

TENDER DOCUMENT

FOR

Supply of Electrical Machine Lab Equipment

Last Date for selling of the
the tender document : 22 June, 2010

Last date and time for submission
of tender document : 22 June, 2010 upto 1600
hrs

Opening of the Bid : 2010 at 1100
hrs

SERIAL NUMBER :
ISSUED TO :
DATE :



BABA GHULAM SHAH BADSHAH UNIVERSITY RAJOURI,

JAMMU AND KASHMIR

Phone 01962-241009,

Website: www.bgsbuniversity.org,

Email: bgsbu@rediffmail.com



**BABA GHULAM SHAH BADSHAH UNIVERSITY
RAJOURI (J&K)**

TENDER FORM

(Tender Notice No:-BGSBU/Estates/10/3528, Dt. 02.06.2010)

1. Name of the Tendering

Firm:.....

2. PAN No.

:.....

3. Service Tax Registration No

:.....

4. Experience in providing Lab. Equipment to Universities/Govt. Institutions:YearMonth(s) (*Attested copies of the relevant certificates must be enclosed*)

5. Details of the experience as mentioned in S.N.4 above.

S.No	Name and address of University/ Govt. Institutions	From	To
1			
2			
3			
4			
5			
	Total		

6. Turnover last three years :
(Enclose preferably audited copies of Loss/Profit A/C)

Year 2007-08 Rs.....

Year 2008-09 Rs.....

Year 2009-10 Rs.....

7. Declaration of tendering Firm :

I/We M/STendering firm for(Lab. Equipment) in the BGSB University, do hereby solemnly affirm that we shall abide by the University rules/conditions of the contract. I/We are aware that the BGSB University reserves right to cancel any/all of the tenders without any obligation for explaining the reasons of the decision of cancellation. I/We also understand that the BGSB University is the final authority to decide any dispute arisen out of the tender process in question

Signature of the Tenderer :

Address of the Tenderer (with seal) :



Baba Ghulam Shah Badshah University, Rajouri

TENDER NOTICE (ELECTRICAL MACHINE LAB EQUIPMENT)

For and on behalf of BGSB University, sealed tenders affixed with Rs. 5/- revenue stamp are invited from Registered Firms, Authorized Dealers, Distributors & Manufacturers for supply of Electrical Machine Lab Equipment for the College of Engineering and Technology.

The detailed tender document can be had from the office of the Assistant Registrar (Estates) BGSB University, Rajouri on payment of Rs 1000/- in the shape of Bank Draft favoring Registrar BGSBU, Rajouri, payable at Rajouri. The tender document can also be downloaded from our website www.bgsbuniversity.org. Tender document downloaded from the University website shall be accompanied with bank draft of Rs. 1000/-. The tender should be submitted in two separate envelopes (Technical Bid & Price Bid) & both envelopes should be sealed in a single larger envelope.

Complete tender should reach the office of the Registrar BGSB University, Rajouri, on or before 22nd June 2010 along with Earnest Money of Rs. 10,000/- (*without which the tender shall not be entertained*). Tenders shall be opened by the committee as per schedule provided in the detailed tender document in presence of tenderers who wish to be present at the time of opening.

No:-BGSBU/Estates/10/3528

DATED:02.06.2010

Sd/-
Assistant Registrar
(ESTATES)

Details/Requirements for Submission of Tenders:

The Competitive Bidding shall be held in accordance with two cover bidding system i.e. Cover-A (Technical/Pre-qualification Bid) and Cover-B (Price Bid).

The tenders are to be furnished in two sealed covers (Cover-A and Cover-B) duly signed by the tenderer clearly superscribing the following information on them:

- Envelope No (Cover-A or Cover-B)
- Name of Work
- Name and Address of Tenderer with phone numbers
- Due date of receipt of tenders.

Cover-A (Technical/Pre-qualification bid):

This Envelope should contain the following information:

- i) Earnest money deposit in the form of CDR for an amount of 10,000/- by any scheduled bank.
- ii) Product catalogues, information brochures etc. should be enclosed with the pre-qualification bid.
- iii) Attested photocopies of latest and valid sales tax, Service Tax and Income Tax clearance certificates including PAN/TIN documents.
- iv) Details of works of similar nature/type and magnitude carried out by the tenderer, documentary proof.
- v) Any other relevant information with regard to specific work which the tenderer would like to present.
- vi) Each page of the documents submitted should be duly signed by the tenderer or his authorized signatory.

Cover-B (Price Bid):

The Cover-B should contain:

- i) The rates quoted for the tendered items should be duly pasted with transparent tape.
- ii) The rates quoted should be inclusive of all relevant taxes, octroi, freight, handling charges and/or other duties and overheads etc.
- iii) The tenderer should quote the rates for all the items as per advertised list/quantity schedule/unit and not for any part of the items or otherwise.

- iv) Each page of the submitted price bid must duly be signed by the tenderer or his authorized signatory.
- v) This envelope should contain only the cost offer of the tenderer which should be written clearly and legibly, both in figures and words. The tenderer should not quote in any case the cost offer anywhere directly or indirectly in envelope-A.

The aforesaid sealed envelopes (Cover-A and Cover-B) shall then be put together in another envelope which shall also be sealed and superscribed with the name of the work.

GENERAL TERMS AND CONDITIONS:

1. The tenderer should submit rates and technical specifications of each item listed in the bill of quantities. The number of items will be need based and can change without assigning any reason thereof.
2. The agency should submit the complete tender with an earnest money of Rs. 10,000/- in the shape of CDR. Tender received without CDR shall be rejected.
3. The items are required to be supplied F.O.R BGSB University Campus, Rajouri.
4. The agency is required to quote clearly for each item being quoted. The agency should quote based on the price list of the respective company (original manufacturer) and should offer a discount, if any, on the price list of the company.
5. The rates to be quoted by the agency should be valid for one year from the date of the placement of order (for Rate contract) & same should be clearly mentioned in their technical offer.
6. The agency/tenderer should quote the rates of the items in figures as well as in words.
7. Conditional tenders shall not be accepted. This tender document is non-transferable. Bid once submitted shall not be allowed to withdraw; failing which the Earnest Money Deposit shall be forfeited.

8. All corrections or alterations in the quotation must be duly countersigned by the authorized signatory, without which tender will not be considered.
9. Tenders can be submitted either **by post or by hand**. In the event of tender received after due date and time due to postal delay, the University will not be responsible for such delay and such tenders/bids will not be considered by the University.
10. The tenders should be submitted with detailed Technical specification of each item as well as the rates in a sealed envelope superscribed with the type of items tendered for along with tender notice number & date, e.g. **“Tender for supply of Electric/Electronic Items” in response to Tender Notice No. BGSBU/Estates/10/3512, Dt.20.05.2010.**
11. The University reserves the right to accept or reject any quotation at any time prior to award of contract, without thereby incurring any liability towards the affected Tenderer(s) or any obligation to inform the affected Tenderer(s) of the grounds for the University’s action.
12. The Central Purchase Committee of the University will do the evaluation of the bids submitted by the bidding agencies on the specified date. Rates of the technically successful tenderers which will be compared and ranking of the tenderers will be done according to the price quoted.
13. University shall be under no obligation to accept the lowest or any other quotation received in response to this tender notice and shall be at liberty to reject any or all offers including those received late or incomplete without assigning any reason whatsoever.
14. The University reserves the right to accept or reject any quotation or reject all quotations at any time prior to award of contract, without thereby incurring any liability towards the affected Tenderer(s) or any obligation to inform the affected Tenderer(s) of the grounds for the University action.
15. The supply of items has to be made within a period of 15 days from the date of issue of supply order by the BGSBU. In case firm

fails to supply articles within the specified time, 0.5% cost of the whole supply for every week as late supply will be deducted from the bill to the maximum of 5% after which the order will be cancelled and earnest money deposited shall be forfeited.

16. In case the tenderer wants to be represented by someone authorized by him to follow up the tendering process/procedures and act on his behalf, he shall submit a duly executed power of attorney in original in the name of such representatives/s along with its two certified copies. The power of attorney shall also include the power to refer disputes to arbitration.
17. Any change in design/specifications found necessary during execution/installation, shall be undertaken by the tenderer on the same rates, terms and conditions as provided for such items. The rate for any extra item, if undertaken, shall be analyzed and approved by the Competent Authority. The same shall be binding on the tenderer.
18. As soon as the acceptance of the tender is communicated to the successful tenderer, the contract shall be complete and binding upon him. A formal deed/agreement shall be drawn by the tenderer within one week from the date of issue of allotment. If the tenderer backs out after the allotment or sublets the work or a part thereof, it will be considered a breach of contract and the tenderer will be dealt with under rules in vogue from time to time.
19. The tenderer shall complete the work to the entire satisfaction of the Project Authority or other designated officer for the purpose. Any item/s found unsatisfactory shall have to be replaced by standard items as laid down in tender document.
20. The successful tenderer to whom the work gets allotted shall provide on site warranty, as per manufacturer's policy for all the products equipment etc supplied, installed or commissioned. This warranty shall however not be less than one year in any case.
21. If the work is suspended by the project authority for any reason for some time, no compensation on this account shall be entertained. However, an extension in completion time may be granted in such case purely at the discretion of the Project authority. However, price escalation for such delay shall not be entertained.
22. Any clarification required by the tenderer in regard to the technical data given in tender document may be sought from the Office of the Assistant Registrar (Estates), BGSBU, Rajouri.

23. The University shall not be responsible for any loss due to flood, earthquake, mutiny, violence, riot or other government action or other natural calamity etc to the men or material engaged by the tenderer during execution of work. In case of injury/ death of any skilled or unskilled labour employed by the tenderer on the work, the tenderer himself shall be responsible for consequences and compensation thereof under rules in vogue in the state.
24. On installation/commissioning/completion of the tendered work/s, a competent officer or agency designated/engaged by the University shall have to certify, that all works executed by the tenderer have been done to their satisfaction. Final payments against the works thus carried out shall be made only after such certificate is issued by the competent designated authority.
25. Disputes, if any, are subjected to the jurisdiction of Rajouri Courts.
26. The University reserves the right to alter/ modify any or all conditions of this tender document.
27. Tender which do not fulfill any or all of the above conditions or incomplete, are liable for rejection.

Sd/-
Assistant Registrar
(Estates)

Bill of Quantities

Laboratory Equipment required by the University during 2010-11

Tender Notice No.: No:-BGSBU/Estates/10/3528 Dt. 02-06-2010.

EMD: Rs. 10,000/-

ELECTRICAL MACHINE Lab. Equipment

S.No	Description	Qty	Price (Rs.) per unit (including all taxes)
1	<p>To study constructional details of a D.C. machine and diagrams of different components. Cut transparent working model DC motor with all the parts like fields, series field, inter pole, Armature, Commutator, Fan, Rocker and carbon brush holder assembly visible capacity of motor 2HP 220V 1500rpm</p>	1	
2	<p>To measure armature and field resistance of a D.C. shunt generator and to obtain its O.C. Characteristics. MACHINE REQUIRED 1 M.G SET: DC SHUNT MOTOR/DC SHUNT GENERATOR <u>SPECIFICATION:</u> DC Shunt Motor: 3HP, 230V, 1500RPM screen protected Horizontal foot Mounted class 'B' insulation, internally fan cooled. DC Shunt Generator 2kw 230V, 1500rpm, screen protected, Horizontal foot mounted, self Excited type, internally Fan Cooled. Both The Machines are Flexibly Coupled And Mounted on Sturdy M.S. Channel Base. The Terminals Of Armature And Shunt Field windings of Both the Machines to be brought Over to Bakelite Plate Fixed on CI Terminal Box Fitted on Top of Machine. CONTROL PANEL Control panel for MG set: DC shunt motor & DC shunt Generator It consist of nicely powder coated M.S. fabricated box with engraved circuit will be fitted on the Bakelite sheet panel with duly marked termination and also back door of the panel to have lock facility for safety of panel. 1 D.P.S.T. Switches. 2 3 pt DC Starters. 3 Regulators for motor and generator.</p>	1	

	<p>4 Analog meters Ammeter (0-1A) MC type (1 Pcs).</p> <p>5 Analog meters Ammeter (0-20A) MC type (2 Pcs.)</p> <p>6 Analog meters Voltmeter (0-300V) MC type (2 Pcs.)</p> <p>7 Fuses.</p>		
3	<p><u>LOAD TEST ON A DC SERIES GENERATOR</u></p> <p>MG set: DC shunt motor/DC. Series generator</p> <p><u>SPECIFICATION:</u></p> <p>DC shunt Motor: 3HP, 230V, 1500RPM screen protected Horizontal foot Mounted , internally fan cooled.</p> <p>DC series Generator 2kw, 230V, 1500rpm, screen protected, Horizontal foot mounted, self Excited type, internally Fan Cooled. Both The Machines are Flexibly Coupled And Mounted on Sturdy M.S. Channel Base. The Terminals Of Armature And Shunt Field windings of Both. The Machines to be brought Over to Bakelite Plate Fixed on CI Terminal Box Fitted on Top of Machine.</p> <p>CONTROL PANEL Specifications same as for item at Serial number 2</p>	1	
4	<p><u>LOAD TEST ON A DC COMPOUND GENERATOR</u></p> <p><u>SPECIFICATION:</u></p> <p>DC shunt Motor: 3HP, 230V, 1500RPM screen protected Horizontal foot Mounted, internally fan cooled.</p> <p>DC compound generator 2kw, 230V, 1500rpm, screen protected, Horizontal foot mounted, self Excited type, internally Fan Cooled. Both The Machines to be Flexibly Coupled And Mounted on Sturdy M.S. Channel Base. The Terminals Of Armature And Shunt Field windings of Both. The Machines to be brought Over to Bakelite Plate Fixed on CI Terminal Box Fitted on Top of Machine.</p> <p>CONTROL PANEL Specifications same as for item at serial number 2</p>	1	
5	<p><u>SPEED TORQUE CHARACTERISTICS OF DC SHUNT MOTOR</u></p> <p>LOAD TEST ON DC MOTORS:</p> <p>MACHINE REQUIRED</p> <p>DC shunt motor 3HP, 220V, 1500rpm with Pony Brake loading arrangement, consisting of CI Drum pulley, suitable for water-cooling, dial type Spring balances,</p>		

	<p>Canvas belt with hooks, threaded studs With wheel for lighting the belt, Frame and base complete.</p> <p>CONTROL PANEL Specifications same as for item at serial number 2</p>	1	
6	<p><u>SPEED TORQUE CHARACTERISTICS OF DC SERIES MOTOR</u> MACHINE REQUIRED DC series motor 3HP, 220V, 1500rpm with Prony Brake loading arrangement, consisting of CI Drum pulley, suitable for water-cooling, dial type Spring balances, Canvas belt with hooks, threaded studs With wheel for lighting the belt, Frame and base complete.</p> <p>CONTROL PANEL Specifications same as for item at serial number 2</p>	1	

7	<p><u>SPEED TORQUE CHARACTERISTICS OF DC COMPOUND MOTOR</u> MACHINE REQUIRED DC compound motor 3HP, 220V, 1500rpm with Prony Brake loading arrangement, consisting of CI Drum pulley, suitable for water-cooling, dial type Spring balances, Canvas belt with hooks, threaded studs With wheel for lighting the belt, Frame and base complete.</p> <p>CONTROL PANEL Specifications same as for item at serial number 2.</p>	1	
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TRANSFORMERS

8	<p>To perform back-to-back test on two identical 1-phase transformers and find their efficiency & parameters of the equivalent circuit. EQUIPMENTS REQUIRED Transformer single phase 2KVA input 220V output 220V with Taping at 50%, 86.6% & 100% housed in steel box with educational type Terminals provided.</p> <p><u>Control panel by sumpner's (back to back) test</u> Control Panel to consist of following accessories:-</p> <ol style="list-style-type: none"> 1. M.C.B. 2. Analogue Ammeter (0-10A) MI type (1 Pc) 3. Analogue Voltmeter (0-300V) MI type (2 Pc) 4. Analogue Ammeter (0-1A) MI type (1Pc) 5. Analogue voltmeter (0-500V) MI type (1Pc) 6. 1 Phase Auto transformer air cooled type 0-270V. 7. Portable single Phase, Single Element 	1	
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	<p>Dynamometer type Wattmeter</p> <ul style="list-style-type: none"> • 1/2A, 150/300/600V – 1 NO. LPF • 5/10A, 75/150/300V – 1NO. UPF <p>8. Educational type insulated coloured terminals.</p>		
	TRANSFORMERS		
9	<p>(a) To perform OC & SC test on a 3-phase transformer & find its efficiency and parameters of its equivalent circuit.</p> <p>(b) To study the performance of Transformer for its various connections i.e. Star/Star, Star/Delta, Delta/Star and delta/Delta.</p> <p>EQUIPMENTS REQUIRED</p> <p>Transformer three phase 2KVA input 415V output 415V with Taping at 50% & 100% housed in steel box with educational type Terminals provided.</p> <p>CONTROL PANEL (For OC & SC Test)</p> <p>Control Panel to consist of following accessories:-</p> <ol style="list-style-type: none"> 1. M.C.B. 2. Analog Ammeter (0-1A) MI type (1 Pc) 3. Analog Ammeter (0-5A) MI type (1 Pc) 4. Analog Voltmeter (0-50V) MI type (1 Pc) 5. Analog Voltmeter (0-500V) MI type (1 Pc) 6. Educational type insulated colored terminals. 7. Wattmeter 1/2A, 150/300/600V – 2 NO. LPF 8. Wattmeter 5/10A, 75/150/300V – 2NO. UPF 9. 3Phase Auto Transformer <p>10. Loading rheostat 3 Phase</p>	1	
	AC MACHINES		
	Description		
10	<ol style="list-style-type: none"> 1. Ammeters 0-10A (1 Pcs.). 2. Star-delta starter. 3. Switch gear. 4. Indicating light and MCB etc. 5. Wattmeter 5/10A, 150/300/600V 	1	
11	<p><u>To perform no-load & block-rotor test on 1 Ph. Induction motor & to determine the parameters of equivalent ckt. Drawn on the basis of double – revolving field theory.</u></p> <p>Equipment Required</p> <p>Single phase induction motor capacitor start 230 rpm 50Hz, 2HP, with Drum pulley arrangement for loading purpose having round dial type spring balances with DOL starter.</p>		

	<p>Control panel All the necessary accessories such as are to be supplied on the panel:</p> <ol style="list-style-type: none"> 1. Analogue Volt meter 0-300V – 1 No's. 2. Ammeters 0-20A – 1 No's DOL starter 3. Switch gear 4. 1phase variac 0-270V (1Pcs.) 5. Indicating light and fuses MCB etc. 6. Wattmeter UPF 10/20A, 75/150/300V 7. Wattmeter LPF 10/20A, 75/150/300V 		
12	<p><u>To Perform no load & short characteristics test on 3-phase alternator and draw open characteristics and short characteristics.</u> Equipment Required: - DC shunt motor 3HP 220Volts coupled to 3phase 440Volts Alternator 2KVA separately excited separately excitation in built in the panel.</p> <p>Control Panel All the necessary accessories such as are to be supplied on the panel:</p> <ol style="list-style-type: none"> 1. D.P.S.T., T.P.S.T Switches for motor and alternator. <p>For D.C. Motor:</p> <ol style="list-style-type: none"> 1. Analog meters ammeter (0-25A) MC Type – 1No's. 2. Analog meters Voltmeter (0-300V) M.C. Type – 1 No's. 3. Field Regulator. <p>For Synchronous Alternators:</p> <ol style="list-style-type: none"> 1. Analog meters Ammeter (0-5A) M.I. Type-1No's. 2. Analog meters Voltmeter (0-500V) M.I. Type - 1No's. 3. M.C.B. 4. Indicating Light. 5. Field Rheostat – 1 No's. <p>For Excitation:</p> <ol style="list-style-type: none"> 1. Analog meter Ammeter (0-2A) M.C. Type. 		1
13	<p><u>To find voltage regulation of an alternator by zero power factor method.</u> Equipment Required DC shunt motor 3HP 220Volts coupled to 3phase 440Volts Alternator 2KVA separately excited separately excitation in built in the panel.</p> <p>Control Panel:- Specification same at for item at serial number 12</p>		1
14	<p><u>To study effect of variation of field current upon the stator current and power factor with synchronous</u></p>		1

	<p><u>motor running at no load and draw V & inverted V curves of motor.</u></p> <p>Equipment Required Synchronous motor 3HP, 415Volts AC 3phase coupled to DC shunt Generator 230Volts 2KW / bolted on common base plate with flexible coupling and Auto transformer starter.</p> <p>CONTROL PANEL All the necessary accessories as follows are to be provided on the panel board:-</p> <ol style="list-style-type: none"> 1. D.P.S.T, T.P.S.T. switches for motor and alternator. <p>For DC Generator</p> <ol style="list-style-type: none"> 2. Analog meters Ammeter (0-15A) MC type (1pc) 3. Analog meters Voltmeter (0-300V) MC type (1pc) 4. Analog meter Ammeter (0-2A) MC type <p>For Synchronous Motor</p> <ol style="list-style-type: none"> 5. Analog meters Ammeter (0-10A) MI type (1pc) 1. Analog meters Voltmeter (0-500V) MI type (1pc) 2. M.C.B (1pc) 3. Indicating lights (3pcs) <p>For Excitor</p> <ol style="list-style-type: none"> 9. Analog meter Ammeter (0-2A) MC type 10. Field Rheostat -1no 		
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15	<p>TO STUDY THE SYNCHRONIZATION OF AN ALTERNATOR WITH INFINITE BUS BY (I) DARK LAMP METHOD (II) BRIGHT LAMP METHOD.</p> <p>MACHINE REQUIRED</p> <p>The experiment can be performed by Equipment at Experiment 12 and 13. Additional equipment as given below and installation of all equipments together, and proving all the three experiments will be required.</p> <p>SYNCHRONIZING CONTROL PANEL Control Panel consist of following accessories:-</p> <p>FOR DC MOTOR</p> <ol style="list-style-type: none"> 1. M.C. Volt 96 x 96sq, mm. 0-300V –2Nos 1. MC Ammeters 96 x 96mm 0-20A –2znos. 2. Rheostat 1A, 300ohms –2Nos. 3. DPIC, 16A, 240V –2Nos. 4. DC starter 3point face plate type suitable for above 	1	
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	<p>motor –2Nos.</p> <p>5. Indicating Lights.</p> <p>6. Insulating terminals.</p> <p>FOR AC GENERATOR</p> <p>1. M.I. Volt 96 x 96sq, mm. 0-500V – 2Nos.</p> <p>2. MI Ammeters 96 x 96mm 0-5A –2znos.</p> <p>3. Frequency vibrating reed type 96 x96xsq. mm</p> <p>4. Phase sequence indicator, 96 x96 sq. mm</p> <p>5. Bulb with holder –6nos.</p> <p>6. Synchroscope 144 x 144sq mm suitable for 440V AC operation panel type</p> <p>7. Tripple pole, Double throw Knife switch</p> <p>8. M.C.B 6A, 3pole –2nos.</p> <p>9. Excitation controlling arrangement –2nos.</p> <p>10. Insulating Terminals for both the machines.</p> <p>FOR DC EXCITATION</p> <p>1. M.C. Volt 96 x 96sq, mm. 0-300V –2Nos.</p> <p>2. M.C.B Double pole 6A –2nos.</p>		
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COMMON ITEMS REQUIRED FOR EXPERIMENTS

S. NO.	ITEMS	QTY.	Price (Rs.) per unit (including all taxes)
1	<p><u>For Conducting All these Experiment DC supply is must in the lab.</u></p> <p><u>A.C. TO D.C. POWER SUPPLY (RECTIFIER TYPE)</u> AC INPUT 3phase, 440V, DC OUTPUT 220V, 100A, with Boost and Buck Press buttons.</p> <p>Specifications:- Natural air rectifier equipment, type 220/100Amp. having the following specification.</p> <p>Input : 440V, 3 ph, 50 Hz, A.C.</p> <p>Output Volts : 0 to 220 V Dc</p> <p>Output Current: 100A, DC</p> <p>Duty cycle : 100% continuous</p>	1	
2	<p>Central control panel with 16 channels</p> <p>Distribution panel with 16 channel circuit of MCB's for both AC and DC and MCB 200A with additional protection of Earth leakage circuit Break, over current Relay, Earth Leakage Relay, over voltage and under voltage Relay with control circuit duly wired for compute Electrical machine lab Terminations.</p> <p>Meters for AC Circuit</p>	1	

	Voltmeter 0-500V MI type with voltage selector switch-(1No) Ammeter 0-200A MI type for each phase –(3Nos) Frequency Meter (Digital type) –(1No) Meters for DC Circuit Voltmeter 0-300V MC type – (1No) Ammeter 0-100A MC type –(1No) Lamp Indicators for all the 3phase AC supply and also for DC Rectifier output Supply.		
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3	<u>FOR LOADING WHICH IS ESSENTIALLY REQUIRES</u> Resistive load 1phase 10A with 10 steps of 1A Resistive load 1phase 20A with 10 steps of 2A Resistive load 3phase 10A with 10 steps of 1A Inductive load 3 phase 10Amp Capacitive load 3 phase 10Amp	1each	
4	<u>TACHOMETERS</u> Digital hand held Tachometers 0-9999RPM	3	
5	Tags Connecting Leads.	200	
6	3ph Auto transformer Input 440Volts, Output 0-270V	1	
7	1ph Auto transformer 10A (closed type)	1	
8	<u>RHEOSTATS</u> 50ohms /5Amps 350ohms/2Amps	2Each	
9	Wattmeter (LPF) 0-300/600, 0.5/1/2A Wattmeter (UPF) 0-75/150, 5/10A Wattmeter (LPF) 0-300/600V, 2.5/5A Wattmeter (UPF) 300/600V, 5/10A	1Each	

10	Wattmeter 3Phase (UPF) 5/10A, 150/300/600V Wattmeter 3Phase (LPF) 2.5.5A, 150/300/600V	1Each	
11	Cut transparent working model DC motor with all the parts like fields, series field, inter pole, Armature, Commutator, Fan, Rocker and carbon brush holder assembly visible.	1	
12	Cut transparent working model of AC squirrel cage induction motor with all the parts like stator, Rotor, Fan, Bearing, winding, visible, 3phase with star and	1	

	delta connection.		
13	Cut transparent working model of 3ph alternator all the parts like fields, series field, Rotor, Fan, slip rings, holder, bearing, winding, visible capacity of alternator 1kva.	1	
14	Cut transparent working model of AC squirrel cage induction motor capacitor start capacitor run with all the parts like stator, Rotor, centrifugal switch starting capacitor running capacitor Fan, Bearing, winding, visible, single phase.	1	
16	Cut transparent working model of single phase transformer with all the parts like E.I. stamping primary coil secondary coil visible.	1	