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No. GECCS/Electrical/2024-25/991 Date 12 MAR 2025

To,

GECCS Notice Board / GECCS Website

Subject :- Quotation for Supply of Power electronics Trainer & etc..

Dear Sir/madam,

You are requested to send your competitive quotations are invited for eligible and interested dealers/distributors/Suppliers for the supply of the following items subject to the following conditions.

Terms & Conditions -

1 Rates quoted should be free delivery at the Institute inclusive of all lead and Lift.
2 Detailed specifications of the articles you intend to supply should be given. If not according to the specification, laid down here under.
3.The material should be supplied within (07) days from the date of order. List of material is given below.
4.The earliest delivery period should be quoted if you cannot supply within the period mentioned above.
5.Quotation should be in sealed cover and superscripted as "Quotations of Mechanical Engineering Department" Due on : 21 -03 -2025, at 5 P.M.
6.Quotation should be valid for six months.
7.Right to reject any or all quotations are reserved with the under signed.
8.Rates quoted must be inclusive of All applicable Taxes.
9. Delivery of the material will be carried out free of cost at our institute in Data Center by the supplier.
10. No advance shall be paid and No part payment shall be made.
11.Detail Specification including make of material should be mentioned in Quotation. If the quoted Item/Peripheral is available with you in different brands/makes, the rates should be mentioned separately brand wise/specification wise. **If the Make/Brand/Manufacturer name is not mentioned in the quotation will be rejected without giving any information to the supplier.**
12.Material will be inspected by the concerned department. If the material found correct subject to the required specifications, bill will be passed, otherwise returned as it is at your cost
13.GST Certificate, Authorized Dealers/distributers/Suppliers Certificate, and other related certificate is attached compulsory.
14.Quotation not complying with the above conditions and incomplete once will not be considered

Sr.No.	Specification	Rate with GST
1	**Power Electronics Trainer** **Features** ➢ Aesthetically designed injection molded electronic desk. ➢ Master unit carrying useful experiment resources like line Synchronized firing circuits, Power supplies, lamp load, RLC loads, Battery Charging supply etc. while the central slot will hold replaceable experiment panels. ➢ Each multi experiment panel is secured in an ABS molded plastic sturdy enclosure, and has colorful screw less overlay showing circuit & Connection through Sturdy 4mm Banana Sockets & Patch Chords. ➢ Set of User Guide provided with each unit. **Power Scope** • Accessory for any Lab CRO for off ground differential measurements upto 1000Vdc to facilitate checking inverter / converter waveform. **Master Unit** **Built in power supply** • DC supply : + 12V, 500mA, • Unregulated Power supply 17V / 750mA, • Regulated 7VDC to 14VDC/3A O/P is provided as 12V Battery charging supply. In absence of battery, same may be used as simulated battery source to run experiments on inverters etc.	

	• Isolated DC supply +12V/ 300amA with isolated common. • On board Inverter transformer of Primary & Secondaries: 12-11-0-11-12/3A. • On board o/p to Isolated Drive Circuit **AC supply** • 230V AC line voltage is made available on two banana 4mm sockets as well as 1.5A fuse extender for variac if used. • Aux DC Power Supply : (Useful as field / armature supply for DC motor) • Variable upto 200Vdc/0.5Amp (Phase controlled Thyristor half bridge) • Field ON/OFF control with field failure relay & over current protection circuit. **LSPT Panel consisting of** • Two pulse transformers of 1:1:1 are provided for isolation & supplying firing pulses along with required DC Power supply to experiment panel under test through 15 pin female 'D' connector. • Selector switch of 2 pole 6 way for selecting different types of firing pulses like out of phase inverter firing using LM3525 with dead time, freq. Control in freq variation from 170 Hz to 250Hz, 12.5/25/6..25 Hz Frequency gated with High Frequency (3KHz) for Cycloconverter, line Synchronized UJT firing for converter and pulse width **R-L-C Load Panel** •Load resistor of 10ohm/ 40W and 100ohm / 10W - 1No.each •Centre tapped 3A choke 4mH/ 16mH each -2Nos. •DC choke 0-100-200 mH/750mA- 1No. •Commutation capacitors of 10uF/100V - 4Nos. •AC Paper capacitor of 4uF/440V - 1No. •DC Cap 220uF / 63V- 1No. •Diode BYT 71 (5407)- 1 No. •On board Lamp load of 15W/ 230VAC provided **Accessories:** •15 pin D connector cable assembly, •4mm patchcords : 100mm X 10 Nos & 500mm X 20 Nos.	
2a	**Modular experiment panels [select one or more]** **1) Power Semiconductor Application Expt. panel** Triac lamp dimmer, AC fan regulator, SCR operated light sensitive switch using LDR, SCR operated temperature sensitive switch using thermistor, UJT relaxation oscillator, Half & full wave (Phase shift controlled) rectifier using SCR, Timer using SCR & UJT. Built in Lamp load.	
2b	**Power Semiconductor Application Experiment Panel** SCR phase shift controlled converter using IC555 through opto isolator (Potentiometric), Triac AC power control using IC 555 (Potentiometric) (optoisolated), SCR AC power control using UJT/PUT (Potentiometric), Triac AC power control using UJT/PUT (Potentiometric), SCR/Triac temperature control using thermister, SCR/Triac intensity control using LDR, Opto isolated DC switch & Photo relay & thermal relay (street light control).	
2c	**Converter / Inverter Panel** • SCR Converters - Provided with sturdy 800V/12A SCRs (4nos) with uncommitted snubbers, 6A diodes (2nos) commutation switch, 47µF/450V cap, Ramp Cosine firing circuit. However actual working currents are limited to 3A (max) for safety. • Half Wave & Full Wave Fully Controlled converter • AC Voltage Controller using Lamp • SCR Controlled Converter 1 phase with R-L Load • Effect of Free Wheeling Diode on SCR converter performance with Inductive load. • Study of SCR converter (Open Loop) output with Inductance Input & Capacitance Input filters • Effect of Source Impedance on performance of SCR converters. • Study of closed loop SCR converters with Resistive Load. **Select motor types from addons below.** • Study of full wave -half controlled SCR bridge. • Resonant DC- DC converter. • Advanced firing Schemes • Study of H.F. gate type SCR triggering.	

	• Study of relation between control voltage & SCR converter output DC voltage - using linear resistor controlled synchronized ramp firing • Study of Linear relation between control voltage & SCR converter output- using cosine firing scheme. • SCR forced Commutation Techniques • Study of forced commutation techniques for SCR, Class A,B,C,D,E,F • SCR based Inverters • SCR based Parallel Inverter. • SCR based series Inverter . • SCR based Bridge Inverter. • SCR based Mcmurray Bedford half bridge inverter. • Cycloconverter • SCR Based cycloconverter • SCR based Chopper • SCR based Jones chopper Resistive load • SCR based Morgans chopper • SCR based buck (step dn), boost (set up), buck boost chopper	
2d	**Triggering circuit / dv/dt Protection panel** • SCR Triggering Schemes / turn ON methods. • Simple Resistance firing circuit for upto 90^0 SCR firing half wave. • Resistance - Capacitor firing circuit with increased control SCR firing - half Wave & full wave. • UJT/PUT based SCR Trigger with series/ shunt transistor controlled ramp, resistance controlled Pedestal • TRIAC Triggering Schemes / turn ON methods. • Simple Resistance firing circuit for TRIAC firing Full wave. • UJT/PUT based TRIAC Trigger with series/ shunt transistor controlled ramp, resistance controlled Pedestal • dv/dt behaviour of SCR • Study of SCR dv/dt protection using gate termination. • Study of SCR dv/dt protection using gate reverse bias with resistance. • Study of SCR dv/dt protection using gate reverse bias with resistance & diode. • Study of SCR dv/dt protection using polarised snubber. • Study of SCR dv/dt protection using polarised RC snubber with discharge resistor. • Study of Triac dv/dt protection using RC Snubber. **Inclusive of 1 Year of onsite warranty and trainer should be safety aesthetically designed injection molded desk not wooden box (anti Green), not metallic box (Corrosive and shock possibility for the JA students).**	
2e	**SCR Application Panel** • Study of Zero Voltage Line switching & Integral cycle control using SCR. • Study of SCR based Ring Counter for sequential switching. • AC voltage control using SCR based transformer tap changer. • SCR based AC flasher / DC flasher.	
2f	**IGBT / MOSFET Inverter Panel** • Provided with uncommitted MOSFET (800V/7.8A, 2No.) IGBT (600V/6.5A, 2 No.) brought out on Banana sockets, LM3525 based PWM converter to generate 200-2000Hz inverter frequency as well as duty cycle control, 1 No. optoisolated driver & 1 no. additional opto Drive provided on Topboard for Chopper etc. • Switching characteristics of MOSFET / IGBT • MOSFET / IGBT based 4 types of Chopper - Buck, Boost, Buckboost, Cuck. • MOSFET / IGBT push pull & half bridge inverter 200/2000Hz.	
3	**DC Shunt/Series/Compound Motor speed control trainer** **The Trainer should have following features :** • Following trainer may need a few set of associated panels (4 nos. typically) which are mounted in a light weight sturdy aluminum flat demo panel system. • Facilitates easy & safe wiring by students due to 4mm sturdy shrouded banana patch	

	cords & shrouded socket arrangement for high voltage circuits. • Each panel has ABS molded plastic sturdy enclosure, & colorful screwless overlays showing circuit diagram & its connection tag numbers for easy understanding & connections. • Set of Instructor Guide & Student Workbook **Technical specifications:** It should consists of : **1] Instrumentation Power supply cum Multi- channel DPM panel** (a) +/-12 V, 500 mA (b) +5V, 300mA (c) Unregulated 17V dc/750 mA (d) line synchronizing signal. (e) Multi channel DPM for digital display of speed, etc. **2] SCR Actuator (variable DC) cum sensor signal conditioning panel** 1. Full bridge SCR based 0V-195V / 12 Amp cosine firing with linear charateristics. 2. Supports signal conditioning circuit for speed to give output 0-2.5Vdc (FS). 3. 2 Nos. of these supplies required for DC Armature & DC motor field. **3] DC voltmeter & DC ammeter panel** a) DC voltmeter (0-300V) b) DC Ammeter (0-5A) with polarity protection diode c) Field failure relay to control Armature supply. **4] DC Integrated Motor Specifications** 180V/300W/1500RPM with series shunt & compound windings, Chasis mounted table top with spring balance loading arrangement [10kg] & Electronic Tacho:1V/1000RPM. **List of Experiments** 1. Open loop torque speed characteristics. 2. Closed loop speed control using Armature voltage / speed feed back using P/PI mode.	
4	**3 Phase High Voltage Thyristor Control Trainer** **Features:** • Facilitates easy & safe wiring by students due to use of 4mm sturdy Shrouded banana patch cords & shrouded socket arrange-ments for high voltage circuits • Each panel has ABS molded plastic sturdy enclosure, & colorful screwless overlays showing circuits diagrams & its connection tag numbers for easy understanding & connection 4. Set of Instructor Guide & Student Workbook • Set of Instructor Guide & Student Workbook. • Supplied with power scope attachment to any lab CRO for H V Differential voltage off-ground measurements. • Trainer should be modular panels for easy site servicing not close control; panel box no wiring should not be there & shrouded 4 mm banana patch cords & shrouded sockets arrangements for the safety of the students **TECHNICAL SPECIFICATIONS** **Input 3 phase DOL Starter panel** • 4 Pole MCB of 415V/4A. • DOL 9A contactor with 230V/50Hz/11VA COIL. •Bimetallic thermal O/L relay with range 1.4A-2.3A. **DC voltmeter & DC ammeter panel** •DC voltmeter (0-600V) •DC Ammeter (0-5A) with polarity protection diode **Lamp Load** 230V/15/40/60/100W X3 bulbs with individual ON/OFF using 6A toggle switch. **Inductive (L) Load** •Inductive load=0.75W/3H/300mAX3Nos. **3 Ph. Bidirectional power cum Energy meter panel** • Bidirectional Multifunction • 3 Phase ¾ wire, 415V CT Input 5A • LCD/LED display, Aux. supply 230V, 45-65 Hz, 5W • V, I, Hz, Pf, KVA, KW, KWh **6 SCR Firing/Synchronizing Panel** • Mode selection switches (3 nos) to select cyclo converter, converter or disable. • Cosine firing scheme to facilate linear control for better harmonic ripple control. • Cyclo converter frequency generator 25Hz/12.5Hz/6.25Hz •Mode selection switched (3 Nos.) to select Cyclo converter frequencies, converter mode or disable.	

	• In built firing angle control pot. • Facility to apply external 0 to 2.5V signal from DAC to control firing angle. **6 SCR/Diode Power Module** •Consist of 6 SCR [Anode to body type] with PIV rating 1200V/25A. •6 Diode with PIV rating of 1200V/16Amp •6 No. of uncommitted Snubbers for protection of thyristors consisting of capacitor 0.1uF/1000V & 100E/5Wceramic resistors. **External Interface : I/P Fault Switches :** 3 Nos. PTs arranged in circuit 230V: 12-0-12@50mA **List of Experiment** **1) Working with 3 Phase HVDC** : a) 3 Ph. half wave uncontrolled converter with Resistive load using diodes. b) 3 Ph. full wave diode bridge (uncontrolled converter) with Resistive load. c) Study of SCR firing circuits in 3-ph. converter environment. d) 3 Ph. half / fully wave fully controlled / half controlled SCR converter with Resistive Load & motor load . **2) Working with 3 Phase AC Voltage Control** : a)Study of SCR firing circuits in 3 ph. AC voltage control. b) 3 Ph. AC voltage controller with resistive load using SCRs. c) 3 Ph. Induction motor speed control using SCR based AC voltage controller. d. 3 Ph. AC voltage controller fed Induction motor Drive. **3) Working with 3 Ph. Cyclo-Converter** : a) Study of SCR firing circuits in 3 ph. Cyclo converter. b) 3 ph. cycloconverter with resistive	
5	**Single Phase Dual Converter Tender Specifications** FEATURES •Facilitates easy & safe wiring by students due to 4mm sturdy shrouded banana patch cords & shrouded socket arrangement for high voltage circuits. •Each panel has ABS molded plastic sturdy enclosure, & colorful screwless overlays showing circuit diagram & its connection tag numbers for easy understanding & connections. •Set of Instructor Guide & Student Workbook. •Trainer should be modular panels for easy site servicing not close control; panel box no wiring should not be there & shrouded 4 mm banana patch cords & shrouded sockets arrangements for the safety of the students **Technical Specifications:** **1) Instrumentation Power supply cum Multi- channel DPM panel** a) +/-12 V, 500 mA (b) +5V, 300mA, c) Unregulated 17V dc/750 mA (d) line synchronizing signal. **2) SCR Actuator (variable DC) cum sensor signal conditioning panel** a) Full bridge SCR based 0V-195V/3 Amp cosine firing with linear characteristics. b) This supplies required for DC Armature. **3) DC voltmeter & DC ammeter panel** a) DC voltmeter (300-0-300VDC) b) DC Ammeter (5-0-5A) with polarity protection diode c) Field failure relay to control Armature supply. Both 6A/6B needed simultaneously **4) 1 phase Motor, Alternator & Sync. Motor Panel** a) 1 phase MCBs of 4A/1.6A 2nos. b) 2no. 2P2W selector switches to run as 1 phase alternator then as synchronous motor. c) 8A pushbutton switch to simulate as centrifugal switch. **5) Single Phase Dual Converter Controller Panel** a) 2 No. CTs (1A/30mA)to detect current zero condition in each converter bridge b) Converter reference voltage generator & required output polarity signal generator. c) Current zero sensing circuit & pulse block signals. **6) PMDC Motor Specifications:** DC Motor 200VDC/ 200W with 1500RPM or 60W Lamp Load on Panel. Isolation Transformer 230:230@3A, 1 Phase. **7) List of Experiments:** 1. Study of Dual converter topology & control strategy. 2. Study of Dual converter operation: Resistive load / motor load. 3.Study of Circulating & non circulating current mode operation. 4. Study of 4 SCR full bridge O/P 0-195V / 3A, cosine firing 5. MOSFET –IGBT panel	

6	**Four Quadrant Chopper Trainer Technical Specifications:** **FEATURES** • Facilitates easy & safe wiring by students due to 4mm sturdy shrouded banana patch cords & shrouded socket arrangement to try out different topologies for high voltage circuits. •Each panel has ABS molded plastic sturdy enclosure, & colorful screw less overlays showing circuit diagram & its connection tag numbers for easy understanding, connections & servicing by swapping at site. •Study of different types of choppers i.e. Type-A, Type-B, Type-C,Type-D &Type-E(first quadrant to fourth quadrant). •Set of Instructor Guide & Student Workbook. •Inbuilt IC based PWM control with variable duty cycle & variable frequency (1-20KHz). •4 independent IGBTs with built in driver & 2KV isolation provided for TTL level driver. Thus easy for site servicing,2 hall current sensors one for load & one for source supplied. **TECHNICAL SPECIFICATIONS:** A] Aluminum profile modular flat demo panel rack (4X2) system, carrying various high voltage components housed in plastic enclosures (panel) to minimize shock possibility. **Instrumentation Power supply cum Multichannel DP Mpanel** •±12V/500 mA, +5V/300mA, Unregulated 17V dc/750 mA, line synchronizing signal, 13V / 3 Amp. •Multi channel DPM for digital display of parameters. •20 pin FRC power bus to supply power to neighboring panel. **4IGBT/MOSFET power & sensing panel** •1200V/40A IGBTwith isolated (lV) TTl compatible isolated driver circuit & individual heat sink 4 nos. •Current measurement DC (2 nos.) 0.5E/5W series resistor default or using hall sensors (Max I/P up to 20A, 50/60Hz), isolation up to 2KV, O/P =0-3V for controller feedback. •Voltage measurement DC (1 no.) MC DC meter / ammeter default orusing hall sensor (Max I/P 10-500V, 50/60Hz), isolation up to 2KV, O/P =0-3V for controller feedback. •IC3525 based PWM control with variable duty cycle (5%-90%) & variable frequency (1-20KHz) •Power supplies isolated 2 nos. 24V@3A & 12V@750mA with loading resistors provided to prevent voltage built up. •2.5mH@5A inductor as load supplied. • Panel consist of diode bridge (1000V/35A), capacitors (0.1 & 2.5µF) & resistors (0.5E/5W & 5E/20W) . **DC Voltmeter & Ammeter panel** •Voltmeter (300V-0-300V) & Ammeter (2A-0-2A) **DC Voltmeter & Ammeter panel** •Voltmeter (30V- 0-30V) & Ammeter (2A-0-2A) **PMDC motor with loading arrangement** **PMDC Motor Specifications:** •200V/200W/2000RPM Chasis mounted table top with spring balance loading arrangement [10kg]10V/1000RPM. Weight : 12 Kg. **Variable AC & DC supply panel:** Variable output : AC 0-270V/3A Variable output : DC 0-250V/3A **Resistive load:** **DC Resistors:** 750E/600E/300E/212E/162E/125E/112E/100E/400W/8taps+OFF+separate 60E tap for DC series Gen. **List of Experiment:** 1. Study of first quadrant chopper or Type-A chopper. 2. Study of second quadrant chopper or Type-B chopper. 3. Study of two quadrant type-A chopper or Type-C chopper. 4. Study of two quadrant type-B chopper or Type-D chopper. 5. Study of fourth quadrant chopper or Type-E chopper. 6.Four quadrant 200V/200W PMDC motor chopper drive. 7. Resonant converter **Accessories** 1) Single IGBT module mounted on 140x40mm heat sink. 2) Single phase rectifier pack mounted on heat sink.	

7	**IGBT/MOSFET Module** 1) IGBT/MOSFET module mounted on 140x40mm finned heat sink with drain & source outputs brought out on 2 solder pads connected to 100mm x 1.5 Sq.mm flying leads terminated on screw less press fit HV WAGO connectors. Forced air cooling (CFM=85) needed else derate by approximately (~50)%. 2) Power device : IGBT (Package-TO 247)1200V/40A with built in short circuit sustainability upto 4 µsec. OR optionally MOSFET 800V/17A (or your choice). 3) Protection: i) Over temperature using NTC @ 85°C ii) Over current using ferrite CT (1:100) iii) Transient high voltage Snubber using RC with 800V clamping voltage transient suppressor. 4) Drive supply : External 12V/100mA supply needed through 4-pin relimate connector while built in transformer (2KV) isolated DC-DC converter inside. 5) Drive input : Opto isolated O/C TTL @10mA, Max switching frequency DC to 25 KHz, propagation delay opto isolated trip feedback signal provided using 5-pin relimate connector. 6) Indication : Power ON green LED & red trip LED provided on module
8	**3 Phase Inverter Trainer** **The trainer should have following features** • includes reconfigurable hardware modules & individually replaceable power modules, which may be interconnected to construct 3 phase/ 1 phase inverter topologies. Moreover, the FPGA controller board is accessible to user, thereby facilitating quick verification & testing of new ideas. • use of hall sensors for voltage/current measurements. • Light weight yet sturdy, table top Aluminum profile modular flat demo panel setup, carrying various high voltage components housed in plastic modular panels with colorful overlays to minimize shock possibility & easy servicing. • Facilitates easy & safe wiring by students due to use of 4mm Shrouded banana patch cords for high voltage circuits. • Each panel has ABS molded plastic sturdy enclosure, & colorful screwless overlays showing circuits diagrams & its connection tag numbers for easy understanding & connections, experiments also set of Instructor Guide & Student Workbook. • Trainer should have modular panels for easy site servicing & not close control; panel box wiring should not be there but should have shrouded 4 mm banana patch cords & shrouded sockets arrangements for the safety of the students **Technical Specifications** Aluminum profile modular flat demo panel rack (5X2) system, carrying various high voltage components housed in plastic enclosures (panel) to minimise shock possibility **Instrumentation Power supply cum Multichannel DPM panel** (a) DC Multi Output power supply (b) Supplies DC power to neighboring signal conditioning circuit panels like EMT9, CIP1, 2, MIT12, CE7 etc. through 20 pin FRC cable. (c) Provides 1 Ph. AC supply through 3 MCB's, 4A each to power up other panels in the rack (d) Multichannel DPM for digital display of torque, speed etc. **8 IGBT Power & sensing panel** Consisting of • 1200V/40A IGBT with opto isolated (LV) TTL compatible driver circuit & individual heat sink with built in isolated DC power supply for gate drive - 8 nos. • Current measurement AC (12 nos) & DC (1no) using Hall sensors (Max I/P up to 20A, 50/60Hz), Isolation up to 2KV, O/P = 0-3V for controller feedback. • Voltage measurement AC (3 nos) & DC (1no) using hall sensors (Max I/P 10-500V, 50/60Hz), Isolation up to 2KV, O/P = 0-3V for controller feedback. • 2 nos of relays for ON/OFF control of I/P & O/P under /uc control. • DC link supply for inverter 300V/5A. • May be used in manual mode using SG3525 PWM controller (1 phase application) as well as from DSP/FPGA controller (User selectable choice of controller). **FPGA based controller panel** • 16MHz crystal operated multi-output clock source to operate various resources on Mother Board like CPU, Baud rate, Timer/Counter etc.

	• 6 LVTTL gate drive outputs to & 6 status feedback inputs from 6 nos IGBT power modules through 26 pin FRC cable. • 2 digital outputs for ON/OFF Relay control & one for controller ON led. • opto isolated 3 inputs for encoder/ hall sensors from PMSR/BLDC & 1 input for DC bus fault interrupt. **AC voltmeter panel** • Voltmeter range: 500V • 1 pole 4 way switch to select line voltage for three phase **Dual range AC ammeter panel** • Current range: 2A/6A selectable • 1 pole 7 way switch to select phase current to three phases **Variable AC & DC supply panel** • Variable O/P: AC 0-270V/3A for V/F manual setting **3 phase Induction motor specs :** 3 phase induction motor, ½ HP, 1500RPM, 3 terminal (star 440Vac/0.5A) motor with Hand held Tachometer for speed measurement **Accessories:** Power scope, BNC to BNC cables x 2 nos., Tachometer **List of Experiments** : 1) Study of speed control of 3 phase induction motor using square wave inverter. 2) Working with 1 phase A.C. 2 winding motor 3) Measurement of inverter waveforms 4) Study of speed control of 3 phase motor using PWM Sine inverter	
9	**UPS Trainer** **Rack Specifications:** Powder coated Sturdy aluminums Flat panel system made up of Alluminium extruded profiles carrying various high voltage components housed in plastic enclosures to minimize shock possibility. Should be able to hold following control panels with colorful overlay. **The Trainer should consists of following Electrical Specification** •Input range is 170-270V A.C./50Hz. •Output (Input present) 195-250V sine. •Output (Input unhealthy / absent) 230 V + 5% Quasi-sine. •Capacity 200W lamp load on AVR. • Branded Battery 12V / 7Ah. (maintenance free lead acid) •Backup of 5 minute on 200W lamp load or 20 minute on one PC with colour monitor. •Test points: 17 Needed. **The Trainer should require following individual Panels :** • Input / Output Module •Battery / Transformer Module •AVR / Charger Module •Inverter Module **The Trainer should cover following Experiments:** •Study of AVR charger •Study of change over logic •Study & working of typical offline UPS	

Yours faithfully

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