**GENERAL INSTRUCTIONS**

(1) Sealed tenders are invited for the procurement of laboratory items of HBTI Kanpur. The tender documents can be bought from the Store Purchase Section, Harcourt Butler Technological Institute Kanpur. Interested tenderers may download the same from the website and submit their offer along with **Tender fee of `1000/- each** (In form of Crossed Demand Draft issued by any Nationalized Bank in favour of Director H.B.T.I., Kanpur). While submitting your offer mark Tender No. and due date on the envelope.

(2) Quotations received without Tender fee will not be considered.

(3) No request for the extension of the due Tender date will be considered.

(4) Each Tender consisted of various schedules and EMD for each schedule is mentioned separately. Tenderers may submit their proposals for **one or more schedules** along with the respective EMD (In form of Crossed Demand Draft issued by any Nationalized Bank in favour of Director H.B.T.I., Kanpur).

(5) The offer submitted for each schedule should be complete in all respect and price quoted for each schedule should be **FOR destination HBTI Kanpur**.

(6) Late/delayed offers will not be accepted.

(7) Tenders received before the deadline shall be opened in the presence of attending Tenderers/their authorized representatives on the same day at scheduled time and venue.

(8) Corrigendum, if issued any for the Tender, shall form part of the Tender document. Corrigendum will be posted only on HBTI Kanpur website (www.hbti.ac.in). Tenderes are requested to visit HBTI Kanpur website regularly and note the corrigendum/amendments to the tender without fail and submit the offer accordingly.

(9) All other terms and conditions are as per the Institute rule.

(9) The Director reserves the right to cancel any or all Tenders without assigning any reason.

**For HBTI Kanpur**

**Tender No.: 07/SPS/EE/2016 Dated: 14.03.2016 due on 04.04.2016 by 01:30 pm**

|  |  |  |  |
| --- | --- | --- | --- |
| **Schedule No.** | **Name of Experiment / Equipment** | **Quantity** | **EMD (`)** |
| 1. | SCR, MOSFET, IGBT & TRAIC – STATIC CHARECTERRISTICS TRAINER MODULE  Specification: It Consists of power devices SCR, TRAIC, MOSFET, IGBT \* Two no. of 12V fixed DC power supply and one no of 30V fixed power supply for characteristics of all devices \* Two nos of potentiometer to vary the gate/base current \* Fixed load resistor \* LED indication for 12V, 30V \* Power on/off switch provided \* All necessary points terminated in the front panel Provision for connecting ammeter and voltmeter 3 meters (multimeter) are provided to measure the various power devices Current and voltage to find the static characteristics. \* For SCR & TRIAC only forward characteristics can be performed. | 01 | 250 |
| 2. | SINGLE PHASE AC VOLTAGE CONTROLLER USING SCR & TRIAC SINGLE PHASE AC VOLTAGE CONTROLLER TRAINING KIT  Specifications: SCRs rated for 1200Volts & 25Amps.  TRIAC rated for 600Volts & 12Amps  Each device is provided with RC Snubber for dv/dt protection Fuses to avoid overload. All the G, A, K & MT terminals are terminated on connectors to use patch chords to form any Converter/ Inverter circuitry.  Devices terminals are terminated on connectors to use patch chords to form AC Regulator  \* 24V Ac @ 2Amp regulated output for low voltage operation \* In the low voltage operation the student can see the waveform using and oscilloscope without any Isolation Transformer LOAD \* One fixed Resistive Load \* One fixed Inductive Load  \*One Ac motor load  All points are terminated at the front panel for wiring for each experiment | 01 | 650 |
| 3. | SINGLE PHASE HALF AND FULL BRIDGE INVERTER  Specifications: SCRS rated 600v/12A , diodes rated 600V/6A provided Commutating capacitors and inductors are also provided  Four isolated gate pulses are provided to fire the four SCRs One potentiometer provided to vary the frequency of the inverter One potentiometer provided to vary the amplitude of the inverter Gate pulses are terminated through proper connectors for patching with SCRs. | 01 | 650 |
| 4. | THREE PHASE HALF**/**FULL WAVE BRIDGE UNCONTROL AND CONTROL RECTIFIER | 01 | 2400 |
| 5. | SINGLE PHASE IGBT MODULE 1200V and 25 Amp. with all protections.  12 Numbers of High speed Opto - isolator provided for PWM isolation One number of Single phase diode rectifier (600v 25a) with filter capacitor\*  diagram indication.\* 230V AC input, one number of power on / off switch with indication.\* | 12 | 4200 |
| 6. | THREE PHASE MULTILEVEL INVERTER  Specifications: This module is designed to study the working principle of IGBT based 3 level inverter multilevel inverter (3 level \* Consists of 12 Nos, 1200V, 50A. IGBT with proper heat sink and snubber circuit \* 6 Nos, Power Diode with proper heat sink and snubber circuit \* 12 nos high speed opto-isolator provided for IGBT PWM inverter. \* 12 nos IGBT gate driver IC provided for IGBT gate driving \* 10 nos isolated +15v dc @ 0.5A capacity provided for control circuit diode bridge rectifier with capacitor provided for input AC-DCΦ\* One no of 1Converter \* 3 no of Hall Effect current sensor provided for O/P current measurement & protection circuit \* 1 no Hall Effect current sensor provided for all current measurement \* Two no FRC connector provided for IGBT PWM input & ADC interface \* MCB protection for input power ON/OFF & protection \* One no of restart switch and LED provided for protection circuit indication & reset the unit \* One no of analog DC voltmeter provided for DC voltage measurement . \* One no Power ON/OFF switch provided.  outputsΦ\* 3 & input are terminated in the front panel.Φ1  \* All are mounted on a nice cabinet with stickered front panel \* Test points provided for PWM input and current sensors output \* INPUT : 0-230V AC OR 300V Dc OUTPUT : , 200V, suitable for 1 HP AC motor | 01 | 3300 |
| 7. | THREE PHASE TWO-LEVEL VOLTAGE SOURCE INVERTER | 01 | 1800 |
| 8. | Digital Storage Oscilloscope 100MHz for 4 Channels, Sampling Rate 2GSa/a Channels, Memory 100Kpts ,  WaveGen 20 MHz function generator, Vertical Resolution 8 bits, Automatic measurement, Math function with FFT  Measurement PC Connectivity via software in CD, Display Min. 8” inch WVGA, Min. Waveform update rate 50000 Waveform per second, Time Base accuracy ±25PPM, Interface USB, with standard accessories | 02 | 6250 |
| 9. | SPEED CONTROL OF THREE PHASE SLIP RING INDUCTION MOTOR USING STATIC KRAMMER DRIVE  Specification : This setup designed for open loop speed control of 3 phase slip ring induction motor using SCR converter & inverter circuit  It consists of three major parts namely  a.SCR 3 phase inverter b.SCR 3 phase inverter firing circuit c.Slip ring induction motor setup with rotor converter circuit & RL for DC filtering  A. SCR 3 PHASE INVERTER:  It consists of 6 nos. of SCRs rated at 1200V, 50Amp with suitable heat sinks to form 3 phase fully controlled converter work as a 3 phase inverter (a\*> 90o).  B. SCR 3 PHASE INVERTER FIRING CIRCUIT:  Six isolated gate signals for full bridge converter\* Firing angle variable from 180o to 0o through ramp\* & pedestal control Gated carrier source at 4KHz\* Test points are provided on the front panel for detailed study of circuit signals by the\*  student Necessary test points are terminated at sockets so that the student can monitor/\*  measure / study the signals using CRO, DVM, etc., One potentiometer to vary the firing angle\* One ON/OFF switch with indicator provided to power the control circuitry so that\*  the Students can monitor all the test points of the control circuitry for correct  functioning  C. SLIP RING MOTOR WITH DIODE BRIDGE RECTIFIER:  3 phase 1 hp slip ring induction motor\* # Make: Benn # Volts: 400/200V, 3 phase, 50 Hz # (1hp), RPM : 1440 # Rotor Volts : 210volt One no. of ‘L’\* & ‘R’ provided for dc filtering Necessary test points provided for easy study\* Entire control circuit mounted inside a compact box\* Mimic circuit is drawn in the front panel\* Many test points are provided along with front panel\* A nice text-lab manual is provided\*  POWER SUPPLY  # Input 230V + 10%, 50Hz 3 phase AC supply # + 15V DC @ 0.5A regulated output for the control circuitry | 01 | 4000 |
| 10. | ARMATURE AND FIELD CONTROL OF DC SHUNT MOTOR USING SINGLE PHASE RECTIFIER IN OPEN AND CLOSE LOOP  Specificatios:  CONVERTER:  SINGLE PHASE FIRING BRIDGE CIRCUIT:  # 4 Isolated gate signals for full bridge converter # Firing angle vary from 1800 to 00 through Ramp and pedestal control # Gated carrier source at 4 KHz (Approx)  SCR CIRCUIT:  # 4 thyristors are provided # Snubber circuit is provided to each device # All gate signals are feed through polarized connectors # Thyristor power back used to provide to vary the field voltage of DC motor.  OUTPUTS:  # Armature voltage : 20-200V # Armature current : 5 Amps # Field voltage : 180- 220 V # Field current : 1.0 Amps \* Inputs : 230V + 10% AC, 50Hz  PI CONTROLLER:  PI controller provided for speed and control\* PI controller provided with front panel variable settings to\* Error Amplifiers provided\* One 3½ digit display to display the reference speed and the actual speed of the motor , selectable by a switch\* Housed in a separate sleek box\* Mimic diagram is screen printed in the front panel\* Optical encoder used to give feedback signal to the PI Unit.\*  DC MOTOR WITH LOAD SETUP:  One separately excited 1 hp DC motor Spring Balance Load setup\* Speed sensor provided speed measurement.\*  PROTECTION: Soft / start facility\* Field failure safety device\* Armature over current protection for the motor\* One main switch\* | 01 | 2000 |