



*"Towards Global Technological Excellence"*  
**GOVERNMENT COLLEGE OF ENGINEERING, AMRAVATI**  
(An Autonomous Institute of Government of Maharashtra)  
Near Kathora Naka, Amravati, (M. S.), India, Pin: 444 604



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Website: [www.gcoea.ac.in](http://www.gcoea.ac.in) E-mail: [principal.gcoeamravati@dtmaharashtra.gov.in](mailto:principal.gcoeamravati@dtmaharashtra.gov.in)

RE-TENDER NOTICE NO.: GCoEA/E&Tc/Trainer kits/2024-25/197 Dt.: 08/01/2025

### INVITATION OF Re - e-Tender for Procurement of Trainer kits

The Principal, Government College of Engineering, Amravati (GCoEA) invites sealed Re - e-tender for Procurement of '**Trainer kits**' for Department of Electronics Engineering of Government College of Engineering, Amravati.

For the procurement process, the bidders shall follow the procedure described on e-Tendering website (<https://mahatenders.gov.in>). For further details about the e-Tendering procedure and its requirements, refer manual available on the e-Tendering website.

#### **Tender Form price payment mode: (Non-refundable)**


The tender document will be available on e-Tendering website and may be downloaded by the interested bidders. The bidders are required to pay online tender fee of Rs. 3,000/- only through Net banking without which bid shall be considered incomplete & non responsive and shall not be considered. The tender fee shall be non-refundable in any case.

Sr. No.	Item	Particulars
1	Tender Reference	GCoEA/E&Tc/Trainer kits/2024-25/197 Dt.: 8/01/2025
2	Name of the Item	<b>'Trainer Kits'</b>
2	Tender Fee	Rs. 3,000/- (Rs. Three Thousand only, non-refundable)
4	EMD	Rs.15,000/- (Rs. Fifteen Thousand Only, refundable post completion of Final Acceptance by the purchaser)
3	Address of Communication	The Principal, Government College of Engineering, Near Kathora Naka, Amravati – 444 604
4	Telephone Number	(0721) 2660360, 2662889
5	Email Address	<a href="mailto:principal@gcoea.ac.in">principal@gcoea.ac.in</a>
6	e-Tendering Website	<a href="https://mahatenders.gov.in">https://mahatenders.gov.in</a>
7	Tender shall remain valid till	120 days from the date of submission of tender

The purchaser reserves the right to accept or reject or cancel any tender or relax any part of the tender offer without assigning any reason thereof.

All the work, under the scope of this tender, will be on rate discovered through the tender.

(Purchaser)

  
**Dr. A. M. Mahalle**  
Principal  
Government College of Engineering  
Amravati- 444 604, Maharashtra (India)

## 2. IMPORTANT DATES

The important dates for the tender are mentioned below, the bidders are requested to take a note of them.

Event	Target Date & Time
Start date and time of tender publication	09/01/2025 @11.00 a.m.
Start date and time of document download	09/01/2025 @11.00 a.m.
Start date and time of bid submission	09/01/2025 @11.00 a.m.
Pre-Bid meeting	13/01/2025 @11.00 a.m.
End date and time of bid submission	16/01/2025 @05:00 p.m.
Date and time of Technical bid opening	17/01/2025 @11:00 a.m.
Date and time of commercial bid opening	To be informed later

### ***Important Note:***

***Any organization debarred / black listed by Central / State government in India, at the time of submission of the bid, shall not be allowed to participate in the tender.***



**Important Instructions to Bidders for submission of Offer against Tender Enquiry Published by Government College of Engineering, Amravati**

**Instructions for submission of Tender and its accompaniments:**

**1) SUBMISSION OF BIDS**

It is proposed to have a Two Cover System for this tender:

- (1) Technical Bid – Cover should contain Technical bid documents mentioned in Part D, of this tender notice
- (2) Commercial Bid – Cover should contain price quote.
- 2) The documents required to be submitted with tender should be STRICTLY in the order as given below in part A, otherwise the tender may get rejected. Also the documents should be serially numbered and initialed. Cutting/overwriting, if any, should be countersigned. **Each page of the tender should be duly signed and stamped by the authorized signatory.**
- 3) The offer should be submitted in the prescribed form. All the documents are to be uploaded in PDF format only.
- 4) Hypothetical and/or conditional bids will not be entertained.
- 5) Rates should be quoted in India Rupees (INR) only as the comparison will be done on the basis of INR prices only. No assumptions are to be made regarding concession certificates like customs duty exemption etc. All inclusive prices in INR must be written on priced tender form.
- 6) In commercial bid, all the items/sub-items like taxes, duties, charges, etc. should be clearly mentioned. Later, no claims will be entertained from the bidders regarding this and also the decision of the Principal, GCoE, Amravati in this regard shall be final and binding on the bidders. It is in the interest of bidders to give all the details of rates. ***The BID MUST contain:***  
***a) Technical Bid: mentioning the eligibility of the bidder for the said tender work. b) Commercial Bid: quoting prices of the products. Please quote price inclusive of all taxes.***
- 7) Tenders will only be opened on the date specified in Tender Notice. The bidders or their authorized representatives may remain present during the opening of the Tenders. The offers of the bidders qualifying technically are only eligible for opening of Commercial Bid. It will be opened in the presence of bidder or their authorized representative (if any present).
- 8) PAYMENT TERMS: - 100% Payment upon satisfactory installation and proper performance of the product. This shall be evaluated by experts at GCoEA. Any deviation in satisfactory installation and proper performance of the product shall lead to withholding the payment.
- 9) **Onsite Warranty and Maintenance:** (Mandatory)

Description	Compliance
Onsite Warranty	One year from the date of installation and signing of Final Acceptance by the Principal, GCoE, Amravati

The warranty period for the systems shall be taken into account as above. Onsite Warranty and Maintenance should be from the date of completion of supply of products, its successful installation/commissioning and acceptance by Purchaser, including free spare parts, kits etc.

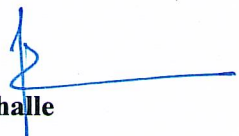
- 10) Details of specifications of the product, relevant information and other technical features shall be quoted. The offer should be firm, inclusive of all taxes. Escalation in price will not be allowed during the entire period of the contract.
- 11) The Principal, Government College of Engineering, Amravati does not bind himself to accept the lowest or any other tender and reserves to itself the authority to reject any or all the



tenders received without the assignment of any reason. Any tender in which any of the prescribed conditions is not fulfilled by the bidder shall be summarily rejected.

- 12) The Commercial bids of the bidders who do not conform to the eligibility criteria as mentioned in Para 14 below will not be opened.
- 13) The bidder should have experience of at-least three years of supply, installation and commissioning of '**Trainer kits**' to any reputed organization. Purchase Order and Letter from the organization where implementation has been carried out is to be submitted on the letter head of the issuing organization in the technical bid envelop.
- 14) The technical qualification of the product offered should comply with the technical specifications as detailed in Technical Specifications. GCoEA has the sole discretion to accept or reject tenders based on deviations, if any, from the technical specifications. Further, GCoEA reserves the full right to judge/consider the technical specifications offered by the service provider in accordance to the requirements of the institute, to annul the complete bidding process and reject all bids at any time prior to award of contract, without thereby incurring any liability to the affected Bidder or Bidders or any obligation to inform the affected bidder or bidders of the grounds for GCoEA's action. The choice of acceptance of technical specifications shall solely remain with the purchaser.
- 15) The supply and installation should start as per the date mentioned in the supply order. If service is not started within the mentioned period then penalty charges of 1% of the cost mentioned in the supply order per week will be applied on the service provider subjected to maximum 5% penalty charges of the cost mentioned in the supply order.
- 16) **The Principal, Government College of Engineering, Amravati does not bind himself to accept the lowest or any tender that does not fulfill the technical and other service requirements of the present system at GCoEA and specifications/requirements stated in this tender and reserves the authority to reject any or all the tenders received without assigning any reason. Any tender in which any of the prescribed conditions is not fulfilled by the bidder shall be summarily rejected.**
- 17) **Amendment to the tender document:** GCoEA reserves the right to make revisions or amendments to the tender documents prior to the closing date of the tender or re-tendering. Such revisions or amendments shall be announced by an addendum or corrigendum.
- 18) We look forward to receiving your quotations and thank you for your interest in this process.

(Purchaser)

  
**Dr. A. M. Mahalle**  
**Principal**  
**Government College of Engineering**  
**Amravati- 444 604, Maharashtra (India)**



*The bidder shall submit the tender and other documents as follows:*

### **Part-(A) ENVELOPE CONTENTS**

“Two Envelop” Systems will be followed for this tender. Two envelopes, namely, ‘Technical Bid Envelop’ and ‘Commercial Bid Envelop’.

#### **PROCEDURE FOR SUBMISSION OF BIDS:**

The quotation shall be submitted in two covers, Technical and Commercial and shall be submitted online on <https://mahatenders.gov.in> website.

#### **I. The envelope containing technical bid should contain the following:**

##### **Technical Bid: (all the documents are to be uploaded in PDF format)**

This envelope must contain documents regarding past experience (min 3 years), Bidder Turnover (min. 20 LPA), OEM Turnover (min. 40 LPA), OEM’s Authorization letter, SHOPACT, PAN card, GST registration certificate, ITR (Last 03 years), GSTR3B, *Non-Black listed letter on Rs. 100/- stamp paper*, Bidder / OEM’s service center number, bidder ISO certificate and leaflet clearly mentioning technical specifications along with picture of trainer kit for each item specified in BoQ, list of past and present clients, services provided in past with nature of services, any recognition or award received for rendering services, any other technical specification if any, filled in and duly stamped proforma mentioning performance of the supplier, duly completed annexure B, No-deviation certificate, GST registration.

- 1) **Covering Letter for Enclosure:** A covering letter stating the list of enclosures should be attached in the offer along with the checklist.
- 2) **EMD:** Rs.15,000/- (Rs. Fifteen Thousand Only, refundable post completion of Final Acceptance Test and without any interest whatsoever) to be paid through e-Tendering website <https://mahatenders.gov.in>.

EMD of all the unsuccessful bidders will be refunded as promptly as possible but not later than 45 days after the decision on the commercial bid is taken. EMD of the successful bidders will be discharged only after the completion of the supply, installation and commissioning of the goods and submission of Testing Report (signed by the Purchaser). GCoE, Amravati shall NOT pay any interest on EMDs of any bidder and reserves the right to refund during the said period subject to condition of proper technical support in financial dealings from the <https://mahatenders.gov.in> website.

EMD shall be forfeited in the following cases:

- If a bidder withdraws its bid during the period of bid validity.
- In case of a successful bidder, if the bidder fails to sign the contract and refuses to supply the goods to GCoE, Amravati.

***Note: To avail exemption in submitting the EMD, bidder must upload relevant documents in support of EMD exemption.***

- 3) **OEM Authorization Letter:** Authorization Letter from OEM is mandatory for the bidder. For OEM as a bidder, OEM certificate is necessary. Warranty period and other compliances should be strictly adhered to by the bidder.

- 4) **GST Registration:** GST registration and clearance certificates either from State or Central Government (as the case may be) showing tax paid up to Last Financial year and no dues. Also attach GST registration certificate or TIN allotment. If it is not possible to submit GST clearance certificate along with Tender. Respective clearance certificates or challan of advance tax paid are necessary.
- 5) **No-Deviation Statement:** A no-deviation certificate must mention the Nature of Product quoted by the bidder against the tender. No-Deviation statement of specification of the products offered giving details of specifications in pro-forma only (No other format will be accepted).

Specifications of the Items called for should be given in **Annexure-A**.

Bidder must fill the pro-forma and mere certifying that 'There is no deviation between tender specifications and specifications quoted by the bidder' is not acceptable and such bids are likely to be rejected.

- 6) **List of Users/Clients for past experience:** List of users/clients regarding nature of the services of similar nature rendered by you stating the years in which it was rendered. Preferably the self-attested photocopies of supply orders confirming the claim of such experience should be given.
- 7) **Experience / Performance of Supplier:** (given as **Annexure-D** of this tender notice) Past experience information of bidder regarding Product supplied should be submitted in mentioned pro-forma giving Order No., date, name & nature of service, name of service provider.
- 8) **Undertaking for giving demonstration** of offered Product within short period of notice must be submitted.
- 9) **Support infrastructure / Service Centre** for the products supplied *must be within the range of 200 km from GCoE, Amravati*. Details with Address & Telephone Nos. of the bidder along with the Address & Telephone Nos. of the service centers must be specified.
- 10) **Declaration by the bidder** (penalty clause): Copy of Declaration duly signed by bidder regarding penalty clause should be submitted by the bidder. **Please refer Annexure-A Terms & Conditions**. Any misleading information, whether intentional or unintentional will lead to disqualification.

## II. The envelope containing Commercial Bid should contain the following:

### Envelop B (Commercial Bid Envelop):

Sr. No.	Specifications and Description of the Product	Quantity	Basic Rate (in Rs.)	Total Amount With taxes)
1	Amplitude Modulation & Demodulation	02		
2	Frequency Modulation & Demodulation	02		



## **Part - (B) SECURITY DEPOSIT / PERFORMANCE GUARANTEE**

Crossed Demand Draft or Bank Guarantee of nationalized bank drawn in favor of “Principal, Government College of Engineering, Amravati” of 3% of the total cost must be deposited as Security Deposit after award of the contract. The name of the firm and tender number should be written on the backside of Demand Draft. Demand Draft / Pay Order should be in the name of “Principal, Government College of Engineering, Amravati”, payable at Amravati and should have validity of minimum 03 months. This SD/DG will be refunded after the expiry of contract period. Please refer Annexure – A Terms and Conditions. In case of violation of any of the conditions of warrantee (for one year), the aforesaid performance guarantee shall be invoked by GCoE, Amravati.

## **Part - (C) SUBMISSION OF TENDER**

- 1) All the bidders should submit their tenders online on the website <https://mahatenders.gov.in>. The bidders shall be fully responsible for proper submission of bids on the said website. Any communication in any form shall not be entertained by the GCoEA regarding bid submission on the said website.
- 2) The tender received after closing date and time will not be accepted at all.

## **Part - (D) OPENING OF TENDER**

- 1) The tenders will be opened on the date specified in the tender notice at GCoE, Amravati. The supplier/their authorized representative can attend the tender opening. In case, under unavoidable circumstances, the specified date for submission of tenders falls on or is subsequently declared as holiday or closed day for this office, the tenders shall be received up to next succeeding working day till the prescribed time. The same shall apply on opening of the tenders where under unavoidable circumstances, the specified date for opening of tenders falls on or is subsequently declared as holiday or closed day for this office, the tenders shall be opened on next succeeding working day on the prescribed time.
- 2) The technical bids shall be opened first for verification and scrutiny for eligibility of the bidder. The offers will be first evaluated for completeness with respect to documents to be submitted with the offer. Those offers which have all the supporting documents as per requirements in the tender enquiry will be evaluated on technical grounds. Commercial bids of technically valid offers will be opened and lowest offer will be recommended. Final decision will be taken by the Principal, Government College of Engineering, Amravati.
- 3) The commercial bids of only those bidders who fulfill all the requirements mentioned in this Tender document shall be opened.
- 4) The Principal, Government College of Engineering, Amravati shall have the full right to reject any tender without assigning any reason whatsoever to the bidder.
- 5) Competent Bidder fulfilling all the requirements and quoting the lowest price will be informed about the intention of award of contract (Acceptance of Tender) by sending an Acceptance Letter (A/L). Purchase order shall be released only on acceptance of Terms & Conditions of Annexure-A.
- 6) The date of opening of tenders is as specified on the website of this office and in this tender notice.

**Part - (E) Check List of documents to be submitted along with tenders in technical bid envelop:**

<b>Sr. No.</b>	<b>Item for which proof document is required</b>
<b>1.</b>	Covering Letter for tender on letter head of the bidder
<b>2.</b>	A self-attested copy of SHOPACT, PAN of the firm/Proprietor(s)
<b>3.</b>	OEM / Manufacturer Authorization for this Tender
<b>4.</b>	GST registration certificate and GST Clearance certificate, GSTR3B
<b>5.</b>	No-deviation certificate in prescribed pro-forma
<b>6.</b>	List of users/clients, Preferably the self-attested photocopies of supply orders confirming the claim of experience in years should be given
<b>7.</b>	Bidder Turnover, ITR (Last 03 years)
<b>8.</b>	OEM's Turnover
<b>9.</b>	Undertaking for demonstration
<b>10.</b>	Undertaking about risk purchase, fall clause, penalty clause (Please refer Annexure-A Terms & Conditions)
<b>11.</b>	Support infrastructure / Service Centre Details with Address & Telephone Nos. of the bidder
<b>12.</b>	Annexure B on firm's letter head
<b>13.</b>	Non – black listed letter must be given on Rs. 100/- stamp paper
<b>14.</b>	Bidder ISO certificate



Part - (F) Description and Technical specifications of products called for are given below:

**List of Trainer kits and quantity**

Sr. No	Name of the Trainer	Specifications	Quantity
1	Amplitude Modulation & Demodulation	<b>Objectives:</b> To study Amplitude Modulation. To measure the modulation index. To Determine the Bandwidth, number of sidebands. To observe the change in modulated o/p w.r.t. change in i/p amplitude. To study Amplitude Demodulation using Detector diode. <b>Specifications:</b> The kit /trainer board must have: In-built power supply, in-built signal generators, On-board facility to observe waveforms at various stages, Multi-colour Circuit Diagram printed on the front / top of the white board, Poly coated imported pine wooden cabinet , Necessary Connecting wires, Instruction manual.	02
2	Frequency Modulation & Demodulation	<b>Objectives:</b> To study Frequency Modulation. To measure the modulation index. To Determine the Bandwidth, number of sidebands, frequency deviation To observe the change in modulated o/p w.r.t. change in i/p amplitude. To study Frequency Demodulation. <b>Specifications:</b> The kit /trainer board must have: In-built power supply, in-built signal generators, On-board facility to observe waveforms at various stages, Multi-colour Circuit Diagram printed on the front /top of the white board, Poly coated imported pine wooden cabinet, Necessary Connecting wires, Instruction manual.	02
3	Phase Modulation & Demodulation	<b>Objectives:</b> To study Phase Modulation. To measure the modulation index. To Determine the Bandwidth, number of sidebands, frequency deviation To observe the change in modulated o/p w.r.t. change in i/p amplitude. To study Phase Demodulation. <b>Specifications:</b> The kit /trainer board must have: In-built power supply, in-built signal generators, On-board facility to observe waveforms at various stages, Multi-colour Circuit Diagram printed on the front/ top of the white board, Poly coated imported pine wooden cabinet, Necessary Connecting wires, Instruction manual.	02
4	Pre-emphasis and De-emphasis	<b>Objectives:</b> To study the concept of Pre-emphasis To study the concept of De-emphasis <b>Specifications:</b> The kit /trainer board must have: In-built power supply, in-built signal generators, synchronization circuits, On-board facility to observe waveforms at various stages, Multi-colour Circuit Diagram printed on the front / top of the white board, Poly coated imported pine wooden cabinet, Necessary Connecting wires, Instruction manual.	02
5	Frequency Division Multiplexing & Demultiplexing	<b>Objective:</b> To study the concept of Frequency Division Multiplexing for n-channel To study the concept of Frequency Division De-multiplexing for n-channel <b>Specifications:</b> The kit /trainer board must have: In-built power supply, in-built signal generators, synchronization circuits, On-board facility to observe waveforms at various stages,	02



		Multi-colour Circuit Diagram printed on the front /top of the white board, Poly coated imported pine wooden cabinet, Necessary Connecting wires, Instruction manual.	
6	Time Division Multiplexing & Demultiplexing	<b>Objective:</b> To study the concept of Time Division Multiplexing for n-channel To study the concept of Time Division De- multiplexing for n-channel <b>Specifications:</b> The kit /trainer board must have: In-built power supply, in-built signal generators, synchronization circuits, On-board facility to observe waveforms at various stages, Multi-colour Circuit Diagram printed on the front /top of the white board, Poly coated imported pine wooden cabinet, Necessary Connecting wires, Instruction manual.	02
7	Pulse Code Modulation and Demodulation	<b>Objectives:</b> To study Analog to Digital Signal Generation. To study Analog signal sampling and 8 bit Quantization process. To study effect of sampling frequency and number of quantization levels on PCM output To study the Digital-To-Analog Conversion in PCM Demodulation. To study effect of sampling frequency and number of quantization levels on Pulse Code Demodulated output <b>Specifications:</b> The kit /trainer board must have: In-built power supply, in-built signal generators, On-board facility to observe waveforms at various stages, Multi-colour Circuit Diagram printed on the front /top of the white board, Poly coated imported pine wooden cabinet, Necessary Connecting wires, Instruction manual.	02
8	Noise Power Spectral Density measurement kit	<b>Objectives:</b> To observe the effect of noise on various analog systems To calculate signal to noise ratio To calculate noise figure, noise power and noise power spectral density To study the effects of low pass filter on noisy signal To study the effects of switch faults <b>Specifications:</b> The kit /trainer board must have: In-built power supply, in-built signal generators, On-board Clock Generator, Pseudo Random Noise Generator, Signal + Noise Adder, Power Spectral Density Meter and Display device, Facility to measure SNR and Noise Figure, Multi-colour Circuit Diagram printed on the front /top of the white board, Poly coated imported pine wooden cabinet, Necessary Connecting wires, Instruction manual.	02
9	Automatic Gain Control	<b>Objectives:</b> To study the circuit of Automatic Gain Control (AGC). To observe and note the change in AGC output voltage w.r.t. change in AF input and control voltage. <b>Specifications:</b> The kit /trainer board must have: In-built power supply, in-built signal generators, On-board facility to observe waveforms at various stages, Multi-colour Circuit Diagram printed on the front /top of the white board, Poly coated imported pine wooden cabinet, Necessary Connecting wires, Instruction manual.	02
10	DSB-SC Modulation and Demodulation	<b>Objectives:</b> To study the <b>DSB-SC Balanced modulator</b> circuit. To observe the double side band output with a suppressed carrier signal. To observe and note the change in output w.r.t. change in modulating and	02



		<p>carrier signal.</p> <p>To study the <b>DSB-SC AM Balanced Demodulator</b> circuit.</p> <p>To observe and note the change in Demodulated output w.r.t. change in modulating.</p> <p>To observe the change in the demodulated w.r.t. change in carrier signal.</p> <p><b>Specifications:</b> The kit /trainer board must have:</p> <p>In-built power supply, in-built signal generators,</p> <p>On-board facility to observe waveforms at various stages,</p> <p>Multi-colour Circuit Diagram printed on the front /top of the white board,</p> <p>Poly coated imported pine wooden cabinet,</p> <p>Necessary Connecting wires, Instruction manual.</p>	
11	SSB-SC Modulation and Demodulation	<p><b>Objectives:</b></p> <p>To study the <b>SSB-SC Balanced Modulator</b> circuit.</p> <p>To observe the single side band output with a suppressed carrier signal.</p> <p>To observe and note the change in SSB output w.r.t. change in modulating &amp; carrier signal.</p> <p>To study the <b>SSB-SC AM Balanced Demodulator</b> circuit.</p> <p>To observe and note the change in Demodulated output w.r.t. change in modulating.</p> <p>To observe the change in the demodulated w.r.t. change in carrier signal.</p> <p><b>Specifications:</b> The kit /trainer board must have:</p> <p>In-built power supply, in-built signal generators,</p> <p>On-board facility to observe waveforms at various stages,</p> <p>Multi-colour Circuit Diagram printed on the front /top of the white board,</p> <p>Poly coated imported pine wooden cabinet,</p> <p>Necessary Connecting wires, Instruction manual.</p>	02
12	Signal Sampling and Reconstruction Trainer	<p><b>Objectives:</b></p> <p>To study the circuit of <b>Analog Signal Sampling</b> PAM output.</p> <p>To observe &amp; note single &amp; dual Polarity sampled PAM output.</p> <p>To observe the change in sampled PAM O/P w.r.t change in modulating signal voltage.</p> <p>To observe and note the maximum sampling frequency for the selected sampling pulse.</p> <p>To study circuit of <b>Reconstruction</b> of analog sampled signal.</p> <p>To observe &amp; note the change in demodulated O/P w.r.t change in analog I/P.</p> <p><b>Specifications:</b> The kit /trainer board must have:</p> <p>In-built power supply, in-built signal generators,</p> <p>On-board facility to observe waveforms at various stages,</p> <p>Multi-colour Circuit Diagram printed on the front /top of the white board,</p> <p>Poly coated imported pine wooden cabinet,</p> <p>Necessary Connecting wires, Instruction manual.</p>	02
13	PAM, PWM and PPM modulation and Demodulation	<p><b>Objectives:</b></p> <p>To study the circuit of <b>Pulse Amplitude Modulation (PAM)</b>. To observe &amp; note Single and Dual Polarity PAM output. To observe change in PAM O/P w.r.t change in modulating I/P.</p> <p>To study the circuit of <b>Pulse Amplitude Demodulation (PADM)</b>. To observe &amp; note the change in demodulated O/P w.r.t change in analog I/P.</p> <p>To study the circuit of <b>Pulse Width Modulation (PWM)</b>. To observe the change in PWM O/P w.r.t change in modulating signal voltage.</p> <p>To study the circuit of <b>Pulse Width Demodulation (PWDM)</b>. To observe &amp; note the change in demodulated O/P w.r.t change in modulating AF input.</p> <p>To study the circuit of <b>Pulse Position Modulation (PPM)</b>. To observe the change in PPM O/P w.r.t change in modulating signal voltage.</p> <p>To study the circuit of <b>Pulse Position Demodulation (PPDM)</b>. To observe &amp; note the change in demodulated O/P w.r.t change in modulating AF input.</p>	02



		<b>Specifications:</b> The kit /trainer board must have: In-built power supply, in-built signal generators, On-board facility to observe waveforms at various stages, Multi-colour Circuit Diagram printed on the front /top of the white board, Poly coated imported pine wooden cabinet, Necessary Connecting wires, Instruction manual.	
14	AM Superhetrodyne Radio Receiver Demonstrator	<b>Objectives:</b> To study principle of AM Superhetrodyne MW Band Radio Receiver. To study Block Diagram & Circuit diagram of AM Superhetrodyne MW Band Radio Receiver. To Study functions of Tuning & Mixer, IF Amplifiers, Diode Detector, AGC and Audio Amplifier sections of AM Radio Receiver. To study the signal analysis at the different sections of AM Radio Receiver. To observe and note the reproduced Audio signal for the selected Radio frequency input. To Study the Radio Characteristics Selectivity, Sensitivity & fidelity of AM Radio receiver. To study the 5 faults on different sections of Radio Receiver. <b>Specifications:</b> The kit /trainer board must have: In-built power supply, in-built signal generators, On-board facility to observe waveforms at various stages, Multi-colour Circuit Diagram printed on the front /top of the white board, Poly coated imported pine wooden cabinet, Necessary Connecting wires, Instruction manual.	02
15	RF Characteristics of AM Radio Receiver Demonstrator (Selectivity, Sensitivity, Fidelity)	<b>Objectives:</b> To study principle of AM Superhetrodyne MW Band Radio Receiver. To study Block Diagram & Circuit diagram of AM Superhetrodyne MW Band Radio Receiver. To Study signal analysis at Tuning & Mixer, IF Amplifiers, Diode Detector, AGC and Audio Amplifier sections of AM Radio Receiver. To observe and note the reproduced Audio signal for the selected Radio frequency input. To Study Selectivity Characteristics of AM Radio receiver. To Study Sensitivity Characteristics of AM Radio receiver. To Study Fidelity Characteristics of AM Radio receiver. <b>Specifications:</b> The kit /trainer board must have: In-built power supply, in-built signal generators, On-board facility to observe waveforms at various stages, Multi-colour Circuit Diagram printed on the front /top of the white board, Poly coated imported pine wooden cabinet, Necessary Connecting wires, Instruction manual.	02
16	DPCM Modulation and Demodulation	<b>Objectives:</b> To study the principle of Differential Pulse Code Modulation and Demodulation (DPCM). To study the circuit of DPCM modulator and Demodulator. To study the Clock section of DPCM. To observe the change in DPCM O/P w.r.t change in modulating input. To observe the effect on DPCM O/P w.r.t change in carrier input. To observe the difference between $m(t)$ and $m(k)$ signals. To observe the change in Demodulated O/P w.r.t change in modulating input of DPCM. To observe the effect on demodulated O/P w.r.t change in carrier input of DPCM. <b>Specifications:</b> The kit /trainer board must have: In-built power supply, in-built signal generators,	02



		On-board facility to observe waveforms at various stages, Multi-colour Circuit Diagram printed on the front /top of the white board, Poly coated imported pine wooden cabinet, Necessary Connecting wires, Instruction manual.	
17	Delta Modulation and Demodulation	<p><b>Objectives:</b></p> <p>To study the principle and circuit of <b>Delta Modulation (DM)</b>. To observe and note DM O/P for the applied modulating AF input and carrier input. To observe and note the change in DM O/P w.r.t change in modulating input. To observe the effect on DM O/P w.r.t change in carrier input. To study the limitations and distortions of DM. To study the principle and circuit of <b>Delta Demodulation</b>. To observe and note demodulated O/P for the applied DM input. To observe the change in Demodulated O/P w.r.t change in modulating AF input of DM. To observe the effect on demodulated O/P w.r.t change in carrier input of DM.</p> <p><b>Specifications:</b> The kit /trainer board must have: In-built power supply, in-built signal generators, On-board facility to observe waveforms at various stages, Multi-colour Circuit Diagram printed on the front /top of the white board, Poly coated imported pine wooden cabinet, Necessary Connecting wires, Instruction manual.</p>	02
18	Adaptive Delta Modulation and Demodulation	<p><b>Objectives:</b></p> <p>To study the principle and circuit of <b>Adaptive Delta Modulation (ADM)</b>. To observe and note ADM O/P for the applied modulating AF input and carrier input. To observe and note the change in ADM O/P w.r.t change in modulating input. To observe the effect on ADM O/P w.r.t change in carrier input. To study the limitations and distortions of ADM. To study the principle and circuit of <b>Adaptive Delta Demodulation</b>. To observe and note demodulated O/P for the applied ADM input. To observe the change in Demodulated O/P w.r.t change in modulating AF input of ADM. To observe the effect on demodulated O/P w.r.t change in carrier input of ADM.</p> <p><b>Specifications:</b> The kit /trainer board must have: In-built power supply, in-built signal generators, On-board facility to observe waveforms at various stages, Multi-colour Circuit Diagram printed on the front /top of the white board, Poly coated imported pine wooden cabinet, Necessary Connecting wires, Instruction manual.</p>	02
19	ASK, FSK, PSK modulation and Demodulation	<p><b>Objectives:</b></p> <p>To Study <b>Amplitude Shift Keying (ASK) Modulation</b>. To observe &amp; note the change in ASK O/P w.r.t. change in carrier &amp; Data I/P.</p> <p>To Study <b>Amplitude Shift Keying (ASK) Demodulation</b>. To observe the note demodulated O/P w.r.t. change in Modulating Data I/P. To observe and note change in O/P w.r.t. change in Carrier I/P</p> <p>To Study <b>Frequency Shift Keying (FSK) Modulation</b> using IC XR2206. To observe &amp; note free-running frequency without applying I/P. To observe &amp; note Mark &amp; Space frequencies w.r.t. change in Keying I/P Vi. To determine frequency shift.</p> <p>To Study <b>Frequency Shift Keying (FSK) Demodulation</b>. To observe the note demodulated O/P w.r.t. change in Modulating I/P. To observe and note change in the O/P w.r.t. change in Mark &amp; Space frequency.</p>	02



		<p>To Study <b>Phase Shift Keying (PSK/BPSK) Modulation</b>. To observe &amp; note change in PSK O/P w.r.t. change in Data I/P and Carrier I/P.</p> <p>To Study <b>Phase Shift Keying (PSK/BPSK) Demodulation</b>. To observe note demodulated O/P w.r.t. change in Modulating Data I/P. To observe change in the O/P w.r.t. Carrier I/P.</p> <p><b>Specifications:</b> The kit /trainer board must have:  In-built power supply, in-built signal generators,  On-board facility to observe waveforms at various stages,  Multi-colour Circuit Diagram printed on the front /top of the white board,  Poly coated imported pine wooden cabinet,  Necessary Connecting wires, Instruction manual.</p>	
20	QPSK Modulation and Demodulation	<p><b>Objectives:</b></p> <p>To Study the <b>Quadrature Phase Shift Keying (QPSK) Modulation</b>.  To observe &amp; note the change in QPSK O/P w.r.t. the change in digital Data I/P.  To observe &amp; note the change in QPSK O/P w.r.t. the change in Carrier I/P.  To Study the <b>Quadrature Phase Shift Keying (QPSK) Demodulation</b>.  To observe the note demodulated O/P w.r.t. change in modulating digital Data I/P.  To observe and note the change in the O/P w.r.t. change in carrier I/P.  To observe and note the distortion/error in O/P w.r.t change in applied digital data I/P.</p> <p><b>Specifications:</b> The kit /trainer board must have:  In-built power supply, in-built signal generators,  On-board facility to observe waveforms at various stages,  Multi-colour Circuit Diagram printed on the front /top of the white board,  Poly coated imported pine wooden cabinet,  Necessary Connecting wires, Instruction manual.</p>	02
21	DPSK Modulation Demodulation	<p><b>Objectives:</b></p> <p>To Study the <b>Differential Phase Shift Keying (DPSK) Modulation</b>.  To observe &amp; note the change in DPSK O/P w.r.t. the change in digital Data I/P.  To observe &amp; note the change in DPSK O/P w.r.t. the change in Carrier I/P.  To Study the <b>Differential Phase Shift Keying (DPSK) Demodulation</b>.  To observe the note demodulated O/P w.r.t. change in modulating digital Data I/P.  To observe and note the change in the O/P w.r.t. change in carrier I/P.  To observe and note the distortion/error in O/P w.r.t change in applied digital data I/P.</p> <p><b>Specifications:</b> The kit /trainer board must have:  In-built power supply, in-built signal generators,  On-board facility to observe waveforms at various stages,  Multi-colour Circuit Diagram printed on the front /top of the white board,  Poly coated imported pine wooden cabinet,  Necessary Connecting wires, Instruction manual.</p>	02
22	QAM Modulation and Demodulation	<p><b>Objectives:</b></p> <p>To Study the <b>Quadrature Amplitude Modulation (QAM)</b>.  To observe &amp; note the change in QAM O/P w.r.t. the change in digital Data I/P.  To observe &amp; note the change in QAM O/P w.r.t. the change in Carrier I/P.  To Study the <b>Quadrature Amplitude Demodulation</b>.  To observe the note demodulated O/P w.r.t. change in modulating digital Data I/P.  To observe and note the change in the O/P w.r.t. change in carrier I/P.</p>	02



		<p>To observe and note the distortion/error in O/P w.r.t change in applied digital data I/P.</p> <p><b>Specifications:</b> The kit /trainer board must have:  In-built power supply, in-built signal generators,  On-board facility to observe waveforms at various stages,  Multi-colour Circuit Diagram printed on the front /top of the white board,  Poly coated imported pine wooden cabinet,  Necessary Connecting wires, Instruction manual.</p>	
23	PN Sequence Generator	<p><b>Objectives:</b>  To Study the PN Sequence Generator.  To observe and note the PN Sequence output pattern for the applied clock inputs.</p> <p><b>Specifications:</b> The kit /trainer board must have:  In-built power supply, in-built signal generators,  On-board facility to observe waveforms at various stages,  Multi-colour Circuit Diagram printed on the front /top of the white board,  Poly coated imported pine wooden cabinet,  Necessary Connecting wires, Instruction manual.</p>	02
24	Hamming Code Generator	<p><b>Objectives:</b>  To study the Hamming Code Generator circuit.  To study combinational Ex-OR operations.  To verify the Hamming Code output for the applied digital data inputs.</p> <p><b>Specifications:</b> The kit /trainer board must have:  In-built power supply, in-built signal generators,  On-board facility to observe waveforms at various stages,  Multi-colour Circuit Diagram printed on the front /top of the white board,  Poly coated imported pine wooden cabinet,  Necessary Connecting wires, Instruction manual.</p>	02
25	Error Detection and Correction Trainer	<p><b>Objectives:</b>  To Study the Error Detection &amp; Correction techniques.  To Study hamming code for error detection and correction.  To observe and note Parity codes generated for the applied data inputs.  To observe and note the received corrected Data at receiver for the given data inputs.  To observe and note the variation in Received data w.r.t. transmitted data inputs.  To study the insertion of Error in transmitted data.  To study the correction in received data.  To observe and note the received data inputs w.r.t. error in transmitted data.</p> <p><b>Specifications:</b> The kit /trainer board must have:  In-built power supply, in-built signal generators,  On-board facility to observe waveforms at various stages,  Multi-colour Circuit Diagram printed on the front /top of the white board,  Poly coated imported pine wooden cabinet,  Necessary Connecting wires, Instruction manual.</p>	02
26	Half Wave, Full Wave Rectifiers with L, C filters	<p><b>Objectives:</b>  To Study the Half Wave Rectifier with and without L, C filters.  To Study the Center tap Full Wave Rectifier with and without L, C filters.  To Study the Bridge type Full Wave Rectifier with and without L, C filters.</p> <p><b>Specifications:</b> The kit /trainer board must have:  In-built power supply,  On-board printed circuit diagrams, along-with test points,  Multi-colour Circuit Diagram printed on the front/top of the white board,  Poly coated imported pine wooden cabinet,  Necessary Connecting wires, Instruction manual.</p>	04

27	Diode Clipper and Clamper Circuit	<p><b>Objectives:</b></p> <p>To Study series, shunt, and combination; biased, unbiased; Positive &amp; Negative Diode Clipper.</p> <p>To Observe &amp; note change in clipped o/p w.r.t. applied ac i/p signal.</p> <p>To Study series, shunt, and combination; biased, unbiased; Positive &amp; Negative Diode Clamper.</p> <p>To Observe &amp; note change in clamped o/p w.r.t. applied ac i/p signal.</p> <p><b>Specifications:</b> The kit /trainer board must have:</p> <p>In-built power supply,</p> <p>On-board printed circuit diagrams, along-with test points,</p> <p>Multi-colour Circuit Diagram printed on the front /top of the white board,</p> <p>Poly coated imported pine wooden cabinet,</p> <p>Necessary Connecting wires, Instruction manual.</p>	04
28	Zener Diode as Voltage Regulator	<p><b>Objectives:</b></p> <p>To Study Change in o/p Voltage w.r.t. change in i/p Voltage with constant Load (Line Regulation)</p> <p>To Study Change in o/p Voltage w.r.t change in Load with constant input voltage (Load Regulation)</p> <p>To study Zener diode as a voltage regulator</p> <p><b>Specifications:</b> The kit /trainer board must have:</p> <p>In-built power supply (fixed /variable / both, whichever is required),</p> <p>Minimum 3.5 digit digital voltmeters (02 in numbers) and digital current meters (01 in numbers). Range of voltmeter and ammeter will be as per circuit requirements,</p> <p>On-board printed circuit diagrams, along-with test points,</p> <p>Multi-colour Circuit Diagram printed on the front/top of the white board,</p> <p>Poly coated imported pine wooden cabinet,</p> <p>Necessary Connecting wires, Instruction manual.</p>	04
29	Voltage Regulator using LM78XX, LM79XX	<p><b>Objectives:</b></p> <p>To Study Change in o/p Voltage w.r.t. change in i/p Voltage with constant Load (Line Regulation)</p> <p>To Study Change in o/p Voltage w.r.t change in Load with constant input voltage (Load Regulation)</p> <p>To study 78XX, 79XX as a voltage regulator</p> <p><b>Specifications:</b> The kit /trainer board must have:</p> <p>In-built power supply (fixed /variable / both, whichever is required),</p> <p>Minimum 3.5 digit digital voltmeters (02 in numbers) and digital current meters (01 in numbers). Range of voltmeter and ammeter will be as per circuit requirements,</p> <p>On-board printed circuit diagrams, along-with test points,</p> <p>Multi-colour Circuit Diagram printed on the front/top of the white board,</p> <p>Poly coated imported pine wooden cabinet,</p> <p>Necessary Connecting wires, Instruction manual.</p>	04
30	Transistor input and output Characteristics for CB, CE and CC configuration	<p><b>Objectives:</b></p> <p>To Study the Transistor input and output characteristics in CE Mode.</p> <p>To Study the Transistor input and output characteristics in CB Mode.</p> <p>To Study the Transistor input and output characteristics in CC Mode.</p> <p><b>Specifications:</b> The kit /trainer board must have:</p> <p>In-built power supply (fixed /variable / both, whichever is required),</p> <p>Minimum 3.5 digit digital voltmeters (02 in numbers) and digital current meters (02 in numbers). Range of voltmeter and ammeter will be as per circuit requirements,</p> <p>On-board printed circuit diagrams, along-with test Points,</p> <p>Multi-colour Circuit Diagram printed on the front/top of the white board,</p> <p>Poly coated imported pine wooden cabinet,</p>	04



		Necessary Connecting wires, Instruction manual.	
31	Biasing schemes for BJT (All Types)	<p><b>Objectives:</b></p> <p>To study BJT Fixed Bias circuit with &amp; without Emitter feedback Resistor.</p> <p>To study BJT Collector to Base Biasing circuit.</p> <p>To study BJT Self Bias / Voltage Divider biasing circuit.</p> <p>To observe &amp; Note the change in Collector Current &amp; Voltage w.r.t. change in biasing resistors.</p> <p>To Determine the various currents &amp; voltages; <math>I_B</math>, <math>I_C</math>, <math>V_B</math>, <math>V_C</math>, <math>V_{CE}</math>, <math>V_E</math> and Stability factor.</p> <p>To Plot DC load line &amp; observe the change w.r.t. change in base resistor &amp; emitter feedback resistor.</p> <p><b>Specifications:</b> The kit /trainer board must have:</p> <p>In-built power supply (fixed /variable / both, whichever is required),</p> <p>Minimum 3.5 digit digital voltmeters (02 in numbers) and digital current meters (02 in numbers). Range of voltmeter and ammeter will be as per circuit requirements,</p> <p>On-board printed circuit diagrams, along-with test points,</p> <p>Multi-colour Circuit Diagram printed on the front/top of the white board,</p> <p>Poly coated imported pine wooden cabinet,</p> <p>Necessary Connecting wires, Instruction manual.</p>	04
32	Single Stage Transistor Amplifier (CB, CE, CC)	<p><b>Objectives:</b></p> <p>To study Single Stage CE, CB, CC Amplifier &amp; Observe change in o/p w.r.t. change in i/p frequency.</p> <p>To Plot the frequency response.</p> <p>To Determine Bandwidth, gain and other parameters</p> <p><b>Specifications:</b> The kit /trainer board must have:</p> <p>In-built power supply,</p> <p>On-board printed circuit diagrams, along-with test points,</p> <p>Multi-colour Circuit Diagram printed on the front/top of the white board,</p> <p>Poly coated imported pine wooden cabinet,</p> <p>Necessary Connecting wires, Instruction manual.</p>	04
33	Transistorised Class A, B, AB, C Amplifiers	<p><b>Objectives:</b></p> <p>To study the class-A, class B, class C Power Amplifier circuit.</p> <p>To Observe &amp; note change in o/p w.r.t. change in i/p frequency.</p> <p>To observe and note the Cross Over Distortion.</p> <p>To Determine Bandwidth, Voltage Gain, Efficiency of class-A, B, C power amplifier.</p> <p><b>Specifications:</b> The kit /trainer board must have:</p> <p>In-built power supply,</p> <p>On-board printed circuit diagrams, along-with test points,</p> <p>Multi-colour Circuit Diagram printed on the front/top of the white board,</p> <p>Poly coated imported pine wooden cabinet,</p> <p>Necessary Connecting wires, Instruction manual.</p>	04
34	Study of H-Parameters of CE configuration	<p><b>Objectives:</b></p> <p>To Study h-parameters: <math>h_{ie}</math>, <math>h_{fe}</math>, <math>h_{oe}</math> &amp; <math>h_{re}</math> of CE Transistor in Common Emitter mode.</p> <p>To Observe the change in these parameter for the change in DC collector current <math>I_C</math>.</p> <p><b>Specifications:</b> The kit /trainer board must have:</p> <p>In-built power supply,</p> <p>On-board printed circuit diagrams, along-with test points,</p> <p>Multi-colour Circuit Diagram printed on the front/top of the white board,</p> <p>Poly coated imported pine wooden cabinet,</p> <p>Necessary Connecting wires, Instruction manual.</p>	04

35	Study of positive and negative feedback in amplifier	<b>Objectives:</b> To Study Voltage Series, Current Series, Voltage Shunt and Current Shunt Feedback circuits. To Observe the change output voltage and current for the change in feedback. <b>Specifications:</b> The kit /trainer board must have: In-built power supply, On-board printed circuit diagrams, along-with test points, Multi-colour Circuit Diagram printed on the front/top of the white board, Poly coated imported pine wooden cabinet, Necessary Connecting wires, Instruction manual.	04
36	Transistorised Astable, Monostable and Bistable multivibrator	<b>Objectives:</b> To Study Transistorised Astable, Monostable and Bistable multivibrator circuits. To Observe input, output waveforms. <b>Specifications:</b> The kit /trainer board must have: In-built power supply, On-board printed circuit diagrams, along-with test points, Multi-colour Circuit Diagram printed on the front/top of the white board, Poly coated imported pine wooden cabinet, Necessary Connecting wires, Instruction manual.	04
37	MOSFET Oscillators	<b>Objectives:</b> To Study various MOSFET Oscillator circuits. To Observe the effect of change of R, L, C on output waveforms. <b>Specifications:</b> The kit /trainer board must have: In-built power supply, On-board printed circuit diagrams, along-with test points, Multi-colour Circuit Diagram printed on the front/top of the white board, Poly coated imported pine wooden cabinet, Necessary Connecting wires, Instruction manual.	04
38	MOSFET as a Relay Driver Circuit	<b>Objectives:</b> To Study MOSFET as a Relay Driver Circuit. To Observe output. <b>Specifications:</b> The kit /trainer board must have: In-built power supply, On-board printed circuit diagrams, along-with test points, Multi-colour Circuit Diagram printed on the front/top of the white board, Poly coated imported pine wooden cabinet, Necessary Connecting wires, Instruction manual.	04
39	JFET and MOSFET input and output Characteristics for CG, CS and CD configuration	<b>Objectives:</b> To Study the JFET input and output characteristics in CS, CG and CD Mode, To Study the MOSFET input and output characteristics in CS, CG and CD Mode. <b>Specifications:</b> The kit /trainer board must have: In-built power supply (fixed /variable / both, whichever is required), Minimum 3.5 digit digital voltmeters (02 in numbers) and digital current meters (02 in numbers). Range of voltmeter and ammeter will be as per circuit requirements, On-board printed circuit diagrams, along-with test points, Multi-colour Circuit Diagram printed on the front/top of the white board, Poly coated imported pine wooden cabinet, Necessary Connecting wires, Instruction manual.	04
40	JFET and MOSFET Biasing methods	<b>Objectives:</b> To study Fixed Bias circuit for FET. To study FET Self Bias Circuit FET To study FET Voltage Divider biasing circuit FET	04



		<p>To study Biasing circuits for D – MOSFET and E – MOSFET.</p> <p>To observe &amp; Note the change in Drain Current &amp; Voltage w.r.t. change in biasing resistors.</p> <p>To Determine the various currents &amp; voltages; <math>I_G</math>, <math>I_D</math>, <math>V_G</math>, <math>V_D</math>, <math>V_{DS}</math>, <math>V_S</math> and Stability factor.</p> <p>To Plot DC load line &amp; observe the change w.r.t. change in base resistor &amp; source feedback resistor.</p> <p><b>Specifications:</b> The kit /trainer board must have:</p> <p>In-built power supply (fixed /variable / both, whichever is required),</p> <p>Minimum 3.5 digit digital voltmeters (02 in numbers) and digital current meters (02 in numbers). Range of voltmeter and ammeter will be as per circuit requirements,</p> <p>On-board printed circuit diagrams, along-with test points,</p> <p>Multi-colour Circuit Diagram printed on the front/top of the white board,</p> <p>Poly coated imported pine wooden cabinet,</p> <p>Necessary Connecting wires, Instruction manual.</p>	
41	Single Stage FET, MOSFET Amplifier (CG, CS, CD)	<p><b>Objectives:</b></p> <p>To Study JFET as Amplifier circuit.</p> <p>To Study MOSFET as Amplifier circuit.</p> <p>To Observe &amp; note change in output w.r.t. change in i/p frequency.</p> <p>To Determine Bandwidth, Voltage Gain.</p> <p><b>Specifications:</b> The kit /trainer board must have:</p> <p>In-built power supply,</p> <p>On-board printed circuit diagrams, along-with test points,</p> <p>Multi-colour Circuit Diagram printed on the front/top of the white board,</p> <p>Poly coated imported pine wooden cabinet,</p> <p>Necessary Connecting wires, Instruction manual.</p>	04
42	BJT Oscillators: Hartley, Colpitts, RC Phase Shift, Wein Bridge	<p><b>Objectives:</b></p> <p>To Study operation of Hartley, Colpitt's, R phase shift, Wein bridge Oscillator Circuit.</p> <p>To Observe &amp; note change in frequency of oscillation w.r.t. change in feedback elements.</p> <p><b>Specifications:</b> The kit /trainer board must have:</p> <p>In-built power supply,</p> <p>On-board printed circuit diagrams, along-with test points,</p> <p>Multi-colour Circuit Diagram printed on the front/top of the white board,</p> <p>Poly coated imported pine wooden cabinet,</p> <p>Necessary Connecting wires, Instruction manual.</p>	04
43	Temperature Measurement using RTD, Thermistor, Thermo-couple	<p><b>Objectives:</b></p> <p>To study temperature measurement using RTD.</p> <p>To study temperature measurement using Thermister.</p> <p>To study temperature measurement using Thermo-couple</p> <p>To observe and note the change in output w.r.t. change in temperature.</p> <p><b>Specifications:</b> The kit /trainer board must have:</p> <p>In-built power supply, Signal conditioning unit,</p> <p>Facility to observe, measure output,</p> <p>Multi-colour Circuit Diagram printed on the front/top of the white board,</p> <p>Poly coated imported pine wooden cabinet,</p> <p>Enough number of connectors,</p> <p>Necessary Connecting wires, Instruction manual.</p>	02
44	Measurement of Strain using Strain Guage	<p><b>Objectives:</b></p> <p>To study strain measurement using strain guage.</p> <p>To observe and note the change in output w.r.t. change in strain.</p> <p><b>Specifications:</b> The kit /trainer board must have:</p> <p>In-built power supply, Signal conditioning unit,</p>	02

		Facility to observe, measure output, Multi-colour Circuit Diagram printed on the front/top of the white board, Poly coated imported pine wooden cabinet, Necessary Connecting wires, Instruction manual.	
45	Pressure Measurement using Bourdon Tube, Pressure guage	Objectives: To study pressure measurement using Bourdon Tube. To observe and note the change in output w.r.t. change in pressure. <b>Specifications:</b> The kit /trainer board must have: In-built power supply, Signal conditioning unit, Facility to observe, measure output, Multi-colour Circuit Diagram printed on the front/top of the white board, Poly coated imported pine wooden cabinet, Necessary Connecting wires, Instruction manual.	02
46	FPGA development board	It includes enough switches, LEDs and other I/O devices to allow a large number of designs to be completed without the need for any additional hardware. The Basys3 board also include enough uncommitted FPGA I/O pins to allow designs to be expanded using custom boards and circuits. <ol style="list-style-type: none"> <li>1. On-board XC7A35T-1CPG236C Xilinx Artix-7 FPGA</li> <li>2. 16 user switches, 16 user LEDs and 5 user pushbuttons</li> <li>3. 4 digit 7 segment display</li> <li>4. 3 standard 12 pin Pmod and 1 dual purpose XADC signal/standard Pmod connector</li> <li>5. 12bit VGA output</li> <li>6. FTDI FT2232HQ USB-UART bridge</li> <li>7. 32Mbit non - volatile serial flash</li> <li>8. Digilent USB-JTAG port for FPGA programming and communication</li> <li>9. USB HID host for mice, keyboards and memory sticks</li> <li>10. Poly coated imported pine wooden cabinet</li> <li>11. Necessary USB Connecting wires</li> </ol>	05
47	8051 Microcontroller Trainer Kit	<ol style="list-style-type: none"> <li>1. 8051/89c52 CPU operating @ 11.0592 MHz.</li> <li>2. 32K user RAM with Battery Backup, 16K bytes monitor EPROM</li> <li>3. Peripherals like 2x 8255, 8253, 8251, RS-232 interface</li> <li>4. On-board Single Line Assembler / Disassembler</li> <li>5. 20x2 Alphanumeric LCD Display with Backlite with 101 ASCII Keyboard</li> <li>6. In-Built Power Supply of +5V/1.5A, <math>\pm 12V/250mA</math></li> <li>7. Two External interrupts INT0 &amp; INT1 are available at 40 pin FRC connector.</li> <li>8. RS-232C using RX/TX of 8051</li> <li>9. Poly coated imported pine wooden cabinet</li> </ol>	04



## Annexure - A

### Tender Form & Terms and Conditions for Tendering

Tender submission should be addressed to:

The Principal  
Government College of Engineering  
Amravati – 444 604 (M.S.)

Reference: GCoEA/E&Tc/Trainer kits/2024-25/197 , Dt.:8/01/2025

We, the undersigned have examined the above mentioned Tender Notice and after having understood the requirement of your office and fully abiding by your terms and conditions, now offer to supply and deliver the required products in accordance with your demand/order in conformity with the specifications and rate given here.

#### **Terms and Conditions:**

##### **1. Scope of Work:**

- a. Supply:** All aspects of safe delivery shall be the exclusive responsibility of the successful bidder. At the destination site, the cartons will be opened only in the presence of official deputed by the purchaser and the intact position of the Seal for not being tampered with, shall form the basis for certifying the receipt in good condition. The successful bidder should deliver the items within 15 days (including holidays) from the date of PO, failing which penalty as per tender clause will be applicable. The successful bidder should deliver and install all the items at specified site without any additional charge.
- b. Installation & Commissioning:** The selected bidder shall complete installation and subsequent commissioning, without any charges on GCoE, Amravati, within next 10days (including holidays) from the date of supply of product at purchaser's address. During installation at GCoEA, if any item is found to be defective or broken, it will be replaced with new one by the Vendor at its own cost and risk within 10 days from the date on which the vendor has been informed of such damage.
- 2. Onsite Warranty and Maintenance:** The warranty period for the systems shall be of one year. And will be from the date of completion of supply of products, its successful installation/commissioning and acceptance by Purchaser, including free spare parts, etc.
- 3. Taxes, Duties, Levies and Incidental Expenses:** The bidder will bear all Taxes, Duties, Levies and Incidental Expenses including Boarding, Lodging & conveyance etc. of the team.
- 4. Indemnity:** Bidder shall at all times indemnify GCoEA being unlimited with the time, against all claims, which may be made in respect of the said work for infringement of any rights protected by patent registration, design or trade mark. In the event of any claim in respect of any alleged breach of a patent, registered design or trade being made against GCoEA, it shall notify to the Bidder and the Bidder shall at its own expense, either settles any such dispute or conduct any litigation that may arise, there from.
- 5. Force Majeure:** The force Majeure condition may include but not limited to Fires, explosions, floods, earthquakes, strikes, mobilization, wars, acts of God, acts of Government, etc. The contract delivery period may be extended in case of Force Majeure condition. In order to be able to obtain an extension to the contract delivery period, the bidder shall promptly notify GCoE, Amravati



advising the existence of such an event, not later than two weeks of such event happening and produce the necessary documents such as a certificate of Chamber of Commerce or any other competent authority indicating the scope; of such an event, and its impact on the performance of the contract and show that such an event is not attributable to any failures on its part.

6. **Termination for Default:** The Purchaser may, without prejudice to any other remedy for breach of contract, by written notice of default, sent to the Supplier, terminate this Contract in whole or in part. If the Supplier fails to deliver any or all of the goods within the time period(s) specified in the Contract, or any extension thereof granted by the Purchaser; If the Supplier fails to perform any other obligation(s) under the Contract; and If the Supplier, in either of the above circumstances, does not remedy his failure within a period of 30 days (or such longer period as the Purchaser may authorize in writing) after receipt of the default notice from the Purchaser.
7. **Penalty Clause:** The supply and installation should start as per the date mentioned in the supply order. If service is not started within the mentioned period then penalty charges of 1% of the cost mentioned in the supply order per week will be applied on the service provider subjected to maximum 5% penalty charges of the cost mentioned in the supply order. Final decision in this regard shall be taken by The Principal, Govt. College of Engineering, Amravati.
8. **Cost of Bidding:** The Bidder shall bear all costs associated with the preparation and submission of its tender, and the Purchaser will in no case be responsible or liable for these costs, regardless of the conduct or outcome of the tendering process.
9. The bidder is further required to understand that The Principal, Govt. College of Engineering, Amravati is not bound to accept the lowest or any bid that may be received against this tender enquiry.
10. Details of the bidder in prescribed format i.e. Annexure-B of the tender form on the Letter Head of the bidders' firm should be submitted with tender submission.

**11. Declaration by the bidder:**

I hereby fully agree to all the terms and conditions mentioned above by the Principal, Government College of Engineering, Amravati for supply of '**Trainer kis**', (with one year onsite warranty and maintenance) for GCoE, Amravati.

I further declare that, I am fully aware of the fact that the Products provided by me towards this tender of GCoE, Amravati shall be in line with the above terms and conditions and with any other factor put forward by Government College of Engineering, Amravati as and when required.

We accept all terms and conditions of the aforesaid Tender Enquiry.

Date:

Name & Signature of the Bidder with Designation

Seal of the Bidder:

Note: Official seal of the firm and signature of authorized signatory is to be appended on each page of this Tender form/Bid.



### Specification and Description of the Product:

Sr. No.	Name of the Product	Specifications and Description along with leaflet
1	Amplitude Modulation & Demodulation	
2	Frequency Modulation & Demodulation	
3	Phase Modulation & Demodulation	
4	Pre-emphasis and De-emphasis	
5	Frequency Division Multiplexing & De-multiplexing	
6	Time Division Multiplexing & De-multiplexing	
7	Pulse Code Modulation and Demodulation	
8	Noise Power Spectral Density measurement kit	
9	Automatic Gain Control	
10	DSB-SC Modulation and Demodulation	
11	SSB-SC Modulation and Demodulation	
12	Signal Sampling and Reconstruction Trainer	
13	PAM, PWM and PPM modulation and Demodulation	
14	AM Super heterodyne Radio Receiver Demonstrator	
15	RF Characteristics of AM Radio Receiver Demonstrator (Selectivity, Sensitivity, Fidelity)	
16	DPCM Modulation and Demodulation	
17	Delta Modulation and Demodulation	
18	Adaptive Delta Modulation and Demodulation	
19	ASK, FSK, PSK modulation and Demodulation	
20	BPSK, QPSK Modulation and Demodulation	
21	DPSK Modulation Demodulation	
22	QAM Modulation and Demodulation	
23	PN Sequence Generator	
24	Hamming Code Generator	
25	Error Detection and Correction Trainer	
26	Half Wave, Full Wave Rectifiers with L, C filters	
27	Diode Clipper and Clamper Circuit	
28	Zener Diode as Voltage Regulator	
29	Voltage Regulator using LM78XX, LM79XX	
30	Transistor input and output Characteristics for CB, CE and CC configuration	
31	Biasing schemes for BJT (All Types)	
32	Single Stage Transistor Amplifier (CB, CE, CC)	
33	Transistorised Class A, B, AB, C Amplifiers	
34	Study of H-Parameters of CE configuration	
35	Study of positive and negative feedback in amplifier	
36	Transistorised Astable, Monostable and Bistable multivibrator	
37	MOSFET Oscillators	
38	MOSFET as a Relay Driver Circuit	
39	JFET and MOSFET input and output Characteristics for CG, CS and CD configuration	
40	JFET and MOSFET Biasing methods	
41	Single Stage FET, MOSFET Amplifier (CG, CS, CD)	

42	BJT Oscillators: Hartley, Colpitts, RC Phase Shift, Wein Bridge	
43	Temperature Measurement using RTD, Thermistor, Thermo-couple	
44	Measurement of Strain using Strain Guage	
45	Pressure Measurement using Bourdon Tube, Pressure guage	
46	FPGA development board	
47	8051 Microcontroller Trainer Kit	



## **Annexure - B**

(Tender for supply of 'Trainer kits' with one year onsite warranty for Department of Electronics Engineering of GCoE, Amravati)

### **DETAILS OF THE FIRM *(on the Letter Head of the firm)***

**1. Name of the firm:** \_\_\_\_\_

**2. Office Address:** \_\_\_\_\_  
\_\_\_\_\_

**3. Tel. & Mob. Nos.:** \_\_\_\_\_

**4. FAX No./Email ID:** \_\_\_\_\_

#### **5. Details of Directors / Partners / Proprietor of the firm:**

a) Name(s):

b) Residence Address(s):

c) Mobile No.(s):

**6. GST Registration No./TIN No.:** \_\_\_\_\_

**7. PAN No. of the Firm/Proprietor:** \_\_\_\_\_

#### **Declaration by the bidder:**

I hereby fully agree to all the terms and conditions mentioned above by the Principal, Government College of Engineering, Amravati for supply of 'Trainer kis' (with one year onsite warranty) for various engineering departments of GCoE, Amravati.

I further declare that, I am fully aware of the fact that the Products provided by me towards this tender of GCoE, Amravati shall be in line with the above terms and conditions and with any other factor put forward by Government College of Engineering, Amravati as and when required.

We accept all terms and conditions of the aforesaid Tender Enquiry.

Date:

Name & Signature of the Bidder with Designation

Seal of the Bidder:

## **Proforma - C**

### **Proforma of No-Deviation Certificate** *(on the Letter Head of the firm)*

Name of the Service Provider:

Specification of Product stated in Tender Enquiry step by step as per specifications mentioned in tender document	Specification of Product offered by the bidder step by step	Whether there are deviation from the tender specification, Yes / No	If yes, indicate clearly which the deviations are
1	2	3	4
Specification detail 1			
Specification detail 2			
etc.			

Signature of Bidder with Seal



**Annexure – D (on the letter head of issuing organization)**

**Proforma of Experience/Performance of Supplier**

Certified that performance of the service provider and after sales service provided by M/S \_\_\_\_\_

\_\_\_\_\_ is as given below:-

Sr. No.	Name of Service	Supply Order No.& Date	Date& Location of Start of Service	No. of failures during Service period (Please Give details)	No. of failures after expiry of Service period (Please Give details)	Service provided by supplier** Unsatisfactory /Satisfactory	Remark Please attach service reports of the supplier, if any
1							
2							
3							
4							
5							
etc..							

\*\* Specific remarks only to be given in words specified.

Signature of Head of  
Institute/Organization/Office/Department  
With name and seal of the Office