active filters, Noise generation & elimination. A) Study of Pink Noise Generator B) Study of Signal To Noise Ratio of an Amplifier C) Study of active 2nd & 4th order Low Pass Filter D) Study of Frequency response of HPF / AC Amplifier [3H] E) Study of Frequency response of HPF / AC Amplifier [1.6K].</p>	
12.	<p>8051/AVR Microcontroller Lab</p> <p>Should consist of:</p> <p>a) Educational Practice Board for 8051 (10 units)</p> <p>- Low cost 8051 micro controller board</p>	01 Set

- General purpose study card to learn, test and apply 8051
- On-board In-circuit programming facility eliminates the need of a separate programmer.
- 64 K on chip program memory.
- On board power on/off switch
- On board reset switch
- On board DB9 connector for program downloading and UART communication
- Availability of all 32 ports for interfacing and application development.
- Low cost & ideal for project development work.
- CDROM with required technical information and programming utilities.

b) Educational Practice Board for AVR ATmega32 (10 Units)

- High-performance, Low-power AVR 8-bit Microcontroller board featuring ATmega32 MCU
- Flash programming using on board USB facility eliminating the need of a separate programmer
- Dual power options: DC input and USB
- 32 K on chip Flash program memory
- Two 20 pin connector for GPIO interfacing and one 20 pin header for 7 channels 10 bit ADC
- External interrupt connector
- On-board I2C, SPI, USB, UART connectors
- Low cost & ideal for project development work
- Supplied in a wooden box packing

c) 8051 IDE (10 Licenses)

ASK-25 All-in-one GPIO board with following interface (10 units):

- LED
- Seven Segment LED
- LCD
- 2X2 Matrix keyboard
- Keys
- I2C EEPROM
- SPI EEPROM
- Stepper Motor Interface
- DC Motor Interface
- Relay

One set of workbook for 8051 and AVR