Gautam Buddha University

Greater Noida – 201 310

Website : www.gbu.ac.in

BID FORM

FOR THE SUPPLY OF EQUIPMENTS FOR

ELECTRICAL MACHINE LABORATORY

OF

SCHOOL OF ENGINEERING

(DEPARTMENT OF ELECTRICAL ENGINEERING)

Gautam Buddha University
Greater Noida – 201 310

TENDER FOR SUPPLY OF EQUIPMENTS FOR ELECTRICAL MACHINE LABORATORY OF SCHOOL OF ENGINEERING, DEPTT. OF ELECTRICAL ENGINEERING

Tender	**Supply of Equipments for Electrical Machine Labs.**
Opening Date	13th May 2011
Closing Date	13th June 2011 upto 3.00 p.m.
Last date of Bid Submission	13th June 2011 upto 5.00 p.m.
Technical Bid Opening Date, Time & Place	14th June 2011 at 3.00 p.m. Venue : Conference Room of the Registrar Office, 1st Floor, Administrative Building, G.B.U., Gr. Noida.
Earnest Money Deposit	2% of the offered cost
Completion Period	Within 10-12 weeks from the date of Purchase Order issued
Bid System	Two Tier : 1) Technical Bid 2) Financial Bid
Technical Bid Shall Contain	i. Technical specifications of each equipment quoted ii. All documents in support of commercial terms & conditions and eligibility criteria. iii. Bidders Proforma iv. EMD & Tender Fee demand drafts / pay orders.
Financial Bid	The Financial Bid shall contain rate schedule only. The price shall be in words as well as in numeric numbers.

"TECHNICAL BID (BIDDER'S PROFORMA)"
(To be submitted in separate envelope)

1. Name of the firm: ……
2. Date of incorporation……..
3. Name of the company – Government / Public Ltd. / Private Ltd. / Partnership / Proprietorship : ……
4. Specify the number of years in this line of activity by the company:……..
5. Sales Tax/VAT registration No. (please attach certificate) : ……
6. Experience (in year) of supplying & installation for similar software to IITs, NIT's or Central Universities or any Academic Institute of National Repute (please attached certificate/P.O.) : ……..
7. Turnover in the last three financial years (Figures should be in Indian Rupees in Lakhs; please attach the certified copies of balance sheet with trading, profit & loss account) : (if the figures for 10-11 are not available then they may furnish balance sheet of year 07-08)

2008-09	2009-10	2010-11

8. Provide the postal address, telephone & fax numbers, and email address of the nearest service center : ……
   ……..
9. Mention delivery period from the date of the placement of an official purchase order : ……..
10. Enclose the list of customers to whom you have supplied /serviced during the last 3 years ending 31/03/2011 with full postal address and name of the contact person with phone, FAX numbers, and E-mail-id, billing amount etc. Certificate regarding satisfactory performance from the minimum three end users should be furnished.
11. Are you the manufacturer / authorized dealer / distributor/ reseller for the product quoted (please attached relevant certificate): ……..
12. Was there any lapse or delay in supplying the goods ordered or any service related issue during the warranty period for the products supplied by your firm to different Institutes/Universities during last three years? If yes, provide details.
13. Deviations in specifications, if yes, please mention in separate sheet.
14. Whether technical specification are attached with Technical Bid or not. Yes/No

DECLARATION

1. The rates quoted in financial bid are inclusive of all taxes, packing, handling and installation charges.
2. The information given in the financial bid by the undersigned is correct.

(SIGNATURE OF THE BIDDER)
WITH SEAL

NAME : ……

ADDRESS : ……

: ……

: ……

Tel./Mobile No. : ……

Note: The financial bid is required to be submitted separately in a sealed cover super scribing as 'Supply of Equipments for Electrical Machine Lab. of School of Engineering.

Annexure : 'A'

Gautam Buddha University

School of Engineering
(Department of Electrical Engineering)

TECHNICAL SPECIFICATIONS: ELECTRICAL MACHINE LABORATORY

S.N.	ITEM	TECHNICAL SPECIFICATIONS
1.	**Setup for Single phase Induction motor Lab** **(List of experiments covered-** -To perform No Load and Blocked Rotor test -To perform Load test and determine performance characteristics -To vary the speed of induction motor by varying voltage**)**	A complete elaborative setup for 1 phase Induction Machines to study the behavior of 1 Phase Motors and their equivalent circuit parameters ➢ **Power Circuit** o Input 230 V 1 phase AC System Should be divided in three sections ➢ **Controlling and Measuring Section** **Controlling Section should Consist of Duly marked terminals on a Laminated board with all accessories as mentioned** 1. This section should consist of all the measuring indicators (Analog) to measure various voltages and currents as per requirement of Experimentation 2. Indicating Lights 3. Educational Type Insulated terminals 4. MCB 2P 5. Digital Speed Indicator 6. Single phase Auto Transformer (8 A, 0-270 V) ➢ **Experimentation board Section** This Section should consist of the mimic circuit diagram on board with educational type insulated terminal to conduct various experiments using shrouded patch cords. ➢ **Induction Machine Section** Capacity 2HP voltage 230 v +/- 10 % frequency 50 hz +/- 5 % combined variation +/- 10 % (absolute sum) insulation class 'F' (temp. rise limited to class 'b') as standard mounting horizontal foot mounting (b3) as per IS :1231. ambient / temperature 50° c / 70° c rise degree of protection IP 55 as per IS: 4691 * Double side shaft extension * Mechanical spring balance load set-up * Speed sensor inbuilt in motor for digital speed

S.N.	ITEM	TECHNICAL SPECIFICATIONS
		indication with speed feedback facility.(0-5V) **Extra accessories** required for experimentation supplied along with the trainer Experimental Manual – 1 Nos.

Annexure : 'B'

Gautam Buddha University

School of Engineering
(Department of Electrical Engineering)

TECHNICAL SPECIFICATIONS: ELECTRICAL MACHINE LABORATORY

S.N.	ITEM	TECHNICAL SPECIFICATIONS
1	**Setup for DC Motor Trainer – I (List of experiments covered-** -To obtain speed torque characteristics of DC Shunt Motor -To obtain speed control of DC shunt motor using armature and field control -To obtain efficiency of DC Shunt Motor using swineburne's method)	➢ **Power Circuit** o Input 230 V AC o Full bridge SCR based 220V / 10 Amp output DC cosine firing with linear characteristics. o Supports signal conditioning circuit for smooth supply for machine. o System should furnish its DC Requirement inbuilt so as no external DC is required System Should divided in three sections ➢ **Controlling and Measuring Section** **Controlling Section should Consist of Duly marked terminals on a Laminated board with all accessories as mentioned** 1. This section should consist of all the measuring indicators (Analog) to measure various voltages and currents as per requirement of experimentation 2. Indicating Lights 3. Educational Type Insulated terminals 4. MCB 2P 5. DC Starter Face Plate type suitable for above motor 6. Digital Speed Indicator ➢ **Experimentation board Section** This Section should consist of the mimic circuit diagram on board with educational type insulated terminal to conduct various experiments using shrouded patch cords. ➢ **DC Machine Section** * 3 HP DC shunt motor * Armature voltage – 440Vdc MAX, * Field voltage - 220Vdc, * Speed 1500rpm * Insulation : Class F * Type of mounting : B3 * Degree of protection IP 23 * Arrangement of t. Box : RHS from de side * Tacho mtg. Provision : DTG 4000 * Type of mounting of blower : top on NDE side * Air flow direction : from NDE to DE * Shaft end : with keyway balancing with full key

		* Double side shaft extension * Mechanical spring balance load set-up * Speed sensor inbuilt in motor for digital speed indication with speed feedback facility. (0-5V) **Extra accessories** required for experimentation supplied along with the trainer Rheostats 270 ohm 1.7 A – 1 Nos. Rheostats 50 ohm 5 A – 1 Nos. Lamp Load (operating in steps) 2KW – 1 Nos. Experimental Manual – 1 Nos.
2	**Setup for Single Phase Transformer Lab – I** **(List of Experiments** -To perform polarity and ratio test of 1 phase transformer -To perform OC and SC test and obtain equivalent circuit Voltage regulation of Single Phase transformer using Direct Loading Method)	A complete elaborative setup for Transformers to study the testing of Single phase transformers and also finding the efficiency of transformer ➢ **Power Circuit** o Input 230 V AC o 0-270 V 4 Amp Variac o MCB 2P 16A System Should be divided in three sections ➢ **Controlling and Measuring Section** **Controlling Section should Consist of Duly marked terminals on a Laminated board with all accessories as mentioned** 1. This section should consist of all the measuring indicators (Analog) to measure various voltages and currents as per requirement of Experimentation 2. Indicating Lights 3. Educational Type Insulated terminals 4. MCB 2P ➢ **Experimentation board Section** This Section should consist of the mimic circuit diagram on board with educational type insulated terminal to conduct various experiments using shrouded patch cords. ➢ **Transformer Section** Single Phase transformer 3 KVA 230/230V with tapings at 50% Naturally air cooled , copper double wound shell type , Insulation –Class F , transformer is housed in MS Sheet Box Enclosure with rubber footing , all the terminals are brought over to front of the box through insulated terminals – 1 Nos. extra accessories required for experimentation supplied along with the trainer LAMP Loads – 3.75 KW Experimental Manual – 1 Nos.
3	**Setup for Single Phase Transformer Lab – II** **(List of Experiments** -To perform Sumpner's Back to Back testing of Single Phase Transformer -To Operate 2 Single phase	A complete elaborative setup for Transformers to study the back to back testing and parallel operation of 2 Single phase transformers ➢ **Power Circuit** o Input 230 V AC

	transformers in parallel and demonstrate their load sharing**)**	○ 0-270 V 8 Amp Variac – 2Nos ○ MCB 2P 16A System Should be divided in three sections ➢ **Controlling and Measuring Section** **Controlling Section should Consist of Duly marked terminals on a Laminated board with all accessories as mentioned** 1. This section should consist of all the measuring indicators (Analog) to measure various voltages and currents as per requirement of experimentation 2. Indicating Lights 3. Educational Type Insulated terminals 4. MCB 2P ➢ **Experimentation board Section** This Section should consist of the mimic circuit line diagram on board with educational type insulated terminal to conduct various experiments using shrouded patch cords. ➢ **Transformers Section** Single Phase transformer 3 KVA 230/230V with tapings at 50% Naturally air cooled , copper double wound shell type , Insulation –Class F , transformer is housed in MS Sheet Box Enclosure with rubber footing , all the terminals are brought over to front of the box through insulated terminals – 2 Nos. **Extra accessories** required for experimentation supplied along with the trainer Electrical Loads – 2KW Experimental Manual – 1 Nos.
4	**Setup for Three Phase Transformer Lab – I** **(**List of Experiments -To obtain 3 phase to 2 Phase conversion using Scott Connection -To study various transformer configuration Δ -Y, Y-Y, Y- Δ, Δ - Δ -To Perform OC and SC Test of Three Phase transformer -Heat Run Test of a Delta Delta Connected transformer**)**	A complete elaborative setup for 3 Phase Transformers to study the testing and Different configurations of Three phase transformers ➢ **Power Circuit** ○ Input 415 V AC 3 Ph ○ MCB 3P 20A System Should be divided in three sections ➢ **Controlling and Measuring Section** **Controlling Section should Consist of Duly marked terminals on a Laminated board with all accessories as mentioned** 1. This section should consist of all the measuring indicators (Analog) to measure various voltages and currents as per requirement of Experimentation 2. Indicating Lights 3. Educational Type Insulated terminals 4. MCB 3P ➢ **Experimentation board Section** This Section should consist of the mimic circuit line diagram on board with educational type insulated

		terminal to conduct various experiments using shrouded patch cords. ➢ **Transformers Section** Three Phase transformer 3 KVA 415/415V Insulation – Class F with tapings at 50% , So transformers can be used as step up and step down , Naturally air cooled , copper double wound shell type . transformer should be housed in MS Sheet Box Enclosure with rubber footing , all the terminals are brought over to front of the box through insulated terminals, RTD Sensor fixed inside the core of transformer – 1 Nos. **Extra accessories** required for experimentation supplied along with the trainer 3 Phase Continuously variable Auto transformer 0-470 V Loading Rheostat 3 Ph 5 KVA Digital Temperature indicator Experimental Manual – 1 Nos.
5	**Setup for Three Phase Transformer Lab – II (Experiments to be conducted** -Parallel Operation of 3 phase transformers -Sumpners Back to Back testing of 3 phase Transformers **)**	A complete elaborative setup for 3 Phase Transformers to study the load sharing of two three phase transformers ➢ **Power Circuit** o Input 415 V AC 3 Ph o MCB 3P 20A System Should be divided in three sections ➢ **Controlling and Measuring Section** **Controlling Section should Consist of Duly marked terminals on a Laminated board with all accessories as mentioned** 1. This section should consist of all the measuring indicators (Analog) to measure various voltages and currents as per requirement of Experimentation 2. Indicating Lights 3. Educational Type Insulated terminals 4. MCB 3P 5. Phase Sequence Indicator ➢ **Experimentation board Section** This Section should consist of the mimic circuit line diagram on board with educational type insulated terminal to conduct various experiments using shrouded patch cords. ➢ **Transformers Section** Three Phase transformer 3 KVA 415/415V Insulation – Class F with tapings at 50% , So transformers can be used as step up and step down , Naturally air cooled , copper double wound shell type . Transformer should be housed in MS Sheet Box Enclosure with rubber footing, all the terminals are brought over to front of the box

		through insulated terminals - 2 Nos. **Extra accessories** required for experimentation supplied along with the trainer 3 Phase Continously variable Auto transformer 0-470 V Loading Rheostat 3 Ph 5 KVA Three phase isolation Transformer - 1 Nos Experimental Manual – 1 Nos.
6	**Setup for Synchronous Generator Trainer – I** **(List of experiments covered-** -To Perform OCC and SCC of an Alternator and find out the equivalent circuit -To determine voltage regulation of an alternator using synchronous impedance Method -To determine voltage regulation of an alternator using ZPF Method **-**To determine Xd and Xq of salient pole machine using slip test**)**	A complete elaborative setup for synchronous Machines to study the behavior of 3 Phase alternators equivalent circuit parameters ➢ **Power Circuit** o Input 230 V AC o Full bridge SCR based 220V / 10 Amp output DC cosine firing with linear characteristics. o Supports signal conditioning circuit for smooth supply for machine. o System should furnish its DC Requirement inbuilt so as no external DC is required System Should be divided in three sections ➢ **Controlling and Measuring Section** **Controlling Section should Consist of Duly marked terminals on a Laminated board with all accessories as mentioned** 1. This section should consist of all the measuring indicators (Analog) to measure various voltages and currents as per requirement of Experimentation 2. Indicating Lights 3. Educational Type Insulated terminals 4. MCB 2P 5. DC Starter Face Plate type suitable for motor 6. Digital Speed Indicator ➢ **Experimentation board Section** This Section should consist of the mimic circuit diagram on board with educational type insulated terminal to conduct various experiments using shrouded patch cords. ➢ **DC Machine Section** ∗ **3 HP DC shunt motor** * Armature voltage – 440Vdc MAX, * Field voltage - 220Vdc, * Speed 1500rpm * Insulation : Class F * Type of mounting : B3 * Degree of protection IP 23 * Arrangement of t. Box : RHS from DE side * Tacho mtg. Provision : DTG 4000 * Type of mounting of blower : top on NDE side * Air flow direction : from NDE to DE * Shaft end : with keyway balancing with full key

		* Double side shaft extension * Speed sensor inbuilt in motor for digital speed indication with speed feedback facility.(0-5V) * **Coupled with flexible coupling & mounted on MS base with** *** 5KVA 3 phase alternator** Rated Voltage 415 V - 3 PH Terminals 6 Leads Voltage Regulation 5% (slipring) Speed 1500 RPM Direction of rotation CW from drive end Phase Sequence UVW Overspeed 1.2 times normal speed for 2 min. Insulation Class -Class 'H' Type of Mounting B3 & B2 Degree of Protection IP23 Duty Rating Continuous (S1) Short circuit withstand Capabilities 3 Times FLC for 3 Sec 10% Overload 1 Hour in 6 Hours Harmonic Distortion Factor Three Phase < 3% **Extra accessories** required for experimentation supplied along with the trainer Rheostats 270 ohm 1.7 A – 2 Nos. 3 phase resistive Load 5KW – 1 Nos. 3 Phase Inductive Load 10A – 1Nos 3 Phase Capacitive Load 10A – 1Nos Experimental Manual – 1 Nos.
7	**Setup for THREE PHASE INDUCTION MOTOR LAB – I (List of experiments covered-** -To perform No Load and Blocked Rotor test -To perform Load test and determine performance characteristics -To vary the speed of induction motor by varying voltage and change the diretion of rotation **)**	A complete elaborative setup for 3 phase Induction Machines to study the behavior of 3 Phase Motors and their equivalent circuit parameters ➢ **Power Circuit** o Input 415 V 3 phase AC System Should be divided in three sections ➢ **Controlling and Measuring Section** **Controlling Section should Consist of Duly marked terminals on a Laminated board with all accessories as mentioned** 1. This section should consist of all the measuring indicators (Analog) to measure various voltages and currents as per requirement of Experimentation 2. Indicating Lights 3. Educational Type Insulated terminals 4. MCB 3P 5. DOL Startor suitable for motor 6. Digital Speed Indicator ➢ **Experimentation board Section** This Section should consist of the mimic circuit diagram on board with educational type insulated terminal to conduct various experiments using shrouded patch cords.

		➢ **Induction Machine Section** Capacity 3HP voltage 415 v +/- 10 % frequency 50 hz +/- 5 % combined variation +/- 10 % (absolute sum) insulation class 'f' (temp. rise limited to class 'b') as standard mounting horizontal foot mounting (b3) as per IS :1231. ambient / temperature 50° c / 70° c rise degree of protection IP55 as per IS: 4691 * Double side shaft extension * Mechanical spring balance load set-up * Speed sensor inbuilt in motor for digital speed indication with speed feedback facility.(0-5V) **Extra accessories** required for experimentation supplied along with the trainer Three phase Auto Transformer - 1 Nos Experimental Manual – 1 Nos.
8	**Setup for Slip Ring motor Lab (List of experiments covered-** To speed Torque Characteristics of Slip-ring motor**)**	A complete elaborative setup for 3 phase Slip Ring Machine ➢ **Power Circuit** o Input 415 V 3 phase AC System Should be divided in three sections ➢ **Controlling and Measuring Section** **Controlling Section should Consist of Duly marked terminals on a Laminated board with all accessories as mentioned** 1. This section should consist of all the measuring indicators (Analog) to measure various voltages and currents as per requirement of Experimentation 2. Indicating Lights 3. Educational Type Insulated terminals 4. MCB 3P 5. Digital Speed Indicator 6. DOL Starter ➢ **Experimentation board Section** This Section should consist of the mimic circuit diagram on board with educational type insulated terminal to conduct various experiments using shrouded patch cords. ➢ **Slip-ring Machine Section** Capacity : 3.75 kW Frame IEC112 to 400 in cast iron Mounting : Foot/Flange/Face Pole : 4 Frequency : 50 or 60 Hz Ambient : -40° to + 65 ° C Protection : IP 23/55 * Double side shaft extension

		* Mechanical spring balance load set-up * Speed sensor inbuilt in motor for digital speed indication with speed feedback facility.(0-5V) **Extra accessories** required for experimentation supplied along with the trainer 3 Phase Auto Transformer – 1Nos. Experimental Manual – 1 Nos.
9	**Setup for Three Phase Induction Motor Lab - II** **(List of experiments covered-** -To Study variation of speed using variable frequency -To control speed of Induction Motor in V/F Constant mode**)**	A complete elaborative setup for 3 phase Induction Machines to study the behavior of 3 Phase Motors in Variable Frequency Mode and V/F constant mode ➢ **Power Circuit** o Input 415 V 3 phase AC System Should be divided in three sections ➢ **Controlling and Measuring Section** **Controlling Section should Consist of Duly marked terminals on a Laminated board with all accessories as mentioned** 1. This section should consist of all the measuring indicators (Analog) to measure various voltages and currents as per requirement of Experimentation 2. Indicating Lights 3. Educational Type Insulated terminals 4. MCB 3P 5. 3 Phase Variable Frequency Drive 6. Digital Speed Indicator ➢ **Experimentation board Section** This Section should consist of the mimic circuit diagram on board with educational type insulated terminal to conduct various experiments using shrouded patch cords. ➢ **Induction Machine Section** Capacity 3HP voltage 415 v +/- 10 % frequency 50 hz +/- 5 % combined variation +/- 10 % (absolute sum) insulation class 'f' (temp. rise limited to class 'b') as standard mounting horizontal foot mounting (b3) as per IS :1231. ambient / temperature 50° c / 70° c rise degree of protection ip55 as per IS: 4691 * Double side shaft extension * Mechanical spring balance load set-up * Speed sensor inbuilt in motor for digital speed indication with speed feedback facility.(0-5V) **Extra accessories** required for experimentation supplied along with the trainer Experimental Manual – 1 Nos.

10	**Setup for DC Motor-II** **(List of experiments covered-** -To obtain efficiency of DC Machines using hopkinsons regenerative method -To control of DC Shunt motor using conventional ward Leonard Method -To Obtain Magnetizing Characteristics of DC shunt Generator -To Obtain Load Characteristics of DC shunt Generator)	A complete elaborative setup for DC Machines to study the starting, characteristics, testing, speed control for DC Motors, DC Generators and also finding the efficiency ➢ **Power Circuit** o Input 230 V AC o Full bridge SCR based 220V / 10 Amp output DC cosine firing with linear characteristics. o Supports signal conditioning circuit for smooth supply for machine. o System should furnish its DC Requirement inbuilt so as no external DC is required System Should be divided in three sections ➢ **Controlling and Measuring Section** **Controlling Section should Consist of Duly marked terminals on a Laminated board with all accessories as mentioned** 1. This section should consist of all the measuring indicators (Analog) to measure various voltages and currents as per requirement of Experimentation 2. Indicating Lights 3. Educational Type Insulated terminals 4. MCB 2P 5. DC Starter Face Plate type suitable for above motor 6. Digital Speed Indicator ➢ **Experimentation board Section** This Section should consist of the mimic circuit diagram on board with educational type insulated terminal to conduct various experiments using shrouded patch cords. ➢ **DC Machine Section** * **3 HP DC shunt motor** * Armature voltage – 440Vdc MAX, * Field voltage - 220Vdc, * Speed 1500rpm * Insulation : Class F * Type of mounting : B3 * Degree of protection IP 23 * Arrangement of t. Box : RHS from de side * Tacho mtg. Provision : DTG 4000 * Type of mounting of blower : top on NDE side * Air flow direction : from NDE to DE * Shaft end : with keyway balancing with full key * Double side shaft extension * Speed sensor inbuilt in motor for digital speed indication with speed feedback facility.(0-5V) * **Coupled with flexible coupling & mounted on MS base with** * **2.2KW DC Shunt Generator** Output 220V DC Separate excitation voltage 220V DC

		Speed 1500rpm * Insulation : Class F * Type of mounting : B3 * Degree of protection IP 23 * Arrangement of t. Box : RHS from de side * Speed sensor inbuilt in motor for digital speed indication with speed feedback facility.(0-5V) * **Extra DC Shunt motor 3HP** same as above **Extra accessories** required for experimentation supplied along with the trainer Rheostats 270 ohm 1.7 A – 2 Nos. Lamp Load (operating in steps) 2KW – 1 Nos. Experimental Manual – 1 Nos.
11	**Setup for Synchronization of Alternators** **(List of experiments covered-** -Synchronization of Alternators on a common bus -To study the effect of speed control of prime mover on real power sharing -To study the effect of excitation on reactive power sharing**)**	A complete elaborative setup for synchronization of two Alternators in parallel operation and their load sharing ➢ **Power Circuit** o Input 230 V AC o Full bridge SCR based 220V / 10 Amp output DC cosine firing with linear characteristics. o Supports signal conditioning circuit for smooth supply for machine. o System should furnish its DC Requirement inbuilt so as no external DC is required System Should be divided in three sections ➢ **Controlling and Measuring Section** **Controlling Section should Consist of Duly marked terminals on a Laminated board with all accessories as mentioned** 1. This section should consist of all the measuring indicators (Analog) to measure various voltages and currents as per requirement of Experimentation 2. Indicating Lights 3. Educational Type Insulated terminals 4. MCB 2P 5. DC Starter Face Plate type suitable for motor 6. Digital Speed Indicator ➢ **Experimentation board Section** This Section should consist of the mimic circuit diagram on board with educational type insulated terminal to conduct various experiments using shrouded patch cords. ➢ **DC Machine – Alternator Section – 2Nos.** * **3 HP DC shunt motor** * Armature voltage – 440Vdc MAX, * Field voltage - 220Vdc, * Speed 1500rpm * Insulation : Class F * Type of mounting : B3

		* Degree of protection IP 23 * Arrangement of t. Box : RHS from de side * Tacho mtg. Provision : DTG 4000 * Type of mounting of blower : top on NDE side * Air flow direction : from NDE to DE * Shaft end : with keyway balancing with full key * Double side shaft extension * Speed sensor inbuilt in motor for digital speed indication with speed feedback facility.(0-5V) * **Coupled with flexible coupling & mounted on MS base with** *** 5KVA 3 phase alternator** Rated Voltage 415 V - 3 PH Terminals 6 Leads Voltage Regulation 5% (slip ring) Speed 1500 RPM Direction of rotation CW from drive end Phase Sequence UVW Overspeed 1.2 times normal speed for 2 min. Insulation Class 'H' Type of Mounting B3 & B2 Degree of Protection IP23 Duty Rating Continuous (S1) Short circuit withstand Capabilities 3 Times FLC for 3 Sec 10% Overload 1 Hour in 6 Hours Harmonic Distortion Factor Three Phase < 3% **Extra accessories** required for experimentation supplied along with the trainer Rheostats 270 ohm 1.7 A – 4 Nos. 3 phase resistive Load 5KW – 1 Nos. 3 Phase Inductive Load 10A – 1Nos 3 Phase Capacitive Load 10A – 1Nos Experimental Manual – 1 Nos.
12	**DS1104 R&D Controller Board for Controller development**	**Technical Details** **Processor:** MPC8240 processor with PPC 603e core and on-chip peripherals 64-bit floating-point processor CPU clock: 250 MHz 2 x 16 KB cache, on-chip On-chip PCI bridge (33 MHz) **Memory:** Global memory: 32 MB SDRAM Flash memory: 8 MB

		Timer: 4 general-purpose timers: 32-bit down counter Reload by hardware 80-ns resolution **1 sampling rate timer:** 32-bit down counter Reload by software 40-ns resolution **1 time base counter:** 64-bit up counter 40-ns resolution **Interrupt controller:** 5 timer interrupts 2 incremental encoder index line interrupts 1 UART interrupt 1 slave DSP interrupt 1 slave DSP PWM interrupt 5 A/D converter (end of conversion) interrupts 1 host interrupt 4 external interrupts (user interrupts) **A/D converter** Channels: 4 multiplexed channels equipped with one sample & hold A/D converter (1x16-bit) 4 parallel channels each equipped with one sample & hold A/D converter (4x12-bit) Resolution: Multiplexed channels: 16 bit Parallel channels: 12 bit Input voltage range:±10 V

		Conversion time: Multiplexed channels: 2 µs Parallel channels: 800 ns Offset error: ±5 mV Gain error: Multiplexed channels: ±0.25% Parallel channels: 0.5% Offset drift: 40 µV/K Gain drift: 25 ppm/K Signal-to-noise ratio: Multiplexed channels: >80 dB Parallel channels: >65 dB **D/A converter** Channels: 8 channels Resolution: 16-bit Output range: ±10 V Settling time: Max. 10 µs (full-scale, accuracy 1/2 LSB) Offset error: ±1 mV Gain error: ±0.1% Offset drift: 130 µV/K Gain drift: 25 ppm/K Signal-to-noise ratio: >80 dB Imax: □ ±5 mA **Digital I/O** Channels: 20-bit parallel I/O Single bit selectable for input or output Voltage range: TTL input/output levels

		Iout, max: ±5 mA **Digital incremental encoder interface** Channels: 2 independent channels Selectable single-ended (TTL) or differential (RS422) input (software programmable for each channel) Position counters: 24-bit resolution Max. 1.65 MHz input frequency, i.e., fourfold pulse count up to 6.6 MHz Counter reset or reload via software Sensor supply voltage: 5 V/0.5 A **Serial interface** Configuration: Single UART (universal asynchronous receiver and transmitter) with FIFO PLL-driven UART for accurate baud rate selection RS232/RS422/RS485 compatibility Baud rate: Up to 115.2 kBd (RS232) Up to 1 MBd (RS422/RS485) **Slave DSP:** Type: Texas Instruments TMS320F240 DSP 16-bit fixed-point processor Clock rate: 20 MHz Memory: 64Kx16

		external code memory 28Kx16 external data memory 4Kx16 dual-port memory for communication 32 KB flash memory I/O channels: 10 PWM outputs 4 capture inputs 1 serial peripheral interface Input voltage range: TTL input/output level A/D converter inputs: 0 … 5 V Output current: Max. □±13 mA **Host interface: one 33 MHz / 32-bit 5-V PCI slot** **Physical characteristics** Physical size: 185 x 107 mm (7.28 x 4.2 in) Ambient temperature: 0 … 55 C (32 … 131 F) Cooling: Active cooling by fan Power consumption: 18.5 W Power supply: +5 V ±5%, 2.5 A +12 V ±5%, 0.3 A -12 V ±5%, 0.2 A **Required related Software and Hardware** **Software:** DS1104 Real-Time Library – Experiment and Platform Manager for hardware management

		Real-Time Interface (RTI) (p. 156): RTI Microtec C Compiler (p. 185): CCPPPC ControlDesk Standard – Operator Version (p. 186): CS_O ControlDesk Standard – Developer Version (p. 186): CS_D MLIB/MTRACE (p. 234): MLIB/MTRACE CLIB (p. 233): CLIB **Hardware:** Connector Panel (p. 338): CP1104 Combined Connector/LED Panel (p. 338): CLP1104 Adapter cable for DS1104: ADP_CAB1104

Annexure : 'C'

Gautam Buddha University

School of Engineering
(Department of Electrical Engineering)

TECHNICAL SPECIFICATIONS: ELECTRICAL MACHINE LABORATORY

S.N.	ITEM	TECHNICAL SPECIFICATIONS
1.	**OPEN Lab**	➢ **DISSECTABLE EXPERIMENTAL ROTATING MACHINES** **FULLY DISSECTABLE EXPERIMENTAL ROTATING MACHINES KIT** The system is a component kit that should allow to assemble the rotating electrical machines, both for AC/DC, leaving the student the possibility of a personal critical realization with the purpose of a real knowledge of the various constructive techniques. Whole unit should to assembled & disassembled very easily. **Should consist of:** - Baseplate - four removable bearing housing - coupling - elastic buffer - optical speed transducer - clamping screws - keys - DC stator with salient poles - AC stator with three-phase winding - commutator rotor - brush holder with two brushes - squirrel cage rotor - slip-ring rotor - brush holder with 3+3 brushes The AC machine should have a stator with 60mm long sheet iron pack with internal diameter of 80mm & external one of 150mm & it presents 24 half closed slots inside which there should be a double three-phase winding and 6 windings in order to change the pole number. Each slot contains two coils of 19 turns each of enameled wire of diameter 1,12mm. 2 or 4; slip-ring rotor with 21 slots (double layer winding) and squirrel cage rotor. The DC machine should have a stator with 2 field poles (series, shunt and compound excitation winding) and 2 interpoles; rotor with 20 slots (lap winding) and 40 segments. DC Rotor is composed of a shaft to which the segment commutator is fixed & of a magnetic sheet iron pack where 20 semi-closed slots suitable to contain the electrical winding are set. The sheet iron pack should be 60mm long, with external diameter of about 80mm. The system must work with low voltage (24/42 V) and should not exceed the 300W for safety precaution during the experiments.

		Should be supplied with plexiglass cover to be fix to the baseplate. ***It must be possible the realization of the following experiments :*** **BASIC** - Flux produced by the poles - Main poles - Interpoles - Main magnetic field - Intensity of the magnetic field - Induced voltage - Interpole effect - No-load magnetic neutral axis - Rotating magnetic field - Three-phase rotating field - Single-phase rotating field **INDUCTION MOTOR** - Three-phase squirrel cage motor, 2 poles, 24 V D - Three-phase squirrel cage motor, 2 poles, 42 V Y - Three-phase squirrel cage motor, 2 poles, 24 V DD - Three-phase squirrel cage motor, 2 poles, 42 V YY - Three-phase squirrel cage motor, 4 poles, 24 V D - Three-phase squirrel cage motor, 4 poles, 42 V Y - Three-phase Dahlander motor, 4/2 poles, 42 V D/YY - Split phase motor - Capacitor start and run motor - Three-phase motor with wound rotor, 2 poles, 42 V YY - Phase shifter - Induction regulator - Three-phase synchronous induction motor, 2 poles, 24 V D - Three-phase synchronous induction motor, 2 poles, 24 V DD **DIRECT CURRENT MOTOR** - DC motor with separate excitation - DC motor with shunt excitation - DC motor with series excitation - DC motor with compound excitation, long shunt - DC motor with compound excitation, short shunt **COMMUTATOR MOTORS FOR ALTERNATING CURRENT** - Single phase series motor - Repulsion motor **SYNCHRONOUS MACHINES** - Winding resistance - Armature resistance - Field resistance - No-load test - Short-circuit test - Behn-Eschenberg's method - Load test - Conventional efficiency - Parallel connection of the alternator with the mains - Alternator as synchronous motor **DIRECT CURRENT GENERATORS** - Winding resistance - Armature winding - Series and interpole windings - Inductor winding

		- Test of the no load motor (Swinburne) - No-load e.m.f. - Excitation characteristic - Separate excitation dynamo - Series excitation dynamo - Compound excitation dynamo The system should be supplied complete with a set of stackable, plug-in cables of suitable lengths and colours and with a training manual. manuals where all the performable experiments are clearly shown with drawing connections and step by step procedure. The above system must be supplied with the following necessary equipments: **POWER SUPPLY MODULE** Suitable for supply two-speed motor system. Provided with differential magnetothermal protection, magnetothermic switch and control for over speed protection of the motor. AC Outputs: Three-phase fixed :24V/14A or 42V/10A Single-phase variable:0-48V/5A or 0-10V/12A DC Outputs: Fixed :32V/14A or 42V/10A Variable:0-40V/5A or 0-8V/12A Supply voltage : 3 ph. 380 V, 50/60 Hz **ELECTRICAL AND SPEED MEASUREMENT MODULE** Suitable for measurement of the electric parameter and rpm of the machine system. The module should be composed by: 2 Analog Voltmeter:3-15-75 dc/ac 2 Analog ammeter :1.5-5-15 A dc/ac Speed meter indicator: 0-4000 r/min Connector for the over-speed protection to be connected to the power supply module. Power Supply : 1 ph. 220V 50/60 Hz **LOADS AND RHEOSTAT MODULE** Single-three-phase RC variable loads Resistance: 3x15 ohm, 90 W each one 1 ohm + (0-2ohm), 80 W Rheostat : 0 to 80 ohm, 1 A Condenser : 3x80 μF/150 V **ADAPTER BRACKET** To be fix on the baseplate; allow the coupling of the electromagnetic brake with the machine under test. **POLE CHANGING UNIT** Switch to change the pole number on Dahlander two-speed motor. **LOCKING AND ROTATABLE DEVICE** Necessary for locking and rotating the rotor of the slip ring asynchronous motor. **PARALLEL BOARD** Rotating light synchronoscope provided with fuses and switch to perform the parallel connection between generators or between the alternator and the mains. **STARTING AND SYNCHRONIZATION UNIT** Three-phase rheostat for half torque starting of the slip ring motors,

		step variable. **ELECTROMAGNETIC BRAKE** Brake for testing motors with power up to 300W Shall be provided with symmetrical coupling semi-joint and educational terminal board on which a clear synoptical must be shown. - Max. voltage : 24 V - Max. current : 1.5 A - Max. speed : 4000 rpm - Complete with arms, weights and balancing level. **POWER SUPPLY FOR ELECTROMAGNETIC BRAKE** Possibility to get from the same output two different variable voltage: 0 - 48 V D.C. 2 A or 0-8 V D.C. 2 A. Power supply: 220 V single phase. **FAULT SIMULATORS** Set of 4 masks to insert simulated faults in the machines of the system The set including: Fault Simulator for a Three Phase Cage Motor - Short Circuit between two Phases - Break-up of stator phase - Break-up of two phases - Internal short-circuit. Fault Simulator for a Dahlander Motor - Short-circuit between two phases - Break-up of a stator phase - Internal short-circuit. Fault Simulator for a single Phase Capacitor Motor - Unsuccessful starting of the motor Fault Simulator for a Compound excited DC motor - Unsuccessful starting of the motor - Break-up of a stator phase - Shunt excitation circuit reversal

GENERAL TERMS AND CONDITIONS

1. Detailed information about the Equipments/Instruments and their specifications are available in tender document, which can be downloaded from the University website www.gbu.ac.in.
2. Two bids system of tender will be adopted.
   (i) The bid containing technical specifications and EMD
   (ii) Bid containing financial offer

   Technical and financial bids should be submitted in separate covers. The envelopes should be marked as technical bid and financial bid with reference numbers. These two envelops shall be sealed in a common cover and addressed to **The Registrar, Gautam Buddha University, Greater Noida, Gautam Budh Nagar -201310 (U.P.)** superscribing "**Tender against Notification Advt. GBU/S&P/02/2011, Name of supply: Laboratory Equipments/Instruments for the Electrical Machine Labs. in School of Engineering**" so as to reach us on or before last date of bid submission.

3. The Technical Bid and Financial Bid should be duly filled-up.
4. These bids will be opened in two stages. The bid containing technical specifications and EMD will be opened at first stage and if same is found according to required specifications, the bid containing financial offer shall be opened in second stage.
5. The "**Technical Bid"** shall contain all documents in support of quoted Equipments/Instruments, their specifications, commercial terms & conditions and eligibility criteria along with the page number for cited specifications in the company brochure for the particular item.
6. The **"Financial Bid"** shall contain price schedule only. The rates and units shall not be overwritten in the price schedule. The price shall be both in words and figures.

7. **Eligibility Criteria**: All the participating suppliers/firms or principal manufacturer- should meet the following qualifying criteria. The firm should be a registered supplier for such supplies. Following documents are required to be submitted with Technical Bid, to qualify eligibility criteria:
   (a) Sales Tax/VAT registration certificate.
   (b) PAN and TIN number should be mentioned.
   (c) The firm should have experience of supplying & installation for similar Equipments/Instruments to institute of National repute such as IIT, AIIMS, CSIR labs etc. The company should also furnish a list of clients of last 3 years.
   (d) Certified copy of balance sheet with trading, profit & loss account for the last three financial years should be submitted.
   (e) Name of branch offices & service centres after sales arrangements.
   (f) Earnest Money Deposit (EMD) **as 2% of the offered cost** is required to be submitted in the form of DD/Banker's Cheque only drawn in favour of "Finance Officer, Gautam Buddha University" payable at "Greater Noida" along with the Technical Bid. If supply is not made within the prescribed period EMD would be forfeited.
   (g) Authorized signatory should sign on all pages. Bids without authorized signature will be rejected.
   (h) ***Minimum turnover required to procure the equipments/instruments :*** *No turnover for Annexure – 'A', Rupees One Crore for Annexure – B' and Rupees Two Crore for Annexure – 'C'.*
   (i) The bidder must be either sole Manufacturer of the Equipments/Instruments or the authorized agent/representative of the OEM. In the case of agent/representative, certified copy of the agency/authorization issued by the OEM should be enclosed with the tender.

8. Offer should be sent in a sealed envelope, submitted either in person or by post on which name and address of the supplier/firm shall be written. Tenders received through E-mails or FAX will not be considered.
9. The technical bids will be opened on scheduled date and time in the presence of the vendors present possessing authorization letter from the respective companies/firms. Suppliers intending to attend the tender opening should intimate in advance.
10. The rate quoted should be F.O.R. Gautam Buddha University (Gautam Budh Nagar, Greater Noida, UP) in rupees inclusive of all charges e.g. packing, forwarding local taxes, railway freight, transit insurance, for outside firms and free delivery at University stores in the case of local firms. The total price should include all accessories required for final installation of the Equipments/Instruments.
11. The Equipments/Instruments should have USEPA/International/National validation certificates, wherever applicable.
12. The cost of the tender is Rs.1000/- (Rupees One Thousand) inclusive of taxes (Non-refundable) and it shall be paid separately in the form of DD/Banker's Cheque only drawn in favour of "Finance Officer, Gautam Buddha University" payable at "Greater Noida" and should be attached with technical bid envelope.
13. The EMD of the successful bidder will be refunded after two months of the completion of the supply and installation of the Equipments/Instruments to the satisfaction of the Gautam Buddha University. The EMD of the unsuccessful bidders will be returned to the concerned immediately after finalization of the tenders. No interest will be paid on EMD in any case.
14. The required delivery period must be mentioned against each item. Tenders should preferably be given only for those equipments/items/articles, which are available ex-stock. Rates of imported goods should be quoted excluding custom duty, as this University is exempted from payment of custom duty (by letter of Department of Scientific and Industrial Research, Ministry of Science & Technology, GOI).
15. Detailed specifications with the mention of make and model/Version of each item should be clearly given supported by the illustrated pamphlets wherever possible. Quotations without specified make and Model/Version and other particulars may be rejected. The payment will be made after the goods have been received, opened, checked, installed and found to be working satisfactorily as per the specifications and requirements. The accessories included in the Equipments/Instruments should also be clearly mentioned.
16. Losses or damage in transit will be borne by the Supplier. The supplier may, if he so desires, get the goods insured and include such charges in the tendered rate.
17. Offered prices should be valid at least for two months from the last date of receipt of tenders.
18. All legal proceedings, if necessity arises to the University may be any of the parties (University or Contractor/Supplier) shall have to be lodged in the courts situated at Gautam Buddha Nagar and not elsewhere.
19. (a) The Equipments/Instruments delivery time should be preferably within 10-12 weeks after the date of issuance of the purchase order. If the delivery time is quoted more than 10-12 weeks, GBU reserves all rights to permit the bidder to compete.

    (b) The Penalty Clause is as under:-

    Should the bidder fail to deliver the goods within stipulated period**,** the Competent Authority may, at his discretion, allow an extension in time subject to recovery from the bidder as agreed liquidated damages, and not by way of penalty, a sum equal to the percentage of the value of tender amount which the bidder has failed to supply for period of delay as stated below:-

i.Delay up to one week	1%
ii.Delay exceeding one week but not	2%

exceeding two weeks	
iii. Delay exceeding two weeks but not exceeding one month	5%
iv. Delay exceeding one month	5% for each month and part there of subject to maximum 10%

(c) In case of failure to supply the goods within stipulated delivery period and in accordance with the specifications given in the quotations, the University shall be free to cancel the order.

20. Supply of the placed order in part will not be accepted.
21. The University's term for payment: 90% against delivery of items in good condition, installation and putting those in satisfactory working conditions; balanced 10% payment shall be released after 60 days of satisfactory working of the items. For balance 10% payment, the firm has to raise bill/letter for balance payment. No advance payment shall be released.
22. The AMC cost, wherever applicable, after warranty period shall be made in equal installments at the end of each quarter subject to satisfactory service rendered.
23. The price quoted should be in Indian Rupees.
24. No revision of price bid will be allowed once the price bids are opened.
25. No increase in price will be allowed after our purchase order(s) are placed.
26. Warranty certificate against all the Equipments/Instruments developed defects covering warranty period, which commences from the date of installation shall be given at the time of supply of the Equipments/Instruments.
27. Inspection certificates of the equipments/instruments inspected by the qualified engineer of the manufacturer and packed in accordance with the terms and conditions of this order must be enclosed.
28. During the warranty period whenever the firm is called upon to attend to the rectification of the defects/faults in the consignments, the firm shall attend to the repair work within a period of a week. They should render timely back up service whenever called upon. A certificate to the effect should be attached to the tender.
29. A certificate to the effect that Equipments/Instruments supplied is fully operational and no additional accessory or space is required to fully functioning the Equipments/Instruments should be issued along with the delivery challans/invoice. GBU reserves the right to refuse payment in the event of not furnishing this certificate at the time of supply.
30. Complete user, technical and service manuals/installation drawings/documentation and spare parts catalogue are to be provided along with the supply of the item.
31. Failure to comply with all the terms and conditions mentioned herein would result in the tender being summarily rejected.
32. Vendors are informed that once the firms are shortlisted based on the eligibility criteria and technical specifications, only then the financial bids of the firms meeting eligibility criteria, technical specifications / requirements would be opened.
33. Conditional tenders will not be accepted.
34. Any cutting and overwriting in the financial bid will not be accepted.
35. GBU reserves the right to change the order quantity or split the orders among multiple vendors without assigning any reason (s) whatsoever.
36. GBU reserves the right to reject any or all the tenders without assigning any reasons whatsoever.

SPECIAL TERMS AND CONDITIONS

1. Warranty period of equipments should be of two years.
2. Quote for three year extensive Annual Maintenance Contract (AMC) should be submitted separately in financial bid.
3. Price quoted shall include all necessary component parts, accessories and software required to run the equipments for successful intended experiments.
4. To verify the technical specifications and capabilities while evaluating technical bids, the firm may be asked to demonstrate the equipment in the University. If demonstration of the equipments in the University is not possible the firm shall arrange a visit of university officials to the nearby location for the same
5. Successful bidders shall arrange training programmes for the faculty and staff for the period decided by the University.
6. All equipments shall be compatible for Indian environmental conditions.

Registrar
Gautam Buddha University

ACCEPTANCE

We accept the above terms and conditions and shall comply with them strictly.

SIGNATURE OF THE AUTHORISED SIGNATORY : ……

NAME OF THE SUPPLIER : ……

ADDRESS : ……

: ……

: ……

Annexure : 'A'

FINANCIAL BID

Name of Laboratory : Electrical Machine Laboratory

Name of the School : School of Engineering, Dept. of Electrical Engineering

S.N.	ITEM	Qty.	Unit Price (Rs. In figure)	Unit Price (Rs. in words)	Total Cost (Rs.)
1	**Setup for Single phase Induction motor Lab** **(List of experiments covered-** -To perform No Load and Blocked Rotor test -To perform Load test and determine performance characteristics -To vary the speed of induction motor by varying voltage**)**	01			

Extensive Annual Maintenance Contract cost (three years) should be mentioned on a sheet for each item separately.

Total cost of the offer is Rs._____ in words (Rupees _____

_____. I abide by all the terms & conditions of the tender.

DECLARATION

1. The information given in the financial bid by the undersigned is correct.

SIGNATURE OF THE AUTHORISED SIGNATORY: _____

NAME OF THE SUPPLIER : _____

ADDRESS : _____

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Annexure : 'B'

FINANCIAL BID

Name of Laboratory : Electrical Machine Laboratory

Name of the School : School of Engineering, Dept. of Electrical Engineering

S.N.	ITEM	Qty.	Unit Price (Rs. In figure)	Unit Price (Rs. in words)	Total Cost (Rs.)
1.	**Setup for DC Motor Trainer – I (List of experiments covered-** -To obtain speed torque characteristics of DC Shunt Motor -To obtain speed control of DC shunt motor using armature and field control -To obtain efficiency of DC Shunt Motor using swineburne's method)	01			
2	**Setup for Single Phase Transformer Lab – I (List of Experiments** -To perform polarity and ratio test of 1 phase transformer -To perform OC and SC test and obtain equivalent circuit Voltage regulation of Single Phase transformer using Direct Loading Method)	01			
3	**Setup for Single Phase Transformer Lab – II (List of Experiments** -To perform Sumpner's Back to Back testing of Single Phase Transformer -To Operate 2 Single phase transformers in parallel and demonstrate their load sharing**)**	01			
4	**Setup for Three Phase Transformer Lab – I (**List of Experiments -To obtain 3 phase to 2 Phase conversion using Scott Connection -To study various transformer configuration Δ -Y, Y-Y, Y-Δ,Δ-Δ -To Perform OC and SC Test of Three Phase transformer -Heat Run Test of a Delta Delta Connected transformer**)**	01			
5	**Setup for Three Phase Transformer Lab – II (Experiments to be conducted** -Parallel Operation of 3 phase transformers -Sumpners Back to Back testing of 3 phase Transformers	01			

6	**Setup for Synchronous Generator Trainer – I** **(List of experiments covered-** -To Perform OCC and SCC of an Alternator and find out the equivalent circuit -To determine voltage regulation of an alternator using synchronous impedance Method -To determine voltage regulation of an alternator using ZPF Method **-**To determine Xd and Xq of salient pole machine using slip test**)**	**01**			
7	**Setup for THREE PHASE INDUCTION MOTOR LAB – I** **(List of experiments covered-** -To perform No Load and Blocked Rotor test -To perform Load test and determine performance characteristics -To vary the speed of induction motor by varying voltage and change the direction of rotation**)**	**01**			
8	**Slip Ring motor Lab** **(List of experiments covered-** To speed Torque Characteristics of Slip-ring motor**)**	**01**			
9	**Setup for Three Phase Induction Motor Lab - II** **(List of experiments covered-** -To Study variation of speed using variable frequency -To control speed of Induction Motor in V/F Constant mode**)**	**01**			
10	**Setup for DC Motor-II** **(List of experiments covered-** -To obtain efficiency of DC Machines using hopkinsons regenerative method -To control of DC Shunt motor using conventional ward Leonard Method -To Obtain Magnetizing Characteristics of DC shunt Generator -To Obtain Load Characteristics of DC shunt Generator)	**01**			
11	**Setup for Synchronization of Alternators** **(List of experiments covered-** -Synchronization of Alternators on a common bus -To study the effect of speed control of prime mover on real power sharing -To study the effect of excitation on reactive power sharing**)**	**01**			
12	**DS1104 R&D Controller Board for Controller development**	**02**			

Extensive Annual Maintenance Contract cost (three years) should be mentioned on a sheet for each item separately.

Total cost of the offer is Rs._____ in words (Rupees _____

_____. I abide by all the terms & conditions of the tender.

DECLARATION

1. The information given in the financial bid by the undersigned is correct.

SIGNATURE OF THE AUTHORISED SIGNATORY: _____

NAME OF THE SUPPLIER : _____

ADDRESS : _____

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Annexure : 'C'

FINANCIAL BID

Name of Laboratory : Electrical Machine Laboratory

Name of the School : School of Engineering, Dept. of Electrical Engineering

S.N.	ITEM	Qty.	Unit Price (Rs. In figure)	Unit Price (Rs. in words)	Total Cost (Rs.)
1	**OPEN Lab**	**01**			

Extensive Annual Maintenance Contract cost (three years) should be mentioned on a sheet for each item separately.

Total cost of the offer is Rs._____ in words (Rupees _____

_____. I abide by all the terms & conditions of the tender.

DECLARATION

1. The information given in the financial bid by the undersigned is correct.

SIGNATURE OF THE AUTHORISED SIGNATORY: _____

NAME OF THE SUPPLIER : _____

ADDRESS : _____

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