BID DOCUMENT

NATIONAL COMPETITIVE BIDDING

FOR

SUPPLY, INSTALLATION, COMMISSIONING & MAINTENANCE OF ENGINEERING PHYSICS LABORATORY EQUIPMENTS FOR I.K.G.PUNJAB TECHNICAL UNIVERSITY, KAPURTHALA AND ITS OTHER CONSTITUENT CAMPUSES (PUNJAB)

Bid No. : **EdCIL/PROC/PTU-2017/LAB-BTECH-PHY/PHY-PKG1/1**

PART-II- FINANCIAL BID

EdCIL (India) Limited
(A Govt. of India Mini Ratna Enterprises)
'EdCIL House', Plot No. 18A, Sector- 16A
NOIDA – 201301 (UP), INDIA
Tel: 0120 – 2512001-006, FAX: 0120-2515372

Dated: 09.06.2017
This document serially numbered from page number 01 to 25.

FINANCIAL BID

Instructions to Bidders

1. Financial Bid shall be submitted with full price details.

Financial Bid shall contain only the prices duly filled in as per the format given in Schedule of Rates provided in the tender document. Price bid should not have any Commercial and/or Technical stipulation in addition to, what is already given in Part I – Technical bid.

Financial Bid Standard Forms (Form-1, Form-2A and /or Form-2B) shall be used for the preparation of the price quote according to the instructions provided.

2. **The Bidder should quote for all the Laboratory items / equipments listed in this document. In case, the Bidder/s does not quote for all the Laboratory items/Equipments, the Bid shall be treated as incomplete and shall be rejected summarily.**

3. The Items / equipments to be supplied / delivered / installed / commissioned at various locations of IKGPTU Campuses is as shown in the enclosed Annexure VI. The rate shall be inclusive of all taxes, octroi, transportation (as per the location), packing, loading and unloading (as designated location) ,Insurance etc. and nothing shall be paid extra.

4. The bid shall be evaluated on total value of all Laboratory items/Equipments as shown in summary and supply order shall be placed to a bidder as a composite bid.

5. The prices quoted by the bidder shall be fixed for the quantity mentioned for the duration of the contract and shall not be subject to adjustment on any account. Price should be firm for any positive or negative variation in quantities up to 100%.

6. The changes displayed in the corrigendum/addendum to the bid documents, particularly with the financial bid should be attached with the financial bid submission, in the same packet, duly signed and stamped by the authorized signatory of the Bidder firm.

FINANCIAL BID SUBMISSION FORM

To:

Chief General Manager (EIS & EPS)
EdCIL (India) Limited
EdCIL House, 18 A, Sector-16 A
NOIDA – 201301 (U.P.), India

Dated: ___/___/2017

Dear Sir,

We, the undersigned, offer to provide "SUPPLY, INSTALLATION , COMMISSIONING & MAINTENANCE OF ENGINEERING PHYSCIS LABORATORY EQUIPMENTS" in accordance with your Request for Proposal dated ___/___/2017.

Our attached Financial Bid is for the amount of _____ *[Indicate the corresponding to the amount(s), currency(ies) {Insert amount(s) in words and figures}].*

Please note that all amounts shall be the same as in Form-1. Our Financial Bid shall be binding upon by us subject to the modifications resulting from Contract negotiations, if any, up to expiration of the validity period of the Proposal.

We remain,

Yours sincerely,

Authorized Signature {In full and initials}:
Name and Title of Signatory:
In the capacity of:
Address:
E-mail:

FORM-1

SUMMARY OF FINANCIAL BID

S. No.	Description	Amount (exclusive of Tax) (Rs.)	Tax (Rs.)	Amount (Inclusive of Tax) (Rs.)
A.	Engineering Physics Laboratory Equipments (Form-2A and/or Form-2B)			
B.	Comprehensive Annual Maintenance (Annexure-IV)			
	Total (Rs.)			
Total Price Bid (exclusive of taxes) (in Words) (Rupees……)				
Total Price of Bid (Inclusive of taxes) (In Words) (Rupees……)				
	Signature of bidder	……..		
	Name & Address	…….. ……..		
Note :	Date	……..		
i)	*Discount or any other offers affecting the package price must be mentioned here only. Discount or any other offers affecting the package price mentioned at any other place of the bid will not be considered.*			
ii)	*In case of discrepancy between unit price and total price, the unit price shall prevail.*			
iii)	*Bids shall be evaluated based on total price without taxes.*			

FORM-2A
(FINANCIAL BID)

PRICE SCHEDULE FOR GOODS TO BE IMPORTED

ANNEXURE – I
Date: ……..

Name of the Department:
Name of the Laboratory:

(A) Price Schedule: (Format used for imported items)

S.No.	Currency	Description and Specification of the Item	Qty. in Units	Unit Price	Agency Commission (If applicable)	Discount	Ex-works price	Packing + Handling + DOC + Inland Freight +Insurance	CIF price	Insurance + Freight	CIP Price	Total Price
			(a)	(b)	(c)	(d)	(e)=(b+c-d)	(f)	(g)=(e+f)	(h)	(i) = (g+h)	(j) = (i*a)
				(i)In Figures: (ii)In words:								

Total Price of Bid (In Words) ……	
Signature of bidder	**……**
Name & Address	**……**
Date	**……**

Note:

1. ***The above financial template should be strictly followed. Any deviation from the above template (in terms of description and specification of the item) may debar the bidder at sole discretion of EdCIL.***
2. ***Discount or any other offers affecting the package price must be mentioned here only. Discount or any other offers affecting the package price mentioned at any other place of the bid will not be considered.***
3. ***In case of discrepancy between unit price and total price, the unit price shall prevail.***
4. ***Bids shall be evaluated based on total price including all charges as CIP Price.***
5. ***CIP - Carriage and Insurance Paid to (named place of destination):*** *The seller pays for the carriage of the goods up to the named place of destination and the seller is required to obtain insurance for the goods while in transit.*

FORM-2B

ANNEXURE-II

PRICE SCHEDULED FOR GOODS (INDIGENOUS / IMPORTED GOODS TO BE QUOTED IN INR)

Price Schedule: (Format used for indigenous items/ Imported Items).

S.No.	Description and Specification of the Item	Qty. in Units	Unit Price in Rs.	Excise Duty % /Custom Duty	CST/ VAT %	Insurance other duties and taxes if any,	Packing and Inland Transportation	F.O.R Destination Price	Total Price in Rs. (Excluding Taxes)	Total Price in Rs. (Including Taxes)
		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)=(b*a)	(i) = (g *a)
			(i)In Figures: (ii)In words:							
Total Price of Bid (In Words) ……										
								Signature of bidder	……	
								Name & Address	……	
								Date	……	

Note:

1. ***The above financial template should be strictly followed. Any deviation from the above template (in terms of description and specification of the item) may debar the bidder at sole discretion of EdCIL.***
2. ***Discount or any other offers affecting the package price must be mentioned here only. Discount or any other offers affecting the package price mentioned at any other place of the bid will not be considered.***
3. ***In case of discrepancy between unit price and total price, the unit price shall prevail.***
4. ***Bids shall be evaluated based on total price including all charges as F.O.R Destination Price.***

ANNEXURE – III

COMPREHENSIVE ANNUAL MAINTENANCE CONTRACT PRICES SCHEDULE

S. No.	Item Description	2nd Yr.	3rd Yr.	Total Comprehensive Annual Maintenance Contract for 2 years(2nd year & 3rd year) after warranty period of 1 year from the date of successful installation. (E= C+D)
A	B	C	D	E
1.	Equipment: Make: Model: Qty.: *(Mention Total quantity from Annexure-VI)*			
			SUB-TOTAL(Rs.) (Carry forwarded to Summary)	
Sub-Total Price Bid (exclusive of taxes) (in Words) (Rupees……)				
Sub-Total Price of Bid (Inclusive of taxes) (In Words) (Rupees……)				
		Signature of bidder		……
		Name & Address		…… ……
Note:		**Date**		……
i)	***Discount or any other offers affecting the package price must be mentioned here only. Discount or any other offers affecting the package price mentioned at any other place of the bid will not be considered.***			
ii)	***In case of discrepancy between unit price and total price, the unit price shall prevail.***			
iii)	***Bids shall be evaluated based on total price without taxes.***			

Note:

1. ***The above rates shall be included in computing the total cost of the equipments.***
2. ***Agency to use separate sheet for each equipment/Item/package.***

DETAILED TECHNICAL SPECIFICATIONS:

ANNEXURE-IV

ENGINEERING PHYSICS LAB

Sr. no.	Name of Experiment	Tender Specification	
1	Setup to study the magnetic field of a circular coil carrying current	A complete setup with all accessories Precise Tangent Galvanometer Sliding Magnetometer Rheostat,4 pin commutator Provided with DC power supply	
		Technical Specifications	
		Mains :	230 V AC ±10%, 50 Hz
		DC Power Supply :	5 Volt, 2.6 A
		Protection:.	Against overload/short current
		DC Ammeter :	0 - 3 A
		Tangent Galvanometer Type :	Stewart and Gee
		Scale :	50 - 0 - 50 cm
		Sliding Magnetometer Pointer :	Aluminium
		Quadrant :	0° - 90° (Four)
		Rheostat	250 ohms/3 Amp
		Coil Bobbin :	Aluminium
		Diameter :	19 cm
		Commutator(If required) 4 pin **Wire** :	Insulated copper
		Turns :	0 to 5, 50, 500
2	Setup for measurement of polarizability of a dielectric substance	Provided with in-built Variable and Test capacitor Variable capacitor with high accuracy measurement LCD display	
		Technical Specifications	
		Main Supply :	230V ±10%, 50Hz
		Display :	LCD
		Variable Capacitor :	20-290pF
		Range :	0pf – 50mf

		Resolution :	0.01pf
		Accuracy :	Better than 1%
		Test Sample :	Glass, Bakelite & Teflon, Lead Titanate, Carbon Tetrachloride Liquid
3	Setup for studying the laser characteristics using diffraction grating aperture & divergence.	A comprehensive and self contained Optics System A complete system with Light Source, Bench and all necessary accessories Sliding stand for precise arrangement Sliding stand with precise measurement Precise Voltage and Current measurement Microcontroller based LCD Provided with DC supply	
		Technical Specifications	
		i. Optics Bench Dimensions (mm) :	L 1500 x W 50 x H 50
		ii. Fixed Stand :	5 Nos.
		iii. Sliding Stand :	1 No. with Precision micrometer Screw
		iv. **Diffraction Grating** :	300L / mm or 600L /mm or 15000L / inch
		v. Scale Horizontal :	10-0-10 cm
		Vertical :	9-0-9 cm
		vi. Helium Neon LASER Input supply :	230V +/-10%, 50Hz
		Output power :	2mW
		Wavelength :	632.8nm
		Beam diameter :	0.5 mm
		Beam divergence :	1.7 mrad
		Supplied with round stand for mounting	
		vii. Optics bench Length :	1.5 meter
		viii. Convex Lens Type :	Double Convex
		Focal Length :	100, 150, 200 mm
		Diameter :	50 mm
		ix. Detector :	Photodiode

		x. **DC Power Supply** : **Mains** : **Fuse** :	0 - 5 V 230 V AC ±10%, 50 Hz 0.5 A
4	Michelson interferometer setup	High quality optics Machined parts with highly stable base Precision micrometer with one micron least count Precision mechanical design for mirror alignment and movement Fringes can be obtained with different types of light sources(He-Ne LASER, Diode LASER)	
		Technical Specifications Base :	Machined MS base of 6kg with rubber sheet attached at bottom to reduce Vibration
		Micrometer Least count :	0.01 mm
		Range :	0-25 mm
		Beam Splitter	
		Type :	Cubic
		Size (mm) :	15 x 15 x 15
		R%/T% :	50 / 50
		Flatness :	λ/4 (at 632nm) or less
		Mirror Type :	Circular
		Diameter (mm) :	25 (5 mm thick) (approx)
		Second Mirror :	Fixed on Beam Splitter
		LASER Type :	Good Quality Diode LASER (Battery operated)
		Wavelength :	630nm
5	Setup for measurement of numerical aperture of an optical fiber	**Features** Simplex Analog and Digital Transreceiver 660 nm channel with Transmitter & Receiver AM-FM-PWM modulation / demodulation On board Function Generator Crystal Controlled Clock Functional Blocks indicated on-board mimic Input-output & test points provided on board On board voice link Built in DC power supply Numerical Aperture measurement jig and mandrel for bending loss included Switched faults on Transmitter & Receiver	

		Technical Specifications	
		Transmitter :	1 no.,
		LED	660 nm
		Receiver :	1 No Fiber Optic Photodetector
		Modulation Techniques :	1. AM 2. FM 3.PWM
		Drivers :	1 No. with Analog & Digital modes
		Clock :	Crystal Controlled Clock 4.096 MHz
		PLL Detector :	1 no.
		AC Amplifier :	1 no.
		Comparator :	1 no.
		Filters :	1 No. 4 order Butterworth, 3.4 KHz cutoff
		Frequency Analog Band Width : Digital Band Width :	 350 KHz 2.5 MHz
		Function Generator :	1 KHz Sine wave (Amplitude adjustable) 1 KHz square wave (TTL)
		Voice Link :	F. O. Voice link using microphone & speaker (built in)
		Switched Faults :	4 in transmitter & 4 in Receiver
		Fiber Optic Cable :	Connector
		Type Standard SMA	
		Cable Type :	Step indexed multimode PMMA plastic cable
		Core Refractive Index	1.492
		Clad Refractive Index :	1.406
		Numerical Aperture :	Better than 0.5
		Acceptance Angle :	Better than 60 deg.
		Fiber Diameter :	1000 microns
		Outer Diameter :	2.2 mm
		Fiber Length :	0.5 m & 1 m
		Test Points :	29 nos. (Gold plated) BNC to BNC
		Inter connections :	2 mm sockets

<table>
<tr><td>6</td><td>Setup for measurement of attenuation and propagation losses in optical fiber</td><td colspan="2">Features

Simplex Analog and Digital Transreceiver
660 nm channel with Transmitter & Receiver
AM-FM-PWM modulation / demodulation
On board Function Generator
Crystal Controlled Clock
Functional Blocks indicated on-board mimic
Input-output & test points provided on board
On board voice link
Built in DC power supply
Numerical Aperture measurement jig and mandrel for bending loss included
Switched faults on Transmitter & Receiver</td></tr>
<tr><td></td><td></td><td>Technical Specifications
Transmitter :</td><td>
1 no.,</td></tr>
<tr><td></td><td></td><td>LED</td><td>660 nm</td></tr>
<tr><td></td><td></td><td>Receiver :</td><td>1 No.,</td></tr>
<tr><td></td><td></td><td colspan="2">Fiber Optic Photodetector</td></tr>
<tr><td></td><td></td><td>Modulation Techniques :</td><td>1. AM 2. FM 3.PWM</td></tr>
<tr><td></td><td></td><td>Drivers :</td><td>1 No. with Analog & Digital modes</td></tr>
<tr><td></td><td></td><td>Clock :</td><td>Crystal Controlled Clock 4.096 MHz</td></tr>
<tr><td></td><td></td><td>PLL Detector :</td><td>1 no.</td></tr>
<tr><td></td><td></td><td>AC Amplifier :</td><td>1 no.</td></tr>
<tr><td></td><td></td><td>Comparator :</td><td>1 no.</td></tr>
<tr><td></td><td></td><td>Filters :</td><td>1 No. 4 order Butterworth, 3.4 KHz cutoff</td></tr>
<tr><td></td><td></td><td>Frequency</td><td>Analog Band Width : 350 KHz
Digital Band Width : 2.5 MHz</td></tr>
<tr><td></td><td></td><td>Function Generator :</td><td>1 KHz Sine wave (Amplitude adjustable) 1 KHz Sine wave (Amplitude adjustable), 1 KHz square wave (TTL)</td></tr>
<tr><td></td><td></td><td>Voice Link :</td><td>F. O. Voice link using microphone & speaker (built in)</td></tr>
<tr><td></td><td></td><td>Switched Faults :</td><td>4 in transmitter & 4 in Receiver</td></tr>
<tr><td></td><td></td><td>Fiber Optic Cable :</td><td>Connector Type Standard SMA</td></tr>
<tr><td></td><td></td><td>Cable Type :</td><td>Step indexed multimode PMMA plastic cable</td></tr>
<tr><td></td><td></td><td>Core Refractive Index :</td><td>1.492</td></tr>
<tr><td></td><td></td><td>Clad Refractive Index :</td><td>1.406</td></tr>
</table>

		Numerical Aperture :	Better than 0.5
		Acceptance Angle :	Better than 60 deg.
		Fiber Diameter :	1000 microns
		Outer Diameter :	2.2 mm (Approx)
		Fiber Length :	0.5 m & 1 m
		Test Points :	29 nos. (Gold plated) BNC to BNC
		Inter connections :	2 mm sockets
7	Setup for measurement of AC frequency using electric vibrator	Provided with weights Adjustment for magnet Inbuilt AC supply	
		Technical Specifications Length of wire	88 cm (approx)
		Weights	1 gm, 2 gm, 5 gm
		Power Supply	230 V ±10%, 50 Hz
		AC Power Supply	6 V, 500 mA
		No. of Turn	800
		Wire dimension(mm)	0.404
		Max. Current(amp.)	0.363
		Inductance(approx**)**	9.2mH
8	Spectrometer setup for measurement of refractive index	A complete setup with all necessary items Adjustment of entrance slit is provided Prism table for accurate component placement Crosswire - Eyepiece Wide aperture optics Rack and pinion arrangement focusing Durable and precise construction	
		Technical Specifications	
		Base: Type :	Cast iron
		Circle dia :	150 mm. (6”)
		Scale : Type :	Stainless Steel
		Main scale :	0 - 360°
		Vernier scale :	30 div
		Collimator : Tube length :	160 mm.

		Focal length of Achromatic lens :	175 mm. (approx.)
		Telescope : Tube length :	185 mm.
		Focal length of Achromatic lens :	175 mm. (approx.)
		Prism Geometry :	50X 50 mm. equilateral
		Refractive index :	1.51
		Hollow prism :	50 X50 mm. equilateral
		Plane transmission grating :	15,000 l/inch
		Light source :	Mercury lamp
9	Setup for measurement of B-H curve using CRO	Display of magnetic field in gauss Provided with nickel, hard steel and soft iron samples Provided with an extensive manual Variable magnetic field A good quality solenoid coil	
		Technical Specifications Display :	3½ digit
		Mains Supply :	230 ±10% 50 Hz
		Sample : Type :	Nickel, Hard Steel,
		Soft Steel Length :	39 mm each (approx)
		Diameter :	1.2 mm each(approx)
		Diameter of pickup coil :	3.21 mm(approx)
10	Setup for measurement of velocity of ultrasound in liquids	Liquid Cell for Velocity Measurement Microcontroller based LCD Ultrasonic Transducers as a Distance Meter Ultrasonic Transducers as a Object Detector Precise Signal Conditioning Self-contained and easy to operate	
		Technical Specifications	
		Ultrasonic Interferometer **Quartz Crystal**	
		Diameter :	20 /14 mm (approx)
		Thickness :	1.4 mm (approx)

		Frequency :	2MHz
		Liquid Cell 3 Optimum Quantity of Liquid :	12 cm
		Max. Displacement :	25 mm of the Reflector
		Least Count of Micrometer	0.01 mm
		Distance Measurement : Ultrasonic Transducer :	28 cm to 1.0 m (approximate)
		Clock Generator :	40kHz
		Amplifier :	60dB
		Threshold Detector :	0 to 9V DC
		Buzzer Indicator :	1.5 - 15V DC
		Mains Supply :	230V ±10%, 50Hz
		Fuse : 500mA	230V ±10%, 50Hz
		Display :	LCD

ANNEXURE-V

TECHNICAL COMPLIANCE REPORT:

I. ENGINEERING PHYSICS LAB

Sr. no.	Name of Experiment	Tender Specification		Numerical values or other specification	Whether comply Yes/No
1	Setup to study the magnetic field of a circular coil carrying current	A complete setup with all accessories Precise Tangent Galvanometer Sliding Magnetometer Rheostat,4 pin commutator Provided with DC power supply			
		Technical Specifications			
		Mains :	230 V AC ±10%, 50 Hz		
		DC Power Supply :	5 Volt, 2.6 A		
		Protection:.	Against overload/short current		
		DC Ammeter :	0 - 3 A		
		Tangent Galvanometer Type :	Stewart and Gee		
		Scale :	50 - 0 - 50 cm or better		
		Sliding Magnetometer Pointer :	Aluminium		
		Quadrant :	0° - 90° (Four)		
		Rheostat	250 ohms/3 Amp		
		Coil Bobbin :	Aluminium		
		Diameter :	19 cm		
		Commutator(If required) 4 pin **Wire** :	Insulated copper		
		Turns :	0 to 5, 50, 500		
2	Setup for measurement of polarizability of a dielectric substance	Provided with in-built Variable and Test capacitor Variable capacitor with high accuracy measurement LCD display			
		Technical Specifications			
		Main Supply :	230V ±10%, 50Hz		
		Display :	LCD		
		Variable Capacitor :	20-290pF		

		Range :	0pf – 50mf		
		Resolution :	0.01pf		
		Accuracy :	Better than 1%		
		Test Sample :	Glass, Bakelite & Teflon, Lead Titanate, Carbon Tetrachloride Liquid		
3	Setup for studying the laser characteristics using diffraction grating aperture & divergence.	A comprehensive and self contained Optics System A complete system with Light Source, Bench and all necessary accessories Sliding stand for precise arrangement Sliding stand with precise measurement Precise Voltage and Current measurement Microcontroller based LCD Provided with DC supply			
		Technical Specifications			
		xi. Optics Bench Dimensions (mm) :	L 1500 x W 50 x H 50		
		xii. Fixed Stand :	5 Nos.		
		xiii. Sliding Stand :	1 No. with Precision micrometer Screw		
		xiv. **Diffraction Grating** :	300L / mm or 600L /mm or 15000L / inch		
		xv. Scale Horizontal :	10-0-10 cm		
		Vertical :	9-0-9 cm		
		xvi. Helium Neon LASER Input supply :	230V +/-10%, 50Hz		
		Output power :	2mW		
		Wavelength :	632.8nm		
		Beam diameter :	0.5 mm		
		Beam divergence :	1.7 mrad		
		Supplied with round stand for mounting			
		xvii. Optics bench Length :	1.5 meter		
		xviii. Convex Lens Type :	Double Convex		
		Focal Length :	100, 150, 200 mm		

		Diameter :	50 mm		
		xix. Detector :	Photodiode		
		xx. **DC Power Supply** : **Mains** : **Fuse** :	0 - 5 V 230 V AC ±10%, 50 Hz 0.5 A		
4	Michelson interferometer setup	High quality optics Machined parts with highly stable base Precision micrometer with one micron least count Precision mechanical design for mirror alignment and movement Fringes can be obtained with different types of light sources(He-Ne LASER, Diode LASER)			
		Technical Specifications Base :	Machined MS base of 6kg with rubber sheet attached at bottom to reduce Vibration		
		Micrometer Least count :	0.001 mm		
		Range :	0-25 mm		
		Beam Splitter			
		Type : Cubic			
		Size (mm) :	15 x 15 x 15		
		R%/T% :	50 / 50		
		Flatness :	λ/4 (at 632nm) or less		
		Mirror Type :	Circular		
		Diameter (mm) :	25 (5 mm thick) (Approx)		
		Second Mirror :	Fixed on Beam Splitter		
		LASER Type :	Good Quality Diode LASER (Battery operated)		
		Wavelength :	630nm		

5	Setup for measurement of numerical aperture of an optical fiber	**Features** Simplex Analog and Digital Transreceiver 660 nm channel with Transmitter & Receiver AM-FM-PWM modulation / demodulation On board Function Generator Crystal Controlled Clock Functional Blocks indicated on-board mimic Input-output & test points provided on board On board voice link Built in DC power supply Numerical Aperture measurement jig and mandrel for bending loss included Switched faults on Transmitter & Receiver			
		Technical Specifications			
		Transmitter :	1 no.,		
		LED	660 nm		
		Receiver :	1 No		
		,Fiber Optic Photodetector			
		Modulation Techniques :	1. AM 2. FM 3.PWM		
		Drivers :	1 No. with Analog & Digital modes		
		Clock :	Crystal Controlled Clock 4.096 MHz		
		PLL Detector :	1 no.		
		AC Amplifier :	1 no.		
		Comparator :	1 no.		
		Filters :	1 No. 4 order Butterworth, 3.4 KHz cutoff		
		Frequency Analog Band Width : Digital Band Width :	 350 KHz 2.5 MHz		
		Function Generator :	1 KHz Sine wave (Amplitude adjustable) 1 KHz square wave (TTL)		
		Voice Link :	F. O. Voice link using microphone & speaker (built in)		

		Switched Faults :	4 in transmitter & 4 in Receiver		
		Fiber Optic Cable :	Connector		
		Type Standard SMA			
		Cable Type :	Step indexed multimode PMMA plastic cable		
		Core Refractive Index	1.492		
		Clad Refractive Index :	1.406		
		Numerical Aperture :	Better than 0.5		
		Acceptance Angle :	Better than 60 deg.		
		Fiber Diameter :	1000 microns		
		Outer Diameter :	2.2 mm		
		Fiber Length :	0.5 m & 1 m		
		Test Points :	29 nos. (Gold plated) BNC to BNC		
		Inter connections :	2 mm sockets		
6	Setup for measurement of attenuation and propagation losses in optical fiber	**Features** Simplex Analog and Digital Transreceiver 660 nm channel with Transmitter & Receiver AM-FM-PWM modulation / demodulation On board Function Generator Crystal Controlled Clock Functional Blocks indicated on-board mimic Input-output & test points provided on board On board voice link Built in DC power supply Numerical Aperture measurement jig and mandrel for bending loss included Switched faults on Transmitter & Receiver			
		Technical Specifications Transmitter :	1 no.,		
		LED	660 nm		
		Receiver :	1 No., Fiber Optic Photodetector		
		Modulation Techniques :	1. AM 2. FM 3.PWM		
		Drivers :	1 No. with Analog & Digital modes		
		Clock :	Crystal Controlled Clock 4.096 MHz		

		PLL Detector :	1 no.		
		AC Amplifier :	1 no.		
		Comparator :	1 no.		
		Filters :	1 No. 4 order Butterworth, 3.4 KHz cutoff		
		Frequency	Analog Band Width : 350 KHz Digital Band Width : 2.5 MHz		
		Function Generator :	1 KHz Sine wave (Amplitude adjustable) 1 KHz Sine wave (Amplitude adjustable), 1 KHz square wave (TTL)		
		Voice Link :	F. O. Voice link using microphone & speaker (built in)		
		Switched Faults :	4 in transmitter & 4 in Receiver		
		Fiber Optic Cable :	Connector Type Standard SMA		
		Cable Type :	Step indexed multimode PMMA plastic cable		
		Core Refractive Index :	1.492		
		Clad Refractive Index :	1.406		
		Numerical Aperture :	Better than 0.5		
		Acceptance Angle :	Better than 60 deg.		
		Fiber Diameter :	1000 microns		
		Outer Diameter :	2.2 mm (Approx)		
		Fiber Length :	0.5 m & 1 m		
		Test Points :	29 nos. (Gold plated) BNC to BNC		
		Inter connections :	2 mm sockets		
7	Setup for measurement of AC frequency using electric vibrator	Provided with weights Adjustment for magnet Inbuilt AC supply			

		Technical Specifications Length of wire	88 cm (approx)		
		Weights	1 gm, 2 gm, 5 gm		
		Power Supply	230 V ±10%, 50 Hz		
		AC Power Supply	6 V, 500 mA		
		No. of Turn	800		
		Wire dimension(mm)	0.404		
		Max. Current(amp.)	0.363		
		Inductance(approx**)**	9.2mH		
8	Spectrometer setup for measurement of refractive index	A complete setup with all necessary items Adjustment of entrance slit is provided Prism table for accurate component placement Crosswire - Eyepiece Wide aperture optics Rack and pinion arrangement focusing Durable and precise construction			
		Technical Specifications			
		Base: Type :	Cast iron		
		Circle dia :	150 mm. (6”)		
		Scale : Type :	Stainless Steel		
		Main scale :	0 - 360°		
		Vernier scale :	30 div		
		Least Count	20”		
		Collimator : Tube length :	160 mm. (Approx)		
		Focal length of Achromatic lens :	175 mm. (approx.)		
		Telescope : Tube length :	185 mm. (Approx)		
		Focal length of Achromatic lens :	175 mm. (approx.)		
		Prism Geometry :	50X 50 mm. equilateral		
		Refractive index :	1.51		
		Hollow prism :	50 X50 mm. equilateral		
		Plane transmission grating :	15,000 l/inch		
		Light source :	Mercury lamp		

9	Setup for measurement of B-H curve using CRO	Display of magnetic field in gauss Provided with nickel, hard steel and soft iron samples Provided with an extensive manual Variable magnetic field A good quality solenoid coil			
		Technical Specifications Display :	3½ digit		
		Mains Supply :	230 ±10% 50 Hz		
		Sample : Type :	Nickel, Hard Steel,		
		Soft Steel Length :	39 mm each (Approx)		
		Diameter :	1.2 mm each (Approx)		
		Diameter of pickup coil :	3.21 mm (Approx)		
10	Setup for measurement of velocity of ultrasound in liquids	Liquid Cell for Velocity Measurement Microcontroller based LCD Ultrasonic Transducers as a Distance Meter Ultrasonic Transducers as a Object Detector Precise Signal Conditioning Self-contained and easy to operate			
		Technical Specifications			
		Ultrasonic Interferometer **Quartz Crystal**			
		Diameter :	20 /14 mm (Approx)		
		Thickness :	1.4 mm (Approx)		
		Frequency :	2MHz		
		Liquid Cell 3 Optimum Quantity of Liquid :	12 cm		
		Max. Displacement :	25 mm of the Reflector		
		Least Count of Micrometer	0.01 mm		
		Distance Measurement : Ultrasonic Transducer :	28 cm to 1.0 m (approximate)		
		Clock Generator :	40kHz		
		Amplifier :	60dB		
		Threshold Detector :	0 to 9V DC		

		Buzzer Indicator :	1.5 - 15V DC		
		Mains Supply :	230V ±10%, 50Hz		
		Fuse : 500mA	230V ±10%, 50Hz		
		Display :	LCD		

ANEXURE-VI

DETAILS OF EQUIPMENTS TO BE SUPPLIED AT VARIOUS IKGPTU CAMPUSES:

S. No.	Name of the Equipment	Kapurthala	Amritsar	Batala	Bhikhiwind	Dinanagar	Quantity
1	Setup to study the magnetic field of a circular coil carrying current	2	2	2	2	2	**10**
2	Setup for measurement of polarizability of a dielectric substance	2	2	2	2	2	**10**
3	Setup for studying the laser characteristics using diffraction grating aperture & divergence.	2	2	2	2	2	**10**
4	Michelson interferometer setup	1	1	1	1	1	**5**
5	Setup for measurement of numerical aperture of an optical fiber	2	2	2	2	2	**10**
6	Setup for measurement of attenuation and propagation losses in optical fiber	2	2	2	2	2	**10**
7	Setup for measurement of AC frequency using electric vibrator	2	2	2	2	2	**10**
8	Spectrometer setup for measurement of refractive index	2	2	2	2	2	**10**
9	Setup for measurement of B-H curve using CRO	2	2	2	2	2	**10**
10	Setup for measurement of velocity of ultrasound in liquids	2	2	2	2	2	**10**