

**FACULTY OF ENGINEERING**  
**UNIVERSITY OF LUCKNOW**  
*Second Campus, Jankipuram, Lucknow-226031 (U.P.)*

**TENDER NOTICE**

The University of Lucknow, Lucknow invites sealed tender from eligible bidders for supply testing and commissioning of Equipments for **Electronics & Communication Engineering laboratories** of Faculty of Engineering, University of Lucknow, Second Campus, Jankipuram, Lucknow-226031 (U.P.). Separate tenders must be submitted at University of Lucknow for each package of following Electrical Engineering Laboratories:

- |                          |  |
|--------------------------|--|
| Package – FOE/EC/01/2019 | - Communication Engineering Laboratory |
| Package – FOE/EC/02/2019 | - Integrated Circuits Laboratory       |
| Package – FOE/EC/03/2019 | - Microwave Laboratory                 |

**For Tender Documents, Tender Cost, EMD, Specifications of equipments and other details please visit our website: [www.lkouni.ac.in](http://www.lkouni.ac.in)**

**REGISTRAR**  
**University of Lucknow**

**FACULTY OF ENGINEERING**  
**UNIVERSITY OF LUCKNOW**  
**Second Campus, Jankipuram, Lucknow-226031 (U.P.)**

**TENDER DOCUMENT**

Tender No. - 01/FOE/LU/2019

Date:

Sealed and separate tenders in two parts i.e. tender bid-I (Technical) and tender bid-II (Financial) are herewith invited for Supply & Commissioning of **Electronics & Communication Engineering laboratories** Equipments at **Faculty of Engineering, University of Lucknow, Second Campus, Jankipuram, Lucknow-226031 (U.P.)**, along with Earnest money (Mentioned with package/unit) in the shape of Demand Draft of Nationalized Bank in favour of Finance Officer, University of Lucknow, Lucknow (U.P.). Both envelopes should be kept in one big envelope. The tender should reach to the undersigned latest **20.06.2019 at 02.00 PM.**

**Terms & Conditions**

1. Tenders are being invited for purchase and commissioning of equipments to establish various laboratories. Each Laboratory will be treated as one package/unit. It is obligatory that a firm selected for the establishment of a Laboratory shall supply all the equipments of that laboratory. The firm will also complete the work of installation/mounting and commissioning of these equipments.
2. Bid Evaluation Criteria: Bid shall be evaluated for whole package.
3. Details of equipments/materials are as per bill of quantity attached.
4. Tenders should be submitted either in person or by post in sealed envelopes on which name of package/unit, tender number and date along with name and address of the firm will be written.
5. **TENDER BID-I** (Technical) shall contain (i) Tender cost (non refundable) (ii) Earnest Money (iii) Proof of PAN and GST registration documents (iv) Standing of the firm (v) Major supplies executed in recent past (vi) Authorized dealer certificate from OEM & Commercial terms and conditions.  
**TENDER BID-II** (Financial) shall contain rate schedule only. The rates per unit must be quoted both in figures and words. Any overwriting and/or cutting must be duly signed failing which tenders are likely to be rejected.
6. Tenders received after due date and time will not be considered.
7. EMD of all unsuccessful bidders will be refunded after opening of tenders. However, EMD of successful bidder will be refunded only after successful installation and commissioning of equipments and due verification by concerned authority.
8. DD of Rs. 1000/- being cost of tender per package has to be attached with Tender form in favour of **Finance Officer, University of Lucknow** payable at Lucknow, which is not refundable in any case.
9. Price quoted should be F.O.R. **Faculty of Engineering, University of Lucknow, Second Campus, Jankipuram, Lucknow-226031 (U.P.)**.
10. Minimum turnover of the firm should be one crore per year (enclosed certificate).
11. The firm should have wide experience of similar work executed during last three years in academic institutions. The proof for the same should be attached.

12. Detailed specifications and make of the equipments/ materials must be given.
13. All available technical literature, catalogues and other data sheets in support of the Specifications and details of the items should be furnished along with the technical bid.
14. All the supplied equipment must have minimum warranty of one year on site from the Date of installation and acceptance by Faculty of Engineering, University of Lucknow.
15. Quoted items should be strictly in order of merit with serial number and metric unit otherwise the tenders are liable to be ignored.
16. Conditions regarding validity of tenders, delivery period, payment discount, warrantee and guarantee period, GST, custom duty and insurance etc. should be mentioned clearly. Net prices should be quoted.
17. No sales tax form "CZX" or 'D' etc. for concessional rates shall be provided by the University.
18. Quoted rates should be valid for at least **six months** from the date of opening of tender.
19. Tenders without sample wherever required may not be accepted.
20. In case of imported equipments, commission allowed to agents must be specifically mentioned.
21. The equipments manufactured in China will not be accepted.
22. Free demonstration shall be done in the University premises if required.
23. Insurance during transport shall be done by the suppliers at their own cost.
24. Tenders without mentioned earnest money deposit will not be entertained.
25. Standing of the firm and major supplies carried out in recent past with proof must be attached.
26. In case of dealers, authorized distributors, dealer's certificate from OEM is required
27. Document through bank and advance payment on proforma invoice shall not be accepted.
28. The items and quantity mentioned in bill of quantity against each item will be treated as provisional and it may be changed depending on actual requirement.
29. Payment will be made only after successful installation and commissioning of equipments in the concerned Laboratory and due verification by concerned authority.
30. If the supply is not made within one month, the firm shall be liable to pay a penalty equal to 0.10% of value of purchase order per day. However this can be waved off by the Hon'ble Vice Chancellor under special circumstances. If the firm fails to supply the equipments the earnest money deposit will be forfeited.
31. Deduction of TDS as per Govt. Rules.
32. Tenders will be opened in the presence of Tender Committee and bidders or their authorized representatives who wish to be present on the date of opening.
33. Any dispute will be subject to **Lucknow (U.P.)**, Jurisdiction only.
34. Conditional tenders will not be accepted.
35. Authorized signatory has to keep all the original documents at the time of opening of tender.
36. The Vice-Chancellor has the right to accept or reject any or all tenders without assigning any reason.

**I/We have read and understood the above conditions and agree to abide by them.**

**Authorized Signatory & Seal of the Bidder/Proprietor**

**FACULTY OF ENGINEERING**  
**UNIVERSITY OF LUCKNOW**  
*Second Campus, Jankipuram, Lucknow-226031 (U.P.)*

**TENDER BID-I (Technical)**

<b>Tender</b>	<b>Purchase and Commissioning of Equipments for Electronics &amp; Communication Engineering laboratories</b>
<b>Package No.</b>	
Name of the firm with full address and contact number	
For	Faculty of Engineering, University of Lucknow, Second Campus, Jankipuram, Lucknow-226031 (U.P.)
Cost of Tender Document	DD No: _____ Amount: _____ Bank: _____ Date: _____ Drawn in favour of Finance Officer, University of Lucknow, payable at Luckow (U.P.).
Earnest Money Deposit	DD No: _____ Amount: _____ Bank: _____ Date: _____ Drawn in favour of Finance Officer, University of Lucknow, payable at Luckow (U.P.).
PAN/GST No	PAN GST (Attach proof)
Income Tax Return of last three years	Attach Copy
Original Equipment Manufacturers/Authorization Letter from O.E.M.	Attach proof
Turnover in the last three years	Attach proof
Details of Similar Work Executed during last Three years in academic institutions	Attach proof
Place of Tender Submission	Proctor Office, University of Lucknow, Old Campus, Lucknow- 226 007 (U.P.)
Last Date of Tender Submission	Date:- 20.06.2019 Time:- 02.00 PM
Place of Tender Opening	Registrar Office, Committee Room, Lucknow University (Old Campus), Lucknow.
Opening of Tender	Date:- 22.06.2019 Time:- 02.00 PM

**Signature and Seal of Bidders**

## TENDER BID-II (Financial)

### Package-FOE/EC/01: Communication Engineering Laboratory

**Tender Cost: Rs. 1000/-+ Rs. 180 GST**

**EMD: Rs. 16,000=00**

### Bill of Quantity

S.No.	Name of the Kit / Equipment	Specification	Qty.	Unit Cost	Total Cost
1.	<b>Amplitude Modulation &amp; Demodulation Kit</b>	<ul style="list-style-type: none"> <li>• On board Carrier Frequency generator</li> <li>• On board Modulating Signal generator</li> <li>• On board Amplitude Modulator circuit</li> <li>• On board Amplitude Demodulator circuit</li> <li>• On-board potentiometer for varying depth / percent of modulation</li> <li>• On board Op Amp Based Amplifier</li> <li>• 2 On board Function Generator -Sine , Square, Triangular- 1MHz variable in between.</li> <li>• On board Interactive Manual using Graphical LCD (128x64).</li> <li>• Test points are provided to analyse signals at various points</li> <li>• ON/OFF switch and LED for power indication.</li> <li>• Bare board Tested Glass Epoxy SMOBC PCB is used.</li> <li>• Block Description Screen printed on PCB</li> <li>• All interconnections are made using 2mm banana Patch cords</li> <li>• Supplied with User manual and patch cords</li> <li>• With built-in power supply                             <ul style="list-style-type: none"> <li>• Enclosed in a wooden/plastic box</li> </ul> </li> </ul>	05		
2	<b>Frequency Modulation &amp; Demodulation Kit</b>	<ul style="list-style-type: none"> <li>• On board Carrier Frequency generator</li> <li>• On board Modulating Signal generator</li> <li>• On board Frequency Modulator circuit</li> <li>• On board Frequency Demodulator circuit</li> <li>• 2 On board Function Generator -Sine , Square, Triangular- 1MHz variable in between.</li> <li>• On board Interactive Manual using Graphical LCD (128x64).</li> <li>• Test points are provided to analyse</li> </ul>	05		

		<p>signals at various points</p> <ul style="list-style-type: none"> <li>• ON/OFF switch and LED for power indication.</li> <li>• Bare board Tested Glass Epoxy SMOBC PCB is used.</li> <li>• Block Description Screen printed on PCB</li> <li>• All interconnections are made using 2mm banana Patch cords</li> <li>• Supplied with User manual and patch cords</li> <li>• With built-in power supply</li> <li>• Enclosed in a wooden/plastic box</li> </ul>			
3	<b>Pulse Amplitude Modulation &amp; Demodulation Kit</b>	<ul style="list-style-type: none"> <li>• On board Carrier Frequency generator</li> <li>• On board Modulating Signal generator</li> <li>• On board Synchronous Clock</li> <li>• On board PAM Modulator circuit</li> <li>• On board PAM Demodulator circuit</li> <li>• 2 On board Function Generator -Sine , Square, Triangular- 1MHz variable in between.</li> <li>• On board Interactive Manual using Graphical LCD (128x64).</li> <li>• Test points are provided to analyse signals at various points</li> <li>• ON/OFF switch and LED for power indication.</li> <li>• Bare board Tested Glass Epoxy SMOBC PCB is used.</li> <li>• Block Description Screen printed on PCB</li> <li>• All interconnections are made using 2mm banana Patch cords</li> <li>• Supplied with User manual and patch cords</li> <li>• With built-in power supply</li> </ul> <p>Enclosed in a wooden/plastic box</p>	05		
4	<b>Pulse Position Modulation &amp; Demodulation Kit</b>	<ul style="list-style-type: none"> <li>• On board Carrier Frequency generator</li> <li>• On board Modulating Signal generator</li> <li>• On board Synchronous Clock</li> <li>• On board PPM Modulator circuit</li> <li>• On board PPM Demodulator circuit</li> <li>• 2 On board Function Generator -Sine , Square, Triangular- 1MHz variable in between.</li> <li>• On board Interactive Manual using Graphical LCD (128x64).</li> <li>• Test points are provided to analyse signals at various points</li> <li>• ON/OFF switch and LED for power indication.</li> </ul>	03		

		<ul style="list-style-type: none"> <li>• Bare board Tested Glass Epoxy SMOBC PCB is used.</li> <li>• Block Description Screen printed on PCB</li> <li>• All interconnections are made using 2mm banana Patch cords</li> <li>• Supplied with User manual and patch cords</li> <li>• With built-in power supply</li> </ul> <p>Enclosed in a wooden/plastic box</p>			
5	<b>Pulse Width Modulation &amp; Demodulation Kit</b>	<ul style="list-style-type: none"> <li>• On board Carrier Frequency generator</li> <li>• On board Modulating Signal generator</li> <li>• On board Synchronous Clock</li> <li>• On board PWM Modulator circuit</li> <li>• On board PWM Demodulator circuit</li> <li>• 2 On board Function Generator -Sine , Square, Triangular- 1MHz variable in between.</li> <li>• On board Interactive Manual using Graphical LCD (128x64).</li> <li>• Test points are provided to analyse signals at various points</li> <li>• ON/OFF switch and LED for power indication.</li> <li>• Bare board Tested Glass Epoxy SMOBC PCB is used.</li> <li>• Block Description Screen printed on PCB</li> <li>• All interconnections are made using 2mm banana Patch cords</li> <li>• Supplied with User manual and patch cords</li> <li>• With built-in power supply</li> </ul> <p>Enclosed in a wooden/plastic box</p>	03		
6	<b>Delta Modulation &amp; Demodulation Kit</b>	<ul style="list-style-type: none"> <li>• On board TTL Clock Generator</li> <li>• On board Modulating Signal Generator 1KHz with variable Amplitude</li> <li>• On board DELTA Modulator circuit</li> <li>• On board DELTA Demodulator circuit</li> <li>• 2 On board Function Generator -Sine , Square, Triangular- 1MHz variable in between.</li> <li>• On board Interactive Manual using Graphical LCD (128x64).</li> <li>• Test points are provided to analyse signals at various points</li> <li>• ON/OFF switch and LED for power indication.</li> <li>• Bare board Tested Glass Epoxy</li> </ul>	03		

		<p>SMOBC PCB is used.</p> <ul style="list-style-type: none"> <li>• Block Description Screen printed on PCB</li> <li>• All interconnections are made using 2mm banana Patch cords</li> <li>• Supplied with User manual and patch cords</li> <li>• With built-in power supply</li> <li>• Enclosed in a wooden/plastic box</li> </ul>			
7	<b>Pulse Code Modulation and Demodulation</b>	<ul style="list-style-type: none"> <li>• On board TTL clock generator 20khz</li> <li>• On board modulating signal generator</li> <li>• On board PCM encoder</li> <li>• On board PCM decoder</li> <li>• On board data display with LED'S</li> <li>• 2 On board Function Generator -Sine , Square, Triangular- 1MHz variable in between.</li> <li>• On board Interactive Manual using Graphical LCD (128x64).</li> <li>• Test points are provided to analyse signals at various points</li> <li>• ON/OFF switch and LED for power indication.</li> <li>• Bare board Tested Glass Epoxy SMOBC PCB is used.</li> <li>• Block Description Screen printed on PCB</li> <li>• All interconnections are made using 2mm banana Patch cords</li> <li>• Supplied with User manual and patch cords</li> <li>• With built-in power supply</li> <li>• Enclosed in a wooden/plastic box</li> </ul>	03		
8	<b>DSB/SSB AM Transmitter Trainer</b>	<ul style="list-style-type: none"> <li>• On board modulator for DSB/SSB</li> <li>• On board Band Pass filter</li> <li>• On board audio Oscillator with variable frequency and amplitude</li> <li>• Audio output amplifier with speaker</li> <li>• Crystal controlled carrier frequency</li> <li>• 2 On board Function Generator -Sine , Square, Triangular- 1MHz variable in between.</li> <li>• On board Interactive Manual using Graphical LCD (128x64).</li> <li>• Test points are provided to analyse signals at various points</li> <li>• ON/OFF switch and LED for power indication.</li> <li>• Bare board Tested Glass Epoxy SMOBC PCB is used.</li> <li>• Block Description Screen printed on PCB</li> </ul>	03		



		<ul style="list-style-type: none"> <li>All interconnections are made using 2mm banana Patch cords</li> <li>Supplied with User manual and patch cords</li> <li>With built-in power supply</li> <li>Enclosed in a wooden/plastic box</li> </ul>			
9	<b>DSB/SSB AM Receiver Trainer</b>	<ul style="list-style-type: none"> <li>Input circuit(RF amplifier, Mixer, Local Oscillator, Beat frequency Oscillator, IF Amplifier)</li> <li>Detector Circuit:Diode Detector(DSB), Product Detector(SSB)</li> <li>Audio output Amplifier</li> <li>Fault switches</li> <li>2 On board Function Generator -Sine , Square, Triangular- 1MHz variable in between.</li> <li>On board Interactive Manual using Graphical LCD (128x64).</li> <li>Test points are provided to analyse signals at various points</li> <li>ON/OFF switch and LED for power indication.</li> <li>Bare board Tested Glass Epoxy SMOBC PCB is used.</li> <li>Block Description Screen printed on PCB</li> <li>All interconnections are made using 2mm banana Patch cords</li> <li>Supplied with User manual and patch cords</li> <li>With built-in power supply</li> <li>Enclosed in a wooden/plastic box</li> </ul>	03		
10	<b>5MHz Function Generator</b>	<ul style="list-style-type: none"> <li>0.5 Hz to 5 MHz Function Generators with sine , square, triangle, TTL &amp; DC</li> <li>DC Offset adjustment</li> <li>Square wave Rise time better than 30 ns</li> <li>Microprocessor based design</li> <li>Distortion factor &lt; 0.5%</li> <li>Internal Sweep and External Frequency Modulation</li> <li>Backlit LCD display for modes and frequency</li> </ul>	06		
11	<b>100MHz DSO</b>	<ul style="list-style-type: none"> <li>Signal bandwidth: 100 MHz</li> <li>Real-time sampling rate: Max. 1 GSa/s Equivalent sampling rate: Max. 50 GS/s</li> <li>7.0" TFT LCD Color display</li> <li>2 Mpts memory depth</li> <li>Independent vertical scale &amp; position control knobs for each channel</li> <li>Edge, Pulse Width, Video, Slope, Alternate trigger mode</li> <li>Math functions including add, Subtract, Multiply, Divide &amp; 1024 point FFT</li> <li>32 parameters of automatic measurements</li> </ul>	05		

		<ul style="list-style-type: none"> <li>• Unique Digital Filter &amp; Waveform recorder function</li> <li>• Advanced cursor modes: Manual, Auto &amp; Track</li> <li>• Waveform Intensity &amp; Grid Brightness can be adjusted</li> <li>• PASS / FAIL detection, PASS/FAIL output</li> <li>• Built-in 100 MHz hardware frequency counter</li> <li>• Save/recall types: Setups, Waveforms, CSV file, Picture</li> <li>• Standard Interface USB Host: Support USB flash driver save/recall function &amp; update firmware, USB Device: Support PictBridge compatible printer &amp; support PC remote control, RS232, Pass/Fail Output</li> </ul>			
<b>12</b>	<b>CRO 30 MHZ</b>	<ul style="list-style-type: none"> <li>• Dual Channel, DC to 30 MHz, Invert facility in both Channels</li> <li>• Vertical Deflection coefficients : 5 mV to 20 V/div.</li> <li>• Time Base: 20 ns -0.2 s/ div; Variable Hold- Off; X10 Magnification</li> <li>• Triggering: DC-60 MHz; Active TV Sync Sep.; Alternate triggering</li> <li>• LED indication for stable triggering</li> <li>• XY mode</li> <li>• Z Modulation</li> <li>• Saw tooth output (5 Vpp approx )</li> <li>• Component Tester; 2 Level Calibrator</li> </ul>	02		
<b>13</b>	Amplitude Shift Keying Modulation & Demodulation Kit	<ul style="list-style-type: none"> <li>• On board AF Signal Generator</li> <li>• On board Clock Generator 62.5Hz, 125Hz, 250Hz &amp; 500Hz</li> <li>• On board ASK Modulator circuit</li> <li>• On board ASK Demodulator circuit</li> <li>• 2 On board Function Generator -Sine , Square, Triangular- 1MHz variable in between.</li> <li>• On board Interactive Manual using Graphical LCD (128x64).</li> <li>•</li> <li>• Test points are provided to analyse signals at various points</li> <li>• ON/OFF switch and LED for power indication.</li> <li>• Bare board Tested Glass Epoxy SMOBC PCB is used.</li> <li>• Block Description Screen printed on PCB</li> <li>• All interconnections are made using 2mm banana Patch cords</li> <li>• Supplied with User manual and patch</li> </ul>	05		

		<ul style="list-style-type: none"> <li>• cords</li> <li>• With built-in power supply</li> <li>• Enclosed in a wooden/plastic box</li> </ul>			
14	<b><u>Frequency Shift Keying Modulation &amp; Demodulation Kit</u></b>	<ul style="list-style-type: none"> <li>• On board Carrier Generator @ 5KHz</li> <li>• On board Modulating Signal Generator using 7490</li> <li>• On board data clock</li> <li>• On board FSK Modulator circuit</li> <li>• On board FSK Demodulator circuit</li> <li>• 2 On board Function Generator -Sine , Square, Triangular- 1MHz variable in between.</li> <li>• On board Interactive Manual using Graphical LCD (128x64).</li> <li>• Test points are provided to analyse signals at various points</li> <li>• ON/OFF switch and LED for power indication.</li> <li>• Bare board Tested Glass Epoxy SMOBC PCB is used.</li> <li>• Block Description Screen printed on PCB</li> <li>• All interconnections are made using 2mm banana Patch cords</li> <li>• Supplied with User manual and patch cords</li> <li>• With built-in power supply</li> <li>• Enclosed in a wooden/plastic box</li> </ul>	05		
15	<b><u>Phase Shift Keying Modulation &amp; Demodulation Kit</u></b>	<ul style="list-style-type: none"> <li>• On board Carrier Generator</li> <li>• On board Modulating Signal Generator using 7490</li> <li>• On board data clock</li> <li>• On board PSK Modulator circuit</li> <li>• On board PSK Demodulator circuit</li> <li>• 2 On board Function Generator -Sine , Square, Triangular- 1MHz variable in between.</li> <li>• On board Interactive Manual using Graphical LCD (128x64).</li> <li>• Test points are provided to analyse signals at various points</li> <li>• ON/OFF switch and LED for power indication.</li> <li>• Bare board Tested Glass Epoxy SMOBC PCB is used.</li> <li>• Block Description Screen printed on PCB</li> <li>• All interconnections are made using</li> </ul>	05		

		<p>2mm banana Patch cords</p> <ul style="list-style-type: none"> <li>• Supplied with User manual and patch cords</li> <li>• With built-in power supply</li> <li>• Enclosed in a wooden/plastic box</li> </ul>			
16	<b><u>QPSK Modulation &amp; Demodulation Kit</u></b>	<ul style="list-style-type: none"> <li>• On board carrier generator-</li> <li>• On board Quadric phase carrier generator</li> <li>• On board Data generator</li> <li>• On board Bit pair data generator</li> <li>• On board QPSK modulator circuit</li> <li>• On board QPSK demodulator circuit</li> <li>• 2 On board Function Generator -Sine , Square, Triangular- 1MHz variable in between.</li> <li>• On board Interactive Manual using Graphical LCD (128x64).</li> <li>• Test points are provided to analyse signals at various points</li> <li>• ON/OFF switch and LED for power indication.</li> <li>• Bare board Tested Glass Epoxy SMOBC PCB is used.</li> <li>• Block Description Screen printed on PCB</li> <li>• All interconnections are made using 2mm banana Patch cords</li> <li>• Supplied with User manual and patch cords</li> <li>• With built-in power supply</li> <li>• Enclosed in a wooden/plastic box</li> </ul>	03		
17	<b><u>Manchester Coding and Decoding Trainer</u></b>	<ul style="list-style-type: none"> <li>• On board Manchester coding circuit</li> <li>• On board Manchester decoding circuit</li> <li>• On board digital data generator in RZ format</li> <li>• On board digital data generator in NRZ format</li> <li>• On board bit clock recovery</li> <li>• On board Interactive Manual using Graphical LCD (128x64).</li> <li>• ON/OFF switch and LED for power indication.</li> <li>• Bare board Tested Glass Epoxy SMOBC PCB is used.</li> <li>• Block Description Screen printed on PCB</li> <li>• All interconnections are made using</li> </ul>	02		

		<p>2mm banana Patch cords</p> <ul style="list-style-type: none"> <li>• Supplied with User manual and patch cords</li> <li>• With built-in power supply</li> </ul> <p>Enclosed in a wooden/plastic box</p>			
18	<b><u>Data Coding and Decoding Technique Trainer</u></b>	<ul style="list-style-type: none"> <li>• On board data coding circuit</li> <li>• On board data decoding circuit</li> <li>• On board digital data generator in NRZ format</li> <li>• On board study of data encoding in NRZ-L format</li> <li>• On board study of data encoding in NRZ-M format</li> <li>• On board study of data encoding in NRZ-E format</li> <li>• On board bit clock recovery</li> <li>• On board Interactive Manual using Graphical LCD (128x64).</li> <li>• ON/OFF switch and LED for power indication.</li> <li>• Bare board Tested Glass Epoxy SMOBC PCB is used.</li> <li>• Block Description Screen printed on PCB</li> <li>• All interconnections are made using 2mm banana Patch cords</li> <li>• Supplied with User manual and patch cords</li> <li>• With built-in power supply</li> <li>• Enclosed in a wooden/plastic box</li> </ul>	02		
19	<b><u>DPSK Mod &amp; Dmod</u></b>	<p>Experiment Trainer board that Contains:-  Provides Sine waveform output using IC 8038,  Frequency variable from 10KHz. - 20 KHz.  Amplitude variable up to Maximum 5V p-p,  Four Nos. of Data Clock using IC 7490,  PSK-modulator circuit using IC TL084 and Two  Nos. of IC 4051,  PSK -Demodulator using IC 7486 and IC 74164  Experiments:-  Study of Differential Phase Shift Keying  Modulation  Study of Differential Phase Shift Keying  Demodulation  On board Interactive Manual using Graphical LCD  (128x64).</p>	03		

## TENDER BID-II (Financial)

### Package-FOE/EC/02: INTEGRATED CIRCUITS LAB

Tender Cost: Rs. 1000/-+ Rs. 180 GST

EMD: Rs.7,000=00

#### Bill of Quantity

S.No.	Name of the Kit / Equipment	Specification	Qty.	Unit Cost	Total Cost
1.	<b>Measurements of op-amp parameters</b>	<ul style="list-style-type: none"> <li>• On board circuit to study different types of op-amp parameters like:</li> <li>• Open loop gain</li> <li>• CMRR</li> <li>• Slew rate</li> <li>• ON/OFF switch and LED for power indication.</li> <li>• On board Interactive Manual using Graphical LCD (128x64).</li> <li>• Bare board Tested Glass Epoxy SMOBC PCB is used.</li> <li>• Block Description Screen printed on glassy epoxy PCB</li> <li>• All interconnections are made using 2mm banana Patch cords</li> <li>• Supplied with User manual and patch cords</li> <li>• With built-in power supply</li> </ul> <p>Enclosed in a wooden/plastic box</p>	05		
2	<b>Op-amp as function generator</b>	<ul style="list-style-type: none"> <li>• On board circuit to study op-amp as function generator(Triangular, Sine &amp; Cos Wave)</li> <li>• On board triangle oscillator</li> <li>• On board integrator circuit</li> <li>• On board differentiator circuit</li> <li>• ON/OFF switch and LED for power indication.</li> <li>• On board Interactive Manual using Graphical LCD (128x64).</li> <li>• Bare board Tested Glass Epoxy SMOBC PCB is used.</li> <li>• Block Description Screen printed on glassy epoxy PCB</li> <li>• All interconnections are made using 2mm banana Patch cords</li> <li>• Supplied with User manual and patch cords</li> <li>• With built-in power supply</li> <li>• Enclosed in a wooden/plastic box</li> </ul>	05		
3	<b>Op-amp inverting &amp; non-inverting amplifier</b>	<ul style="list-style-type: none"> <li>• On board circuit to study op-amp as inverting and non-inverting amplifier.</li> <li>• On board Interactive Manual using</li> </ul>	03		

		<p>Graphical LCD (128x64).</p> <ul style="list-style-type: none"> <li>• ON/OFF switch and LED for power indication.</li> <li>• Bare board Tested Glass Epoxy SMOBC PCB is used.</li> <li>• Block Description Screen printed on glassy epoxy PCB</li> <li>• All interconnections are made using 2mm banana Patch cords</li> <li>• Supplied with User manual and patch cords</li> <li>• With built-in power supply Enclosed in a wooden/plastic box</li> </ul>			
4	<b>Op-amp as voltage regulator</b>	<ul style="list-style-type: none"> <li>• On board circuit to study op-amp as voltage regulator.</li> <li>• On board unregulated input 1.2v to 15v</li> <li>• On board Interactive Manual using Graphical LCD (128x64).</li> <li>• ON/OFF switch and LED for power indication.</li> <li>• Bare board Tested Glass Epoxy SMOBC PCB is used.</li> <li>• Block Description Screen printed on glassy epoxy PCB</li> <li>• All interconnections are made using 2mm banana Patch cords</li> <li>• Supplied with User manual and patch cords</li> <li>• With built-in power supply</li> <li>• Enclosed in a wooden/plastic box</li> </ul>	03		
5	<b>V to I &amp; I to V converters</b>	<ul style="list-style-type: none"> <li>• On board circuit to study voltage to current converter</li> <li>• On board circuit to study current to voltage converter</li> <li>• On board variable voltage supply 1.2v to 12v</li> <li>• On board Interactive Manual using Graphical LCD (128x64).</li> <li>• ON/OFF switch and LED for power indication.</li> <li>• Bare board Tested Glass Epoxy SMOBC PCB is used.</li> <li>• Block Description Screen printed on glassy epoxy PCB</li> <li>• All interconnections are made using 2mm banana Patch cords</li> <li>• Supplied with User manual and patch cords</li> <li>• With built-in power supply</li> <li>• Enclosed in a wooden/plastic box</li> </ul>	03		

6	<b>Log and antilog amplifier</b>	<ul style="list-style-type: none"> <li>• On board circuit to study log and antilog amplifier using op-amp.</li> <li>• On board POT for varying amplitude of input signal.</li> <li>• On board Interactive Manual using Graphical LCD (128x64).</li> <li>• On board test point to analyse the signal</li> <li>• ON/OFF switch and LED for power indication.</li> <li>• Bare board Tested Glass Epoxy SMOBC PCB is used.</li> <li>• Block Description Screen printed on glassy epoxy PCB</li> <li>• All interconnections are made using 2mm banana Patch cords</li> <li>• Supplied with User manual and patch cords</li> <li>• With built-in power supply</li> </ul> <p>Enclosed in a wooden/plastic box</p>	05		
7	<b>Active filter using op-amp</b>	<ul style="list-style-type: none"> <li>• On board circuit to study:</li> <li>• Frequency response of Low Pass Filter</li> <li>• Frequency response of High Pass Filter</li> <li>• On board POT to vary input signal</li> <li>• On board Interactive Manual using Graphical LCD (128x64).</li> <li>• ON/OFF switch and LED for power indication.</li> <li>• Bare board Tested Glass Epoxy SMOBC PCB is used.</li> <li>• Block Description Screen printed on glassy epoxy PCB</li> <li>• All interconnections are made using 2mm banana Patch cords</li> <li>• Supplied with User manual and patch cords</li> <li>• With built-in power supply</li> </ul> <p>Enclosed in a wooden/plastic box</p>	05		
8	<b>Phased locked loop using IC 565</b>	<ul style="list-style-type: none"> <li>• On board circuit to study PLL</li> <li>• On board test points to analyse the signal</li> <li>• On board Interactive Manual using Graphical LCD (128x64).</li> <li>• ON/OFF switch and LED for power indication.</li> <li>• Bare board Tested Glass Epoxy SMOBC PCB is used.</li> <li>• Block Description Screen printed on glassy epoxy PCB</li> </ul>	05		



		<ul style="list-style-type: none"> <li>• All interconnections are made using 2mm banana Patch cords</li> <li>• Supplied with User manual and patch cords</li> <li>• With built-in power supply</li> </ul> <p>Enclosed in a wooden/plastic box</p>			
9	<b>Astable and monostable multivibrators using IC555</b>	<ul style="list-style-type: none"> <li>• On board circuit to study Astable Multivibrator</li> <li>• On board circuit to study Monostable Multivibrator</li> <li>• On board Interactive Manual using Graphical LCD (128x64).</li> <li>• ON/OFF switch and LED for power indication.</li> <li>• Bare board Tested Glass Epoxy SMOBC PCB is used.</li> <li>• Block Description Screen printed on glassy epoxy PCB</li> <li>• All interconnections are made using 2mm banana Patch cords</li> <li>• Supplied with User manual and patch cords</li> <li>• With built-in power supply</li> </ul> <p>Enclosed in a wooden/plastic box</p>	05		
10	<b>ADC and DAC Trainer</b>	<ul style="list-style-type: none"> <li>• On board ADC (0809) and DAC(0800)</li> <li>• FOR ADC:</li> <li>• On board eight channel inputs</li> <li>• On board 8 Output LEDs</li> <li>• On board switches for channel selection</li> <li>• On board ADC clock</li> <li>• On board EOC and SOC</li> <li>• On board variable voltage source 0 to 5v</li> <li>• On board test point to measure voltage</li> <li>• FOR DAC:</li> <li>• On board High &amp; Low inputs</li> <li>• On board test point to measure voltage</li> <li>• On board digital voltmeter for voltage measurements.</li> <li>• On board Interactive Manual using Graphical LCD (128x64).</li> <li>• ON/OFF switch and LED for power indication.</li> <li>• Bare board Tested Glass Epoxy SMOBC PCB is used.</li> <li>• Block Description Screen printed on glassy epoxy PCB</li> <li>• All interconnections are made using 2mm banana Patch cords</li> </ul>	03		

		<ul style="list-style-type: none"> <li>• Supplied with User manual and patch cords</li> <li>• With built-in power supply</li> </ul> <p>Enclosed in a wooden/plastic box</p>			
11	<b>Advance Analog cum Digital Trainer Kit</b>	<ul style="list-style-type: none"> <li>• On Board Digital Voltmeter</li> <li>• Power supplies:</li> <li>• +5V and –5V Power Supply.</li> <li>• +12V and –12V Power Supply</li> <li>• 0 to 15V Variable Supply</li> <li>• On Board sine, square and triangular wave generator with variable frequency</li> <li>• On board 10 TTL Input switches with Dual colour LEDs to indicate low or High</li> <li>• On board 10 TTL Input switches with Dual colour LEDs to indicate low or High</li> <li>• On board Four seven segment Displays</li> <li>• On board Manual Pulsar switch</li> <li>• On board 1 Hz, 10 Hz, 100 Hz and 1 MHz clock</li> <li>• On board Logic Probe</li> <li>• On board Micro Processor Interface</li> <li>• On board Interactive Manual using Graphical LCD (128x64).</li> <li>• Bare board Tested Glass Epoxy SMOBC PCB is used.</li> <li>• Block Description Screen printed on glassy epoxy PCB</li> <li>• All interconnections are made using 2mm banana Patch cords</li> <li>• Supplied with User manual and patch cords</li> <li>• ON/OFF switch for power indication.</li> </ul>	03		
12	<b>Op-amp instrumentation amplifier</b>	<ul style="list-style-type: none"> <li>• On board circuit to study instrumentation amplifier using op-amp.</li> <li>• On board test points to analyse the signal</li> <li>• ON/OFF switch and LED for power indication.</li> <li>• Bare board Tested Glass Epoxy SMOBC PCB is used.</li> <li>• On board Interactive Manual using Graphical LCD (128x64).</li> <li>• Block Description Screen printed on glassy epoxy PCB</li> <li>• All interconnections are made using 2mm banana Patch cords</li> </ul>	05		

		<ul style="list-style-type: none"> <li>• Supplied with User manual and patch cords</li> <li>• With built-in power supply</li> </ul>			
13	<b>5MHz Function Generator</b>	<ul style="list-style-type: none"> <li>• 0.5 Hz to 5 MHz Function Generators with sine , square, triangle, TTL &amp; DC</li> <li>• DC Offset adjustment</li> <li>• Square wave Rise time better than 30 ns</li> <li>• Microprocessor based design</li> <li>• Distortion factor &lt; 0.5%</li> <li>• Internal Sweep and External Frequency Modulation</li> </ul> <p>Backlit LCD display for modes and frequency</p>	03		
14	<b>100MHz DSO</b>	<ul style="list-style-type: none"> <li>• Signal bandwidth: 100 MHz</li> <li>• Real-time sampling rate: Max. 1 GSa/s Equivalent sampling rate: Max. 50 GS/s</li> <li>• 7.0" TFT LCD Color display</li> <li>• 2 Mpts memory depth</li> <li>• Independent vertical scale &amp; position control knobs for each channel</li> <li>• Edge, Pulse Width, Video, Slope, Alternate trigger mode</li> <li>• Math functions including add, Subtract, Multiply, Divide &amp; 1024 point FFT</li> <li>• 32 parameters of automatic measurements</li> <li>• Unique Digital Filter &amp; Waveform recorder function</li> <li>• Advanced cursor modes: Manual, Auto &amp; Track</li> <li>• Waveform Intensity &amp; Grid Brightness can be adjusted</li> <li>• PASS / FAIL detection, PASS/FAIL output</li> <li>• Built-in 100 MHz hardware frequency counter</li> <li>• Save/recall types: Setups, Waveforms, CSV file, Picture</li> <li>• Standard Interface USB Host: Support USB flash driver save/recall function &amp; update firmware, USB Device: Support PictBridge compatible printer &amp; support PC remote control, RS232, Pass/Fail Output</li> </ul>	03		

## TENDER BID-II (Financial)

### Package-FOE/EC/03 : Microwave Engineering Lab

**Tender Cost: Rs. 1000/-+ Rs. 180 GST**

**EMD: Rs. 7,000=00**

### Bill of Quantity

S.No.	Components	Specifications	Qty.	Unit Cost	Total Cost
<b>A. Klystron based microwave test bench</b>					
1.	Klystron Mount	Freq. Range: 8.2 to 12.4 GHz; Waveguide: RG-52/U; Flange type : UG-39/U; Make: SICO Model:XM-251	03		
2	Klystron Tube	X-band Freq. range: 8.2 – 12.4 GHz Model: 2k25 Or equivalent	03		
3	Isolator	Freq. Range: 8.2 to 12.4 GHz; Waveguide type: WR90; Flange type : UG/U 39; Max VSWR: 1.15; Min Isolation: 25 dB; Min insertion loss: 0.4 dB <b>Make: SICO</b> Model: <b>XI-621</b>	03		
4	Frequency Meter	Freq. Range: 8.2-12.4 GHz; <b>Make: SICO</b> <b>Model:XF-710</b>	03		
5	Variable Attenuator	Freq. Range: 8.2 to 12.4 GHz; Waveguide type: WR90; Flange type : UG/U 39; <b>Make: SICO</b> Model: <b>XA-520</b>	03		
6	Slotted Section	Freq. Range: 8.2-12.4 GHz; Residual VSWR: 1.01; Slope: $\pm 0.2$ dB; Waveguide: RG-52AJ; Flange: UG-39/U <b>Make: SICO</b> Model: <b>XS-651</b>	03		
7	Tunable Probe	Freq. Range: 8.2 to 12.4 GHz; Detector: IN-23; Output Connector: BNC(F); <b>Make: SICO</b> Model: <b>XP-655</b>	03		
8	Detector Mount	Freq. Range: 8.2-12.4 GHz; Crystal: shotkee diode/23 Output Connector: BNC/SMA (F); Waveguide: RG-52/U; Flange: UG-39/U <b>Make: SICO</b> Model: <b>XD-451</b>	03		
9	Leaky Wave	Substrate: Neltek Freq. Range: 8-12 GHz Connector : SMA ( Female) 2 nos. <b>Make: SICO</b>	3		

10	Movable Short	Freq. Range: 8.2 to 12.4 GHz; Waveguide: RG-52/U; Flange type : UG-39/U; Reflection Coefficient: 0.98; <b>Make: SICO</b> <b>Model:XT-481</b>	03		
11	Matched Termination	Freq. Range: 8.2-12.4 GHz; Max VSWR: 1.02; Avg Power: 2W; Type: Fixed; Waveguide: RG-52/U; Flange: UG-39/U <b>Make: SICO</b> <b>Model:XL-400</b>	03		
12	Slide Screw Tuner	Freq. Range: 8.2 to 12.4 GHz; Waveguide: RG-52/U; Flange type : UG-39/U; Maximum VSWR: 20:1.02; <b>Make: SICO</b> <b>XT-441</b>	03		
13	Waveguide Stands	X-band <b>Make: SICO</b> <b>Model:XU-535</b>	06		
14	VSWR Meter	Freq. Range: 8.2 to 12.4 GHz; <b>Sensitivity:</b> 0.2 $\mu$ V at a 200 ohms input for full scale deflection <b>Noise Level:</b> At least 5 dB below full scale at rated sensitivity and maximum band width input terminated in 100 ohms and 500 ohms for crystal low and high respectively. <b>Calibration:</b> Square law, meter indicates SWR, dB <b>Range:</b> 70 dB, input attenuator provides 60 dB in 10 dB steps, accuracy $\pm$ 0.2 dB per 10 dB steps Maximum commutative error $\pm$ 0.5 dB <b>Scale selector:</b> Normal Expand and – 5dB <b>Meter Scale:</b> SWR1-4,SWR 3-10 , expand SWR 1.1.3, dB 0-10, expand dB0.2 <b>Gain Control:</b> Adjust the reference level, variable range 0-10 dB approx. <b>Input:</b> “Bolo” bias provided for 4.3 mA low current bolo meters <b>Recorder output:</b> Socket provided for recording having 1 V for full scale deflection, internal resistance of 1000 ohms or less <b>A/C Output:</b> BNC connector for amplified output <b>Input connector:</b> BNC (F) <b>Frequency:</b> 1000Hz $\pm$ 10% <b>Power:</b> 230 volts A.C $\pm$ 50 Hz, mains supply <b>Make: SICO</b> <b>Model:SW-115</b>	03		
15	Solid State Klystron Power Supply	<b>Beam Supply</b> Voltage Range: 195-400 V continuously variable Current: 45mA Max. Regulation: Better than 0.5% for $\pm$ variation in	03		

		<p>Mains Supply Voltage Ripple: Less than 5 mV rms</p> <p><b>Repeller Supply</b> Voltage Range: -10 V to -300 DC continuously variable with respect to Klystron cathode Regulation: 0-25% for <math>\pm</math> variation in Mains supply voltage</p> <p><b>Heater Supply</b> 6.3V DC (regulated)</p> <p><b>Modulation</b> Square Wave: Freq. 500 Hz-1.7 KHz Max Amp. +110 Volt peak to peak Amplitude and frequency continuously variable Saw tooth: Freq. 50Hz-196 Hz Amplitude -60 V max peak to peak Amplitude and frequency continuously variable</p> <p><b>Operating Voltage</b> 230V <math>\pm</math> 10%, 50 Hz, A.C</p> <p><b>Make: Sico</b> <b>Model:SKPS-610</b></p>			
16	Cooling Fan with Stand	<p>X-band <b>Make: SICO</b> <b>CF-205</b></p>	03		
17	Co-axial Cable (BNC)	<p>X-band <b>Make: SICO</b></p>	06		
<b>B. Gunn Based Microwave Test Bench</b>					
1	Gunn Oscillator	<p><b>Freq Range: 8.2-12.4 Ghz</b> <b>Pushing fac. (MHz/V): 8</b> Bias Voltage Max.10V, Normal power output: 10 Temp Coeff.(MHz) <math>\pm</math>0.2, Output connector : BNC (F) Freq Adjustment: By micrometer, WG: RG-52/U Flange: UG-39/U <b>Make: SICO</b> <b>Model: XG-11</b></p>	02		
2	PIN Modulator	<p><b>Freq. Range: 8.2-12.4 Ghz</b> <b>Bias volts: 0.10 volts,,</b> Output connector : BNC (F) WG: RG-52/U Flange: UG-39/U <b>Make: SICO</b> <b>Model:XM-55</b></p>	02		
3	Isolator	<p>Freq. Range: 8.2 to 12.4 GHz; Waveguide type: WR90; Flange type : UG/U 39; Max VSWR: 1.15; Min Isolation: 25 dB; Min insertion loss: 0.4 dB <b>Make: SICO</b> <b>XI-621</b></p>	02		
4	Frequency Meter	<p>Freq. Range: 8.2-12.4 GHz; <b>Make: SICO</b> <b>XF-710</b></p>	02		
5	Variable Attenuator	<p>Freq. Range: 8.2 to 12.4 GHz; Waveguide type: WR90;</p>	02		

		Flange type : UG/U 39; <b>Make: Sico</b> <b>Model:XA-520</b>			
6	Slotted Section	Freq. Range: 8.2-12.4 GHz; Residual VSWR: 1.01; Slope: $\pm 0.2$ dB; Waveguide: RG-52AJ; Flange: UG-39/U <b>Make: SICO</b> <b>XS-651</b>	02		
7	Tunable Probe	Freq. Range: 8.2 to 12.4 GHz; Detector: IN-23; Output Connector: BNC(F); <b>XP-655</b>	02		
8	Detector Mount	Freq. Range: 8.2-12.4 GHz; Crystal: shotkee diode/23 Output Connector: BNC/SMA (F); Waveguide: RG-52/U; Flange: UG-39/U <b>Make: SICO</b> <b>XD-451</b>	02		
9	Movable Short	Freq. Range: 8.2 to 12.4 GHz; Waveguide: RG-52/U; Flange type : UG-39/U; Reflection Coefficient: 0.98; <b>Make:Sico</b> <b>XT-481</b>	02		
10	Matched termination	Freq. Range: 8.2-12.4 GHz; Max VSWR: 1.02; Avg Power: 2W; Type: Fixed; Waveguide: RG-52/U; Flange: UG-39/U <b>Make: SICO</b> <b>XL-400</b>	02		
11	S. S. Tuner	Freq. Range: 8.2 to 12.4 GHz; Waveguide: RG-52/U; Flange type : UG-39/U; Maximum VSWR: 20:1.02; <b>Make: SICO</b> <b>XT-441</b>	02		
12	Waveguide stand	X-band <b>Make: SICO</b> <b>XU-535</b>	04		
13	VSWR Meter	Freq. Range: 8.2 to 12.4 GHz; <b>Sensitivity:</b> 0.2 $\mu$ V at a 200 ohms input for full scale deflection <b>Noise Level:</b> At least 5 dB below full scale at rated sensitivity and maximum band width input terminated in 100 ohms and 500 ohms for crystal low and high respectively. <b>Calibration:</b> Square law, meter indicates SWR, dB <b>Range:</b> 70 dB, input attenuator provides 60 dB in 10 dB steps, accuracy $\pm 0.2$ dB per 10 dB steps Maximum commutative error $\pm 0.5$ dB <b>Scale selector:</b> Normal Expand and – 5dB	02		

		<p><b>Meter Scale:</b> SWR1-4,SWR 3-10 , expand SWR 1.1.3, dB 0-10, expand dB0.2</p> <p><b>Gain Control:</b> Adjust the reference level, variable range 0-10 dB approx.</p> <p><b>Input:</b> “Bolo” bias provided for 4.3 mA low current bolo meters</p> <p><b>Recorder output:</b> Socket provided for recording having 1 V for full scale deflection, internal resistance of 1000 ohms or less</p> <p><b>A/C Output:</b> BNC connector for amplified output</p> <p><b>Input connector:</b> BNC (F)</p> <p><b>Frequency:</b> 1000Hz <math>\pm</math> 10%</p> <p><b>Power:</b> 230 volts A.C <math>\pm</math> 50 Hz, mains supply</p> <p><b>Make: SICO</b> <b>SW-115</b></p>			
14	Gunn Power Supply	<p><b>Voltage Range:</b>0 -12 volts variable</p> <p><b>Current:</b> 1 Amp. Max</p> <p>Regulation: 0.2<math>\pm</math>10% variation in the mains supply voltage</p> <p>Ripple: 1 m V rms</p> <p>Modulation Freq. : 1 KHz <math>\pm</math> 20% ( 900-1100 Hz)</p> <p>Output Connector BNC (F) for Gunn oscillator and TNC (F) for Pin modulator</p> <p><b>Make: SICO</b> Model GS-610</p>	02		
15	Cooling Fan with stand	<p>X-band</p> <p><b>Make: SICO</b> <b>Model: CF-205</b></p>	02		
16	BNC Cable	<p>X-band</p> <p><b>Make: SICO</b></p>	04		
17	TNC Cable	<p>X-band</p> <p><b>Make: SICO</b></p>	02		
18	Brass Screw Nuts ( 50 nos.)		01		
19	T/Y Circulator	<p>Freq Range:8.2-12.4 GHz</p> <p><b>Make: Sico</b> <b>Model: XC-621,Model-XC-622</b></p>	2 each		
20	Fixed Attenuator 33dB,6dB,10,dB	<p>Freq Range:8.2-12.4 GHz</p> <p><b>Make: Sico</b> <b>Model: XA-503,506,510</b></p>	02 each		
21	Smith Chart		02		
22	Spiral	<p>Substrate: Neltek</p> <p>Freq. Range: 8 -12 GHz</p> <p>Connector : SMA ( Female) 2 nos.</p> <p><b>Make: SICO</b></p>	02		
<b>C. Antenna Trainer Kit</b>					
1	Antenna Trainer Kit	<p>Freq. 500 MHz to 3 GHz or more) consist of -</p> <p>RF Transmitter and Receiver Unit</p> <p>Motorised Antenna Turn Table</p> <p>Antenna Type:</p> <p>1)Dipole L/2</p>	01		



		2) Folded Dipole 3) Yagi Uda (4E) 4) Slot 5) Rhombus 6) Axial Mode Helix RHCP 7) Endfire (Phase Array L/2) 8) Broadside Array L/2 9) Microstrip Patch 10) Monopole With associate accessories for E & H Plane radiation pattern measurement			
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