Malaviya National Institute of Technology Jaipur

Jawahar Lal Nehru Marg, JAIPUR-302017 (Rajasthan)
Ministry of Education
(Government of India)

Open Tender Enquiry

For

Procurement of Equipments for Power Electronics & Electrical Drive lab (total articles- 16)

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

No. F5(1852)ST/MNIT/EE/2022 **Phone : 0141-2713312,2713352**

NOTICE INVITING QUOTATIONS

Registrar, MNIT, JLN Marg, Jaipur invites sealed tenders for the supply of **"Equipments for Power Electronics & Electrical Drive lab (total articles- 16)"** for **Electrical Engineering Department** of this Institute in **Two Bid System (Technical & Financial bids in separate envelope)** as per schedule given below:

Schedule	
Event	**Date & Time**
Download of Tender	12.08.2022
Pre-Bid Meeting Date & Time	23.08.2022 by 2.00 PM
Bid Submission Last Date & Time	05.09.2022 by 2.00 PM
Technical Bid Opening Date & Time	05.09.2022 at 3.00 PM
Earnest Money	**(Rs. 40,000.00)** **EMD in the form of Demand Draft** in the name of The Registrar, MNIT payable at Jaipur or NEFT/RTGS in the bank account details as under**:-** Bank Name: ICICI Bank Ltd., Bank Branch: MNIT Jaipur Account Holder: Registrar MNIT Jaipur, J.L.N. Marg, Jaipur Bank Account No: 676805000011 Bank IFSC Code: ICICI0006768
Performance Bank Guarantee	3% of the contract value valid till warranty period plus 60 days.
Warranty	Standard OEM warranty not less than 1 year
Delivery	60 Days
No. of Covers	02
Bid Validity days	90 days
Email Address (for Technical Clarifications)	storepurchase@mnit.ac.in

Quotation must be enclosed in a properly sealed envelope addressed to **Deputy Registrar (S&P), Malaviya National Institute of Technology, Jawahar Lal Nehru Marg, Jaipur -302017 (**E-mail address storepurchase@mnit**.**ac**.**in**)** by designation and not by name. The quotations must be super scribed "Quotations for the supply of **"Equipments for Power Electronics & Electrical Drive lab (total articles- 16)"** as called for in Tender Notice No. ---------- dated _____due on--------- at ----------AM/PM. The Quotation must reach on or before the due date and time mentioned in the ´**Schedule'**. The documents must be dropped in the tender box available in Central Store during office hours (9.30am to 6.00pm) on all working days. Bids delivered to any other place or any individual shall not be considered as valid document. Quotations sent by e-mail will also not be considered valid. The complete Tender document can be viewed and downloaded only from the website **(**www**.**mnit**.**ac**.**in**)** and CPPP site https://eprocure.gov.in/epublish/app during the tender period**.**

2. The bids (complete in all respect) must be submitted in **two separate** Envelopes as explained below.

Envelope – 1 (Following documents to be provided)			
Sl. No.	**Type**	**Content**	**Supporting Page Number of bid**
1.	Technical Bid	Index / Table of Content	
2.		Proof of Earnest money Deposit as mentioned in the **'Schedule'**. In case of exemption from submission of Earnest Money Deposit, proof of registration with NSIC/MSME.	
3.		Copy of GST Certificate and PAN.	
4.		Leaflets Catalogue (Brochure)	
5.		Compliance Sheet **(Annexure-I)**	
6.		Non Blacklisting of Supplier and Price reasonability declaration as per **Annexure-II**	
7.		Required past Experience as per **Annexure- III** (kindly refer clause No. 4.7.5)	
8.		Minimum average annual turnover of the bidder (kindly refer clause No. 4.7.6)	
9.		After Sale Service Certificate **(Annexure IV)** (kindly refer clause No. 4.30)	
10.		Manufacturer's Authorization Letter as per **Annexure-V**	
11.		Certificate - Bidder Not from Country sharing Land border with India & Registration of Bidder with Competent Authority **(Annexure-VII)**	
12.		Declaration of Local Content **(Annexure-VIII)**	

Envelope - 2		
Sl. No.	**Type**	**Content**
1.	Financial Bid	Price bid in specified format only. **(Annexure- IX)** *Note:* ***1.Price is to be quoted in Indian Rupees only.*** ***2.-Comparison of prices will be done ONLY on the bids submitted for the Main Equipment and anything asked as 'Optional' in the specifications is not to be included for overall comparison)***

Note: **Price are to be quoted in Financial bid only placed in separate sealed envelope. If price are quoted anywhere in technical bid documents, the bid will summarily be rejected.**

3. INVITATION FOR TENDER OFFER FOR PROCUREMENT OF "EQUIPMENTS FOR POWER ELECTRONICS & ELECTRICAL DRIVE LAB (TOTAL ARTICLES- 16)"

Malaviya National Institute of Technology, Jaipur (MNIT) invites bids (Technical bids and Commercial bid) from eligible and experienced OEM (Original Equipment Manufacturer) or OEM Authorized Dealer for procurement of '**Equipments for Power Electronics & Electrical Drive lab (total articles- 16)**" (warranty period as stated at "Schedule") on site comprehensive warranty from the date of receipt of the material as per terms & conditions specified in the tender document.

3.1. TECHNICAL SPECIFICATION:

Sl. No.	Technical Specifications required			
Instrument Specifications	**Equipments for Power Electronics & Electrical Drive lab (total articles- 16)**			
	S.No.	**Name of Item**	**Specifications**	**Qty.**
	1.	**Kit for the Experimental investigation of Boost Rectifier with Power Factor Correction (PFC).** The experimental kit will help to understand the operating principle of Boost Rectifier with Power Factor Correction (PFC) features.	➢ The experimental setup consists of low-voltage boost rectifier with PFC feature. ➢ 32-bit Cortex M4 ARM microcontroller-based controller for gate pulse generation. ➢ Test points for current and voltage waveform observation across different elements are provided. ➢ Detailed features and specifications are as listed below: 1. Isolated 40V, 50Hz AC input voltage. 2. Boost Converter with 60-70V, 1.5A capacity. 3. Series shunt resistor across source, inductor, switch, diode and load for current waveform observation. 4. Slow outer voltage control loop working at order of 100 µSec and fast inner current loop working at order of 10 µSec. 5. Two different current control method including Average Current Control and Hysteresis Current Control can be studied. 6. Accessibility to monitor the gate pulses of the boost converter. 7. Rugged packaging with plug and socket type banana connector.	**1**
	2.	**Kit for the studying the Performance Investigation of Digitally & Computerized Controlled BLDC Motor Drive**.	**Specifications/Setup Includes:** ➢ 0.5 HP, 48 V, 1500 RPM, BLDC Motor with mechanical loading arrangements having linear scales (with inbuilt sensor), Make: Benn or equivalent, ➢ Motor Performance as per IS / IEC Standards. ➢ ARM Cortex M4 32-bit microcontroller for programming (STM32F407VGT6 microcontroller featuring 32-bit ARM Cortex-M4F core), On-board ST-LINK/V2 for programming and debugging, ADC, DAC, USB/JTAG terminal facility on board and other features like Waijung facility, GPIO ports are routed to header on mother board for easy connection and having :- 8 General purpose input lines, 8 General purpose output lines, 16X2 LCD interface, 5 keys interface, 3 high speed digital outputs and 2 High speed digital input lines, 6 PWM outputs, 3 QEI inputs, SPI bus for SPI slave interface, 9 Analog inputs, 2 Analog Universal outputs: 0 to 10V or 4-20mA, 9-pin D-type connector for RS232 interfaces. ➢ Three Phase Inverter with Protection having 600V, 10 A DC link, 600V, 25 A IGBTs, 2 A rail-to-rail output, bipolar pulses Isolated +16V/-8V, shoot through, short circuit protection with DESAT-detection, on board hardware dead time generator circuit (1 uSec), RESET to start gate pulses after clearing the FAULT. Driver should be RESET via on board switch or external reset pulse. ➢ Control circuit with LCD and keyboard interface should be provided for selecting different operating modes.	**1**

			➢ Provision for the observation of hall sensor outputs, encoder pulses and gate pulses of BLDC motor. ➢ Intel Core-i3 (6th generation or higher) 3.3 GHz processor or higher, Mother Board -ASUS/GIGA-BITE or equivalent, RAM- 8 GB, Hard disk min.- 500 GB, DVD writer, Screen (18.5 Inch) – LG or equivalent, with required essential accessories. ➢ Can be operated in Open loop and closed loop speed control of BLDC motor. ➢ Speed estimation and closed loop control using encoder feedbacks. ➢ MATLAB and C Language Coding support. Self written Program/model dumping facility with related software. ➢ Setup should works directly with 230 V, 50 Hz, AC supply. ➢ Proper isolation between control and power circuit needs to be provided. ➢ Other required and supportive accessories with operating manual.	
	3.	**Kit to study the speed control principle (open loop & closed loop) of 5 phase induction motor drive using ARM Cortex 32-bit Microcontroller with computer programming facility.**	**Specifications Includes:** ➢ 1.5 HP, 5 Phase, 100 V - 200 V, 1400 RPM, Star connected, 50 Hz, SPDP, Foot Mounted, Ins. Cl. B, Single shaft extended, Sq. Cage Induction Motor with Mechanical loading arrangement having linear scales, Make: Benn or equivalent, ➢ Motor Performance as per IS / IEC Standards. ➢ Speed sensor for motor RPM Indication ➢ ARM Cortex M4 32-bit microcontroller for programming (STM32F407VGT6 microcontroller featuring 32-bit ARM Cortex-M4F core), On-board ST-LINK/V2 for programming and debugging, ADC, DAC, USB/JTAG terminal facility on board and other features like Waijung facility, GPIO ports are routed to header on mother board for easy connection and having :- 8 General purpose input lines, 8 General purpose output lines, 16X2 LCD interface, 5 keys interface, 3 high speed digital outputs and 2 High speed digital input lines, 6 PWM outputs, 3 QEI inputs, SPI bus for SPI slave interface, 9 Analog inputs, 2 Analog Universal outputs: 0 to 10V or 4-20mA, 9-pin D-type connector for RS232 interfaces. ➢ 5 Phase Inverter Power Module with IGBT Rating @ 1200 V, 30 Amp with onboard& detailed protection and snubber circuits arrangement, Interface circuit arrangement with controller using FRC or connectors, Input- 415V AC, Output – 5 Phase 200V AC@ 5A suitable for 1.5 hp AC motor, Proper heat sink arrangement, Diode rectifier with filter capacitor for Input AC-DC Conversion, On-board driver circuit with protection and PWM isolation, Hall effect current sensor is provided for output motor current and input DC current measurement. Over current trip circuit is provided with trip status indicator, RESET switch, All connections terminated with banana connector. ➢ Intel Core-i3 (6th generation or higher) 3.3 GHz processor or higher, Mother Board -ASUS/GIGA-BITE or equivalent, RAM- 8 GB, Hard disk min.- 500 GB, DVD writer, Screen (18.5 Inch) – LG or equivalent, with required essential accessories. ➢ MATLAB and C Language Coding support. Self-written Program/model dumping facility with related software. ➢ Other required and supportive accessories with operating manual.	**1**
	4.	**Kit for study and evaluate the performance of Single Phase Rectifier (AC-DC).** Following experiments can be performed with this experimental module: Single-phase half-wave uncontrolled rectifier with	➢ Both controlled (SCR based), as well as uncontrolled (Diode based) rectification is available for performance investigation. ➢ Various experimentation on single-phase rectifiers with an output ports for observing current waveform on DSO. ➢ The experimental kit also includes step-down power supply, control circuit, power circuit, and different types of loads. ➢ The module typically operates with 230 V, 50 Hz, AC supply and other low power supplies required for the operation is derived internally. ➢ Step down supply voltage with load resistance and load inductance with their combination should be provided. ➢ Proper isolation between control and power circuit should be	**1**

		different types of load. Single-phase full-wave uncontrolled rectifier with different types of load. Single-phase half-wave controlled rectifier with different types of load. Single-phase full-wave controlled rectifier with different types of load. Single-phase full-wave half-controlled rectifier with different types of load. Single-phase SCR gate pulse and other control signals.	provided with necessary equipment which ever required for smooth operation of experiment. ➢ Freewheeling diode should be provided to provide path to the trapped energy in case of R-L load.	
	5.	**Kit for study and investigate the operation of Three Phase Rectifier (AC-DC).** Following experiments can be performed with this experimental module: Three-phase half-wave uncontrolled rectifier with different types of load; Three-phase full-wave uncontrolled rectifier with different types of load; Three-phase half-wave controlled rectifier with different types of load; Three-phase full-wave controlled rectifier with different types of load; Three-phase semi-converter with different types of load; and Three-phase SCR's gate pulse generation and other control signals.	➢ Both controlled (SCR based), as well as uncontrolled (Diode based) rectification is available for performance investigation. ➢ Various experimentation on three-phase rectifiers with an output ports to display current waveforms on DSO. ➢ The experimental module consist step-down power supply, control circuit, power circuit, and different types of load arrangements. ➢ The given experimental kit operates effectively with 415 V, 50 Hz, AC supply. ➢ Step-down three-phase supply voltage with load resistance and load inductance with their combination should be provided. ➢ Proper isolation between control and power circuit should be provided with necessary equipment which ever required for smooth operation of experiment.	**1**
	6.	**Kit to test the performance of DC-DC Chopper and understand the difference between DC-DC chopper and DC-DC converter.** Following experiments can be performed with this experimental module: Study of different chopper controlling methods; Study of gate pulses require for Class-A, Class-B, Class-C1, Class-C2, Class D, and other four	➢ Various chopper configurations with a provision of observing current waveforms on DSO is integrated in the experimental module. ➢ The experimental kit typically includes step-down power supply, control circuit, power circuit, and different types of load arrangements. ➢ The kit works with 230 V, 50 Hz, AC supply and other low power supplies required for the operation are derived internally. ➢ Proper isolation between control and power circuit is provided. ➢ Loading arrangements for experimentation as a part of kit with R Load and R-L Load are provided. ➢ Step-down supply voltage with load resistance and load inductance with their combination should be provided in accordance with experiment successful operation. ➢ Moreover, significant battery is provided for demonstrating regeneration mode. ➢ Microcontroller based control circuit with LCD and keyboard	**1**

		types of Class E; Study of Fist quadrant / Type A Chopper with different types of Load. Study of two-quadrant chopper with different loads; Study of four-quadrant chopper with different loads; and Study of step-up chopper with different loads Study of regeneration technique with four quadrant chopper.	interfacing is provided for selecting different operating modes.	
	7.	**Kit to study and analyze the performance of Single-phase AC Voltage regulator.** Following experiments can be performed with this experimental module: Study of AC voltage controller controlling methods; Study of gate pulses generation for AC voltage controller; Single-phase half-wave AC Voltage controller with different types of loads; Single-phase full-wave AC Voltage controller with different types of loads; and Study of TRIAC based controller(Fan regulator circuit) circuit.	➢ Single-phase AC voltage regulator circuit with provision of performing different experiments. ➢ Single-phase half controlled and fully controlled configurations are integrated. ➢ TRIAC based controller (application of Fan regulator circuit) section is provided. ➢ The experimental module generally includes step-down power supply, control circuit, power circuit and different types of load arrangements. ➢ Moreover, the kit operates directly with 230V; 50Hz, AC supply. ➢ Requisite step down supply voltage with R, R-L combinations should be provided at power level. ➢ Proper isolation between control and power circuit should be provided with necessary equipment which ever required for smooth operation of experiment.	**1**
	8.	**Kit to study and analyze the performance of Three-phase AC Voltage regulator**. Following experiments can be performed with this experimental module: Study of gate pulse generation and their control methods; Three-phase, four-wire line controlled AC voltage controller with star loads; Three- phase AC voltage controller with inside delta controlled loads; Study of Three-phase, three-wire line controlled AC voltage controller with star loads; and	➢ Three-phase AC voltage regulator with provision of performing various experiments. ➢ All possible configurations of three-phase AC voltage regulator are integrated in the module. ➢ The module works efficiently with three-phase 440V; 50Hz AC supply and all measuring meters connected externally. ➢ Step-down three-phase supply voltage of 30 V AC, three load resistance of order of at least200 E, and three-phase load inductance of order of at least 120 mH should be provided. ➢ Proper isolation between control and power circuit should be provided. ➢ Test points for observing intermediate waveforms of gate pulse generation are provided for observation.	**1**

		Three phase line controlled AC voltage controller with delta loads.		
	9.	**Kit to study and evaluate the performance of Single Phase Inverter (DC-AC).** Following experiments can be performed with this experimental module: Study of single phase half bridge inverter with different types of loads. Study of single phase full bridge inverter with different types of loads. Study of FFT analysis of square wave inverter; Study of Quasi Square Wave (Q.S.W.) inverter; Study of Sinusoidal Pulse Width Modulated (SPWM) inverter; Study of T.P.W.M.,M.P.W.M., UNIPOLAR & BIPOLAR PWM inverter; and Study of Gate pulses for IGBT's in different types of Modes.	➢ Most popularly methods like Square Wave, Quasi Square Wave, Multiple PWM, Trapezoidal PWM, UNIPOLAR & BIPOLAR PWM can be performed. ➢ The experimental kit typically composed of step-down power supply, control circuit, power circuit, and different types of load arrangements are provided internally. ➢ The module works with 230 V, 50 Hz AC supply and other low power supplies required for the operation are derived internally. ➢ Proper isolation between control and power circuit with DC link fuse should be provided with necessary equipment which ever required for smooth operation of experiment. ➢ In addition, step-down supply voltage of at-least 24 V DC, load resistance order of 100 E or higher, load inductance 100 mHor higher should be in experiment. ➢ Microcontroller based control circuit with LCD and keyboard interfacing is provided for selecting different operating modes. ➢ Test points may be arrange.	**1**
	10.	**Kit to study and investigate the operation of Three Phase Inverter (DC-AC).**Following experiments can be performed with this experimental module: Study of gate pulses for different control techniques; Study of three-phase120-degree mode inverter with R load / R-L load; Study of three-phase180-degree mode inverter with R load / R-L load; Study of FFT analysis of 120/180 degree mode square wave inverter; Study of Sinusoidal Pulse Width Modulated (SPWM) inverter; and Study of Space Vector modulated (SVM) inverter.	➢ Most popular controlling methods like 120° mode, 180° mode sinusoidal PWM ,square and space vector modulation are experimented. ➢ Cortex M4 32-bit Microcontroller based gate pulse generating circuit. ➢ The experimental module composed of step-down power supply, control circuit, power circuit and different types of load internally. ➢ The module operates directly with 230 V, 50 Hz AC supply and other low power supplies required for the operation are derived internally. ➢ Proper isolation between control and power circuit with DC link fuse should be provided with necessary equipment, test points which ever required for smooth operation of experiment. ➢ Step down supply voltage of 24 V DC, load resistance of three-phase 200 E, load inductance three-phase 120 mH are provided or equivalent / higher.	**1**

	11.	**Kit to study and analyze the performance of Non-Isolated Switch Mode DC-DC Converter.** Following experiments can be performed with this experimental module: Study of gate pulse generation circuit for DC-DC converter; Study of Buck converter designing; Study of Buck converter circuit operation in CCM/DCM modes; Study of Boost converter designing; Study of Boost converter circuit operation in CCM/DCM modes; Study of Buck-Boost converter designing; and Study of Buck-Boost converter circuit operation in CCM/DCM modes.	➢ The module demonstrates basis three topologies of DC-DC conversion i.e. Buck, Boost, and Buck-Boost converter. ➢ Switching frequency in the range of 40 kHz or equivalent. ➢ The module typically includes step-down power supply, control circuit, power circuit and different types of load arrangements. ➢ The experimental kit works directly with 230 V, 50 Hz, AC supply. ➢ Proper isolation between control and power circuit is provided. ➢ Step-down supply voltage with fixed and variable load resistors/ rheostat, inductance of requisite value should be provided. The load values should be strictly match with the experiment need and CCM/ DCM operation requirements. ➢ Loading arrangements as a part of trainer and experimentation for continuous current mode (CCM) and discontinuous current mode (DCM) operation are provided.	**1**
	12.	**Kit to study and investigate the operation of Single-phase Cycloconverter.** Following experiments can be performed with this experimental module: Study of single-phase Cycloconverter gate pulse generating circuit; Study of single phase Cycloconverter with R Load; and Study of single phase Cycloconverter with R-L Load.	➢ Input: 1-phasesupply 230V AC, 50 Hz. ➢ Output: 30-35 V, Center-tap transformer of 15-0-15 VAC or suitable for operation of kit. ➢ Step-down supply voltage with load resistance and load inductance with their combination should be provided in accordance with experiment successful operation. ➢ Modes of operation: f, f/2, f/3, f/4. ➢ Firing angle control should be provided with display facility, if possible. ➢ Test points: CV, Vsync, VG1, VG2, VG3, VG4 with respect to ground and others as required. ➢ Microcontroller based control circuit with LCD and keyboard interfacing isprovided. ➢ Proper inbuilt isolation between power and control circuit.	**1**
	13.	**Kit for study and investigate the performance of Three Phase Diode Clamped Multilevel Inverter.** Following experiments can be performed with this experimental module: 1. Study of gate pulse generating circuit for multilevel inverters; 2. Study of multilevel inverter in square wave mode with R-load;	➢ An experimental module with 3-level diode clamped multilevel inverter. ➢ Cortex M4 32-bit based Microcontroller for pulse generation or equivalent. ➢ Different control technique: 1. Square wave mode 2. Sinusoidal Pulse Width Modulation (SPWM) 3. Space Vector Modulation (SVM) ➢ Different mode of control: 1. Only Voltage control 2. Only frequency control 3. Voltage – frequency (v/f) control ➢ Input Voltage range: Step-down supply voltage upto48 V DC or equivalent. ➢ Load: Three load resistance in the range of 100 E and three-phase inductance having value 120 mH or equivalent. Load values should be compatible with successful operation of	**1**

		3. Study of multilevel inverter in square wave mode with R-L load; 4. Study of voltage control in multilevel inverter controlled with SPWM inverter; 5. Study of voltage control in multilevel inverter controlled with SVM inverter; 6. Study of v/f control in multilevel inverter controlled with SPWM inverter; 7. Study of v/f control in multilevel inverter controlled with SVM inverter; and 8. Comparative study of SPWM and SVM control in multilevel inverter	experiment. ➢ Three current transformers (CTs) are internally integrated to observe the inverter output current waveforms. ➢ 12 IGBTs modules or equivalent with proper heat-sink and snubber arrangements. ➢ 12 nos. of high speed opto-isolator provided for IGBT PWM inverter. ➢ Requisite IGBT gate driver IC provided for IGBT gate driving. ➢ One no of input DC power supply for gate driver card. ➢ 3 phase outputs and DC input terminals are terminated on the front panel. ➢ All are mounted on a nice cabinet with stickered front panel. ➢ Proper isolation between control and power circuit is provided with essential test point's facility.	
	13.	**Kit for analyze and understand the operating principle of 12-pulse Multi-pulse Converter.** Following experiments can be performed with this experimental module: 1. Study of firing pulse generation for 12-pulse converter; 2. Study of 12-pulse uncontrolled converter; 3. Study 12-pulse controlled converter; 4. Study of source voltage waveform of 12-pulse uncontrolled converter; 5. Study of source current waveform of 12 Pulse controlled converter; and 6. Comparison of supply Power Factor of 6-pulse and 12-pulse converter.	➢ Three-phase 415 V: 30V: 30V, 500 VA (Star – Star / Delta supply Transformer). ➢ 12-pulse diode rectifier configuration is composed of 2 numbers of six-pulse diode rectifiers. ➢ 12-pulse thyristor rectifier configuration consists of 2 numbers of six pulse thyristor rectifiers. ➢ 12-pulse rectifier with provision to study output voltage, transformer secondary currents, and transformer primary current. ➢ Firing module - 12 nos. of isolated gate pulses for thyristor converter. ➢ Firing angle control: 1. Potentiometer to vary firing angle in analog mode; 2. 8051 controller or equivalent controller to vary firing angle in digital mode. ➢ Necessary test points are provided for intermediate stage control for display. ➢ Power circuit – 12 nos. of diode, 12 nos. of SCR with snubber. ➢ Proper isolation between control and power circuit is provided.	**1**
	14.	**Kit for study the Performance investigation of Single-phase Dual Converter.** Following experiments can be performed with this experimental module: 1. Study of gate pulse generating circuit for dual converters; 2. Study of non-circulating mode of operation of dual converter with R load;	➢ SST89E516RD 8-bit MCU clocked @18.432MHz based Microcontroller with gate pulse generation circuit. ➢ Observation of intermediate stage waveforms of gate pulse generation. ➢ Selector switch for circulating and non-circulating mode of operation will be provided. ➢ Experimentation with both R and R-L loads is possible. ➢ Firing modules: 8 nos. of isolated gate pulses for positive and negative group of thyristors. ➢ Inductors are internally fabricated for circulating current mode operation. ➢ Keyboard and LCD display as user interface for adjusting firing angle.	**1**

		3. Study of circulating mode of operation of dual converter with R load; 4. Study of non-circulating mode of operation of dual converter with R-L load; and 5. Study of circulating mode of operation of dual converter with R-L load.	➢ One DPDT switch for selection of Dual converter with circulating non-circulating current mode of operation. ➢ MCB protection for input power ON/OFF and protection. ➢ Potentiometer to vary the firing angle. ➢ Proper isolation between control and power circuit is provided.	
	15.	**Kit ti study and test the operation of Isolated DC-DC Converter**. Following experiments can be performed with this experimental module: 1. Study of gate pulses of Flyback, Forward, and push-pulls converter; 2. Study of Flyback converter designing; 3. Study of Flyback converter circuit operation; 4. Study of Forward converter designing; 5. Study of Forward converter circuit operation; 6. Study of push-pull converter designing; and 7. Study of push-pull converter circuit operation.	➢ The experimental module typically operates with 230V, 50Hz AC supply. ➢ Step-down supply voltage upto 24 V DC and variable load rheostat will be provided for experimentation. ➢ Three topologies of isolated DC-DC converters are integrated in the experimental kit: 1. Flyback converter; 2. Forward converter; and 3. Push-Pull converter. ➢ Microcontroller based gate pulse generation circuit. 1. STM32F407VGT MCU @168MHz; 2. Buffered I/O Ports using 74HC573; and 3. 2 DAC outputs including all necessary features. ➢ Variable resistive load for open-loop and closed loop control demonstration. ➢ Stabilized DC supply 24 V DC or equivalent supply as per strictly suitable for the smooth operation of experiment.	**1**
	16.	**Kit of IGBT based SMART Power Module**	This power module should be generalized and can be used for AC, DC, BLDC, PMSM Motor application by proper external PWM controller interfacing (like Dspic , FPGA & DSP or equivalent). This Module consists of IGBT:-One Number of SPM-Smart Power Module Rating atleast@ 600V/20AModule should have suitable heat sink and snubber circuit for protection, IGBT Power circuit input and outputs are terminated by suitable rating banana connectors in front panel with necessary indication. DIODE RECTIFIER:- One number of diode rectifier (600V @ 35A) is provided to converter input AC voltage to DC Bus voltage with suitable filtering, Analogue DC Voltmeter 600V should be provided to measure DC Bus voltage. PWM ISOLATOR:- Six Number of PWM Isolator IC (6N137) is used to isolate All the six PWM signals input, One number of +15V@1amp fixed dc power supply is provided for PWM Isolator input side for power excitation, One number of +5V@1amp fixed dc power supply is provided for PWM Isolator Output side power excitation PWM Driver:- Built in IGBT Gate Driver is provided in SPM for	**1**

			IGBT Gate signal amplification SENSORS:- 3 numbers of Hall effect current sensor @ 25A is provided for 3Ø output AC/DC Current measurement, 1 numbers of Hall effect current sensor @ 25A is provided for Input DC bus Current measurement .Op-Amp based Signal conditioner circuits are provided in all sensors for output current signals amplifications, All current sensor signal conditioner circuit outputs are terminated in front panel by suitable connectors PROTECTION CIRCUIT:-One number of automatic trip circuit is provided for O/C protection. LED is provided for trip status indication, Reset switch is provided for TRIP RESET CONNECTORS:- One number of 34 pin FRC Connector is provided for PWM input signal input and feed back, Banana connectors are provided for AC input, Banana connectors are provided for 3 phase output or DC ,Test points are provided for PWM signal and Current wave form measurements, MCB is provided at input side for Input supply ON/OFF Broad Specification:Power Circuit: Input :0-230VAC, 50 HZ (or) 0-300VDC, Output : 3 Ø 230V (Phase voltage)@ 5A , Variable Voltage , Variable frequency (OR) 0 +/-280VDC, PWM Section, Number of PWM Input :6, Maximum PWM Frequency:15KHZ, PWM Level:0-5V (TTL) Power circuit and control circuit isolation should be provided internally. <u>Note : Department already have different type of controller boards and dedicated programs for different motors in different topologies , supplier should supply the power modules , demonstrate and provide training using existing controller boards and motors in department</u>	
Additional Terms & Conditions.	1. Vendor must provide service engineer visit to Institute Premises every month till Warranty Period. 2. As Experience Criteria (Last 3 Years) Vendor must have to provide the proof of Past Performance with Completion of the similar work to the reputed organizations such as IIT/NIT/Govt. Universities. 3. The vendor must provide Pre-Technical Physical Inspection for the selected items at the MNIT Premises, during technical evaluation. Absence or failure of pre-technical inspection of the selected items would disqualify the vendor technically. 4. Quoted rates must be inclusive of all spares and accessories/ consumable, Including Training and Installation at MNIT Premises for 10 Working Days. 5. Need an Engineer as & when required to support during Warranty Period, within 24 hours of complaint, for all Equipment. 6. Escalation Matrix for Service Support: Bidder/OEM must provide Escalation Matrix of Telephone Numbers for Service Support.			

4. GENERAL TERMS & CONDITIONS

4.1. Due date: The tender has to be submitted on or before the due date. The offers received after the due date and time will not be considered.

4.2. Earnest Money Deposit (EMD): The Bidder should submit EMD as per **"Schedule"**. The Technical Bid without EMD would be considered as UNRESPONSIVE and will not be accepted. The EMD will be refunded without any interest to the unsuccessful Bidders after the award of contract. **The bidders are required to submit their bank details/cross cancelled cheque in this regard.** In case of successful bidder, it will be refunded after receipt of Performance Bank Guarantee. **NSIC / MSME registered bidders must submit copy of valid NSIC / MSME Registration Certificate for exemption of EMD.**

4.3. Opening of the tender: The bid will be opened by a committee duly constituted for this purpose. The bids (complete in all respect) received will be opened in presence of bidder's representative if

available. Only one representative will be allowed to participate in the tender opening. The technical bid will be opened first and it will be examined by a technical committee (as per specification and requirement). The financial offer/bid will be opened only for the offer/bid which technically meets all requirements as per the specification, and will be opened subsequently to determine the lowest quoted bid and purchase order will be awarded to firm (L_1) quoting lowest price.

4.4. Preference to Make in India Products:

The Institute is following and abide with the revised Public Procurement (Preference to Make in India), Order 2017 P- 45021/2/2017 – B. E. –II dated 04.06.20 issued by DPIIT, Ministry of Commerce and Industry, Govt. of India & subsequent amendments/instructions of Ministry. Accordingly, preference will be given to the make in India products while evaluating the bids. However, it is sole responsibility of the bidder(s) to specify the product quoted by them is of Make in India along with respective documentary evidence in the technical bid itself.

4.5. Purchase preference to Micro and Small Enterprises (MSEs):

Purchase preference will be given to MSEs as defined in Public Procurement Policy for Micro and Small Enterprises (MSEs) Order, 2012 dated 23.03.2012 issued by Ministry of Micro, Small and Medium Enterprises and its subsequent Orders/Notifications issued by concerned Ministry. If the bidder wants to avail the Purchase preference for product/services, the bidder must be the manufacturer/Service provider of the offered product/service. Relevant documentary evidence in this regard shall be submitted along with the bid in respect of the offered service. If L-1 is not an MSE and MSE Service Provider (s) has/have quoted price within L-1+ 15% of margin of purchase preference /price band defined in relevant policy, then 100% order quantity will be awarded to such MSE bidder subject to acceptance of L1 bid price.

4.6. Acceptance/ Rejection of bids: The Institute reserves the right to reject any bid not fulfilling the eligibility criteria. Submission of incomplete bid/ incomplete bid format would lead to rejection of bids. All documents required to be submitted should be the part of the bid. If any document is not submitted, the bid will be treated as incomplete and this would lead to rejection. No communication in this regard will be entertained. Non-compliance of tender terms, non-submission of required documents, lack of clarity of the specifications, contradiction between bidder's specification and supporting documents etc. may lead to rejection of the bid.

4.7. Pre Qualification Criteria:

4.7.1. Bidder should be the manufacturer / authorized dealer. Letter of Authorization from Original Equipment Manufacturer (OEM) specific to the tender should be enclosed in the format **(Annexure V). Letter of authorization from OEM in any other format or not specific to this tender will not be accepted.**

4.7.2. An undertaking from the OEM is required stating that they would facilitate the bidder on a regular basis with technology/product updates and extend support for the warranty as well. **(Annexure II**)

4.7.3. In the tender, either the Indian agent on behalf of the Principal/OEM or Principal/OEM itself can bid but both cannot bid simultaneously for the same item/product in the same tender.

4.7.4. If an agent submits bid on behalf of the Principal/OEM, the same agent shall not submit a bid on behalf of another Principal/OEM in the same tender for the same item/product.

4.7.5. The Bidder must have successfully executed / completed at least one single order of Rs.12,91,000.00 or 2 orders each of Rs. 8,07,000.00 or 3 orders each of Rs.6,45,000.00 for similar products in last three years to any IIT/NIT/CFTIs/ any other Govt. organization. Copies of contracts / purchase orders and documentary evidence of successful execution / completion in support of Past Experience of Similar product along with names, address and contact details of clients shall be submitted in the format **(Annexure III)** with the bid for verification by the Buyer.

4.7.6. The minimum average annual financial turnover of the bidder during the last three years, ending on 31st March of the previous financial year, should be Rs. 12,91,000.00. **Documentary evidence in the form of certified Audited Balance Sheets of relevant**

periods or a certificate from the Chartered Accountant / Cost Accountant indicating the turnover details for the relevant period shall be submitted with the bid. In case the date of constitution / incorporation of the bidder is less than 3-year-old, the average turnover in respect of the completed financial years after the date of constitution shall be taken into account for these criteria.

4.7.7. Only "Class–I and Class-II local supplier will be eligible to bid notified vide (DPIIT) Notification No. P- 45021/2/2017-PP (BE-II) dated 4th June, 2020. It is mandatory for bidders to quote items having local content more than 20%. Refer revised Public Procurement (Preference to Make in India), Order 2017 P-45021/2/2017-B.E-II dated 04.06.2020 issued by DPIIT, Ministry of Commerce and Industry, Govt. of India. **(Submit duly filled Annexure VIII for the same)**

4.8. Performance Security: The supplier shall require to submit the performance security in the form of irrevocable bank guarantee issued by any commercial bank in the prescribed format **(Annexure VI)** for an amount which is stated at the "Schedule" of the tender document within 10 days from the date of receipt of the purchase order/LC and should be kept valid for a period of 60 days beyond the date of completion of warranty period.

4.9. Force Majeure: The Supplier shall not be liable for forfeiture of its performance security, liquidated damages or termination for default, if and to the extent that, it's delay in performance or other failure to perform its obligations under the Contract is the result of an event of Force Majeure.

1) For purposes of this Clause, "Force Majeure" means an event beyond the control of the Supplier and not involving the Supplier's fault or negligence and not foreseeable. Such events may include, but are not limited to, acts of the Purchaser either in its sovereign or contractual capacity, wars or revolutions, fires, floods, epidemics, quarantine restrictions and freight embargoes.
2) If a Force Majeure situation arises, the Supplier shall promptly notify the Purchaser in writing of such conditions and the cause thereof. Unless otherwise directed by the Purchaser in writing, the Supplier shall continue to perform its obligations under the Contract as far as is reasonably practical, and shall seek all reasonable alternative means for performance not prevented by the Force Majeure event.

4.10. Risk Purchase Clause: In event of failure of supply of the item/equipment within the stipulated delivery schedule, the purchaser has all the right to purchase the item/equipment from the other source on the total risk of the supplier under risk purchase clause.

4.11. Packing Instructions: Each package will be marked on three sides with proper paint/indelible ink, the following:

a) Item Nomenclature
b) Order/Contract No.
c) Country of Origin of Goods
d) Supplier's Name and Address
e) Consignee details
f) Packing list reference number

4.12. Delivery and Documents:

Delivery of the goods should be made within a maximum period mentioned at the **'Schedule'** from the date of placement of purchase order. Within 24 hours of shipment, the supplier shall notify the purchaser and the insurance company by cable/telex/fax/e-mail the full details of the shipment including contract number, railway receipt number/ AAP etc. and date, description of goods, quantity, name of the consignee, invoice etc. The supplier shall submit the following documents to the purchaser:

a) 4 Copies of the Supplier invoice showing contract number, goods' description, quantity
b) unit price, total amount;
c) Insurance Certificate if applicable;

d) Manufacturer's/Supplier's warranty certificate;
e) Inspection Certificate issued by the nominated inspection agency, if any
f) Supplier's factory inspection report; and
g) Certificate of Origin (if possible by the beneficiary);
h) Two copies of the packing list identifying the contents of each package.
i) The above documents should be received by the Purchaser before arrival of the Goods (except where the Goods have been delivered directly to the Consignee with all documents) and, if not received, the Supplier will be responsible for any consequent expenses.

4.13. Liquidated Damages (L.D):

If a supplier fails to execute the order in time as per the terms and conditions stipulated therein, it will be open to the purchaser to recover liquidated damages for delay in delivery and installation from the supplier at the rate 0.5% of the value of the order per week subject to a maximum of 10% of the total order value. The L.D charges can be increased in case of gross violation of the Purchase Order terms as decided by the Competent Authority of the Institute.

4.14. Prices: The price should be quoted in prescribed format **(Annexure IX)** only. The offer/bid should be exclusive of taxes and duties, which will be paid by the purchaser as applicable. However, the percentage of taxes & duties shall be clearly indicated. The price should be quoted without custom duty and excise duty.

MNIT Jaipur being a public funded research Institution registered with Department of Scientific & Industrial Research is eligible for concessional GST @ 5 percent as per provisions of Ministry of Finance (Department of Revenue) Notification No. 47/2017- Integrated Tax dated 14.11.2017 & Notfication No. 45/2017- Central Tax dated 14.11.2017. The Institute is also eligible for concessional rate of custom duty@ 5.15 percent as per provision of Government of India Notification No. 51/96-Customs dated 23.07.1996. Necessary certificate will be issued to the supplier in this regard.

4.15. Progress of Supply: Wherever applicable, supplier shall regularly intimate progress of supply, in writing, to the Purchaser as under:

a) Quantity offered for inspection and date;
b) Quantity accepted/rejected by inspecting agency and date;
c) Quantity dispatched/delivered to consignees and date;
d) Quantity where incidental services have been satisfactorily completed with date;
e) Quantity where rectification/repair/replacement effected/completed on receipt of any communication from consignee/Purchaser with date;
f) Date of completion of entire Contract including incidental services, if any; and
g) Date of receipt of entire payments under the Contract (In case of stage-wise inspection, details required may also be specified).

4.16. Resolution of Disputes: The dispute resolution mechanism would be as follows:

4.16.1. In case of Dispute or difference arising between the Purchaser and a domestic supplier relating to any matter arising out of or connected with this agreement, such disputes or difference shall be settled in accordance with the Indian Arbitration & Conciliation Act, 1996, the rules thereunder and any statutory modifications or re-enactments thereof shall apply to the arbitration proceedings. The dispute shall be referred to the Director, MNIT Jaipur and if he is unable or unwilling to act, the sole arbitration of some other person appointed by him willing to act as such Arbitrator. The award of the arbitrator so appointed shall be final, conclusive and binding on all parties to this order.

4.16.2. In the case of a dispute between the purchaser and a Foreign Supplier, the dispute shall be settled by arbitration in accordance with provision of sub-clause (i) above. But if this is not acceptable to the supplier then the dispute shall be settled in accordance with provisions of UNCITRAL (United Nations Commission on International Trade Law) Arbitration Rules.

4.16.3. The venue of the arbitration shall be the place from where the order is issued.

4.17. Place of Jurisdiction: The place of jurisdiction would be Jaipur (Rajasthan).

4.18. Right to Use Defective Goods

If after delivery, acceptance and installation and within the warranty period, the operation oruse of the goods proves to be unsatisfactory, the Purchaser shall have the right to continue to operate or use such goods until rectifications of defects, errors or omissions by repair or by partial or complete replacement is made without interfering with the Purchaser's operation.

4.19. Transfer and Subletting: The supplier shall not sublet, transfer, assign or otherwise part with the acceptance to the tender or any part thereof, either directly or indirectly, without the prior written permission of the Purchaser.

4.20. Supplier Integrity

The Supplier is responsible for and obliged to conduct all contracted activities in accordance with the Contract using state of the art methods and economic principles and exercising all means available to achieve the performance specified in the contract.

4.21. Installation & Demonstration

The supplier is required to do the installation and demonstration of the equipment within two weeks of the arrival of materials at the MNIT Jaipur, site of installation; otherwise the penalty clause will be the same as per the supply of materials.

In case of any damage to equipment and supplies during the carriage of supplies from the origin of equipment to the installation site, the supplier has to replace it with new equipment/supplies immediately at his own risk. Supplier will settle his claim with the insurance company as per his convenience. MNIT Jaipur will not be liable to any type of losses in any form.

4.22. Insurance (if applicable): For delivery of goods at the purchaser's premises (MNIT Jaipur), the insurance shallbe obtained by the supplier from "warehouse to warehouse" (final destinations) on "All Risks" basis including War Risks and Strikes. The insurance shall be valid for a period of not less than 3 months after installation and commissioning.

4.23. Warranty:

4.23.1. Warranty period shall be (as stated at "Schedule "of this tender) from date of installation of Goods and acceptance at MNIT Jaipur. The Supplier shall, in addition, comply with the performance and/or consumption guarantees specified under the contract. If for reasons attributable to the Supplier, these guarantees are not attained in whole or in part, the Supplier shall at its discretion make such changes, modifications, and/or additions to the Goods or any part thereof as may be necessary in order to attain the contractual guarantees specified in the Contract at its own cost and expense and to carry out further performance tests. The warranty should be comprehensive on site.

4.23.2. The Purchaser shall promptly notify the Supplier in writing of any claims arising under this warranty. Upon receipt of such notice, the Supplier shall arrange to repair or replace the defective goods or parts within 3 days free of cost in MNIT Jaipur. The Supplier shall take over the replaced parts/goods at the time of their replacement. No claim whatsoever shall lie on the Purchaser for the replaced parts/goods thereafter. The period for correction of defects in the warranty period is 03 days. If the supplier, having been notified, fails to remedy the defects within 03 days, the purchaser may proceed to take such remedial action as may be necessary, at the supplier's risk and expenses and without prejudice to anyother rights, which the purchaser may have against the supplier under the contract.

4.23.3. The warranty period should be clearly mentioned. The maintenance charges (AMC) under different schemes after the expiry of the warranty should also be mentioned. The comprehensive warranty will commence from the date of the satisfactory installation/commissioning of the equipment against the defect of any manufacturing, workmanship and poor quality of the components.

4.24. Governing Language

The contract shall be written in English language. English language version of the Contract shall govern its interpretation. All correspondence and other documents pertaining to the Contract, which are exchanged by the parties, shall be written in the same language.

4.25. Applicable Law

The Contract shall be interpreted in accordance with the laws of the Union of India and all disputes shall be subject to place of jurisdiction.

4.26. Notices

4.26.1. Any notice given by one party to the other pursuant to this contract/order shall be sent to the other party in writing or by cable, telex, FAX or e-mail and confirmed in writing to the other party's address.

4.26.2. A notice shall be effective when delivered or on the notice's effective date, whichever is later.

4.27. Taxes and Duties

Suppliers shall be entirely responsible for all taxes, duties, license fees, octroy, road permits, etc., incurred until delivery of the contracted Goods to the Purchaser. However, GST in respect of the transaction between the Purchaser and the Supplier shall be payable extra, if so stipulated in the order.

4.28. Payment:

1) For Indigenous supplies, 100% payment shall be made by the Purchaser against delivery, inspection, successful installation, commissioning and acceptance of the equipment at MNIT Jaipur in good condition and to the entire satisfaction of the Purchaser and on production of unconditional performance bank guarantee as specified in bid document.
2) GST Deduction at source as per Order/ notification of the Govt.
3) GST No of MNIT Jaipur is **08AAAJM0351L1Z6**
4) HSN/SAC No of the items must be clearly mentioned in the quotation along with GST No.
5) As per Notification No. 45/2007- Central Tax (Rate) dated 14.11.2017 and 47/2017- Integrated Tax (Rate) dated 14.11.2017, issued by Ministry of Finance, MNIT Jaipur will avail 5% GST rate, on the items, as mentioned in the Notification.

4.29. Manuals and Drawings:

4.29.1. Before the goods and equipment are taken over by the Purchaser, the Supplier shall supply operation and maintenance manuals. These shall be in such details as will enable the Purchaser to operate, maintain, adjust and repair all parts of the works as stated in the specifications.

4.29.2. The Manuals shall be in the ruling language (English) in such form and numbers as stated in the contract.

4.29.3. Unless and otherwise agreed, the supply of goods shall not be considered to be completed for the purposes of taking over until such manuals and drawing have been supplied to the Purchaser.

4.30. After Sale Service certificate:

The bidder must mention the details of 'After Sale Services' in the format **(Annexure- IV). Without After sale service certificate in the prescribed format, bid will not be considered technically responsive.**

4.31. Site Preparation: The supplier shall inform to the Institute about the site preparation, if any, needed for the installation of equipment, immediately after the receipt of the purchase order. The supplier must provide complete details regarding space and all the other infrastructural requirements needed for the equipment, which the Institute should arrange before the arrival of the equipment to ensure its timely installation and smooth operation thereafter. The supplier may visit the Institute and see the site where the equipment is to be installed and may offer his advice and render assistance to the Institute in the preparation of the site and other pre- installation requirements.

4.32. **Defective Equipment**: If any of the equipment supplied by the Supplier is found to be substandard, refurbished, un-merchantable or not in accordance with the description/specification or otherwise faulty, the committee will have the right to reject the equipment or its part. The prices of such equipment shall be refunded by the Supplier with 18% interest if such payments for such equipment have already been made. All damaged or unapproved goods shall be returned at suppliers cost and risk and the incidental expenses incurred thereon shall be recovered from the supplier. Defective part in equipment, if found before installation and/or during warranty period, shall be replaced within 7 days on receipt of the intimation from this office at the cost and risk of supplier including all other charges. In case supplier fails to replace above item as per above terms & conditions, MNIT Jaipur may consider "Banning" the supplier.

4.33. **Termination for Default:** The Purchaser may, without prejudice to any other remedy for breach of contract, by written notice of default sent to the Supplier, terminate the Contract in whole or part:

i. If the Supplier fails to deliver any or all of the Goods within the period(s) specified in the order, or within any extension thereof granted by the Purchaser; or
ii. If the Supplier fails to perform any other obligation(s) under the Contract.
iii. If the Supplier, in the judgment of the Purchaser, has engaged in corrupt or fraudulent practices in competing for or in executing the Contract.
iv. For the purpose of this Clause:
    1. "Corrupt practice" means the offering, giving, receiving or soliciting of anything of value to influence the action of a public official in the procurement process or in contract execution.
    2. "Fraudulent practice" means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the Borrower, and includes collusive practice among bidder (prior to or after bid submission) designed to establish bid prices at artificial non- competitive levels and to deprive the Borrower of the benefits of free and open competition;""
v. In the event the Purchaser terminates the Contract in whole or in part, the Purchaser may procure, upon such terms and in such manner, as it deems appropriate, Goods or Services similar to those undelivered, and the Supplier shall be liable to the Purchaser for any excess costs for such similar Goods or Services. However, the Supplier shall continue the performance of the Contract to the extent not terminated.

4.34. **Training of Personnel (if applicable):** The supplier shall be required to undertake to provide the technical training to the personnel involved in the use of the equipment at the Institute premises, immediately after completing the installation of the equipment if applicable.

4.35. **Compliance certificate:** This certificate must be provided indicating conformity to the technical specifications. **(Annexure-I)**

4.36. **Genuine Pricing:** Vendor is to ensure that quoted price is not more than the price offered to any other customer in India to whom this particular item has been sold.

4.37. **Comparison of Bids:** Comparison of prices will be done only on the bids submitted for the main equipment and anything asked as optional in the specifications is not to be included for overall comparison. To evaluate a Price Bid, the Purchaser shall only use all the factors, methodologies and criteria defined below. No other criteria or methodology will be used. The price bids shall be evaluated on the basis of final landing cost which shall be arrived as under:

i) The price of the goods quoted Ex-works.
ii) GST which will be payable on the goods if the contract is awarded.
iii) The charges for installation, commissioning, training charges, inland transportation, insurance, packing and forwarding charges and other local services required for delivering the goods at the desired destination as specified in the price schedule form.

4.38. Award of Contract

MNIT Jaipur shall award the contract to the eligible bidder whose technical bid has been accepted and determined as the lowest evaluated commercial bid based on the criteria mentioned above. However, MNIT Jaipur reserves the right and has sole discretion to reject the lowest evaluated bid.

In case more than one bidder happens to quote the same lowest price, MNIT Jaipur reserves the right to decide the criteria and further process for awarding the contract. Decision of MNIT Jaipur shall be final for awarding the contract.

4.39. Restriction on procurement from bidder of country sharing land border with India:

As per Ministry of Finance, Deptt. of Expenditure, Public Procurement Division Order (Public Procurement No.1) issued from file No.6/18/2019-PPD dated 23rd July, 2020 regarding restrictions under Rule 144 (xi) of the General Financial Rules (GFRs) 2017, a certificate **(Annexure VII)** shall be submitted by bidders in the tender documents regarding their compliance with the said order. If the certificate submitted by a bidder whose bid is accepted is found to be false, this would be a ground for immediate termination and further legal action in accordance with law.

4.40. Exemption to Startups:

If the bidder is a Startup, the bidder shall be exempted from the requirement of "Bidder Turnover" criteria and "Experience Criteria". In case any bidder is seeking exemption from Turnover / Experience Criteria, the supporting documents to prove his eligibility for exemption must be uploaded for evaluation by the buyer.

4.41. Exemption to MSME:

If the bidder is a Micro or Small Enterprise as per latest definitions under MSME rules, the bidder shall be exempted from the requirement of "Bidder Turnover" criteria and "Experience Criteria". In case any bidder is seeking exemption from Turnover / Experience Criteria, the supporting documents to prove his eligibility for exemption must be uploaded for evaluation by the buyer.

Deputy Registrar
Stores and Purchase MNIT Jaipur

ANNEXURE -I

COMPLIANCE SHEET

Name of the Item : Equipments for Power Electronics & Electrical Drive lab (total articles- 16)"

Sl No.	Particulars					Comply (Yes/No)	Supporting Page No.
1.	Instrument specifications:	**S.No.**	**Name of Item**	**Specifications**	**Qty.**		
		1.	**Kit for the Experimental investigation of Boost Rectifier with Power Factor Correction (PFC).** The experimental kit will help to understand the operating principle of Boost Rectifier with Power Factor Correction (PFC) features.	➢ The experimental setup consists of low-voltage boost rectifier with PFC feature. ➢ 32-bit Cortex M4 ARM microcontroller-based controller for gate pulse generation. ➢ Test points for current and voltage waveform observation across different elements are provided. ➢ Detailed features and specifications are as listed below: 8. Isolated 40V, 50Hz AC input voltage. 9. Boost Converter with 60-70V, 1.5A capacity. 10. Series shunt resistor across source, inductor, switch, diode and load for current waveform observation. 11. Slow outer voltage control loop working at order of 100 µSec and fast inner current loop working at order of 10 µSec. 12. Two different current control method including Average Current Control and Hysteresis Current Control can be studied. 13. Accessibility to monitor the gate pulses of the boost converter. 14. Rugged packaging with plug and socket type banana connector.	**1**		
		2.	**Kit for the studying the Performance Investigation of Digitally & Computerized Controlled BLDC Motor Drive**.	**Specifications/Setup Includes:** ➢ 0.5 HP, 48 V, 1500 RPM, BLDC Motor with mechanical loading arrangements having linear scales (with inbuilt sensor), Make: Benn or equivalent, ➢ Motor Performance as per IS / IEC Standards. ➢ ARM Cortex M4 32-bit microcontroller for programming (STM32F407VGT6 microcontroller featuring 32-bit ARM Cortex-M4F core), On-board ST-LINK/V2 for programming and debugging, ADC, DAC, USB/JTAG terminal facility on board and other features like Waijung facility, GPIO ports are routed to header on mother board for easy connection and having :- 8 General purpose input lines, 8 General purpose output lines, 16X2 LCD interface, 5 keys interface, 3 high speed digital outputs and 2 High speed digital input lines, 6 PWM outputs, 3 QEI inputs, SPI bus for SPI slave interface, 9 Analog inputs, 2 Analog Universal outputs: 0 to 10V or 4-20mA, 9-pin D-type connector for RS232 interfaces. ➢ Three Phase Inverter with Protection having 600V, 10 A DC link, 600V, 25 A IGBTs, 2 A rail-to-rail output, bipolar pulses Isolated +16V/-8V, shoot through, short circuit protection with DESAT-detection, on board hardware dead time generator circuit (1 uSec), RESET to start gate pulses after clearing	**1**		

				the FAULT. Driver should be RESET via on board switch or external reset pulse. ➢ Control circuit with LCD and keyboard interface should be provided for selecting different operating modes. ➢ Provision for the observation of hall sensor outputs, encoder pulses and gate pulses of BLDC motor. ➢ Intel Core-i3 (6th generation or higher) 3.3 GHz processor or higher, Mother Board -ASUS/GIGA-BITE or equivalent, RAM- 8 GB, Hard disk min.- 500 GB, DVD writer, Screen (18.5 Inch) – LG or equivalent, with required essential accessories. ➢ Can be operated in Open loop and closed loop speed control of BLDC motor. ➢ Speed estimation and closed loop control using encoder feedbacks. ➢ MATLAB and C Language Coding support. Self written Program/model dumping facility with related software. ➢ Setup should works directly with 230 V, 50 Hz, AC supply. ➢ Proper isolation between control and power circuit needs to be provided. ➢ Other required and supportive accessories with operating manual.			
		3.	**Kit to study the speed control principle (open loop & closed loop) of 5 phase induction motor drive using ARM Cortex 32-bit Microcontroller with computer programming facility.**	**Specifications Includes:** ➢ 1.5 HP, 5 Phase, 100 V - 200 V, 1400 RPM, Star connected, 50 Hz, SPDP, Foot Mounted, Ins. Cl. B, Single shaft extended, Sq. Cage Induction Motor with Mechanical loading arrangement having linear scales, Make: Benn or equivalent, ➢ Motor Performance as per IS / IEC Standards. ➢ Speed sensor for motor RPM Indication ➢ ARM Cortex M4 32-bit microcontroller for programming (STM32F407VGT6 microcontroller featuring 32-bit ARM Cortex-M4F core), On-board ST-LINK/V2 for programming and debugging, ADC, DAC, USB/JTAG terminal facility on board and other features like Waijung facility, GPIO ports are routed to header on mother board for easy connection and having :- 8 General purpose input lines, 8 General purpose output lines, 16X2 LCD interface, 5 keys interface, 3 high speed digital outputs and 2 High speed digital input lines, 6 PWM outputs, 3 QEI inputs, SPI bus for SPI slave interface, 9 Analog inputs, 2 Analog Universal outputs: 0 to 10V or 4-20mA, 9-pin D-type connector for RS232 interfaces. ➢ 5 Phase Inverter Power Module with IGBT Rating @ 1200 V, 30 Amp with onboard& detailed protection and snubber circuits arrangement, Interface circuit arrangement with controller using FRC or connectors, Input- 415V AC, Output – 5 Phase 200V AC@ 5A suitable for 1.5 hp AC motor, Proper heat sink arrangement, Diode rectifier with filter capacitor for Input AC-DC Conversion, On-board driver circuit with protection and PWM isolation, Hall effect current sensor is provided for output motor current and input DC current measurement. Over current trip	**1**		

				circuit is provided with trip status indicator, RESET switch, All connections terminated with banana connector. ➢ Intel Core-i3 (6th generation or higher) 3.3 GHz processor or higher, Mother Board -ASUS/GIGA-BITE or equivalent, RAM- 8 GB, Hard disk min.- 500 GB, DVD writer, Screen (18.5 Inch) – LG or equivalent, with required essential accessories. ➢ MATLAB and C Language Coding support. Self-written Program/model dumping facility with related software. ➢ Other required and supportive accessories with operating manual.			
		4.	**Kit for study and evaluate the performance of Single Phase Rectifier (AC-DC).** Following experiments can be performed with this experimental module: Single-phase half-wave uncontrolled rectifier with different types of load. Single-phase full-wave uncontrolled rectifier with different types of load. Single-phase half-wave controlled rectifier with different types of load. Single-phase full-wave controlled rectifier with different types of load. Single-phase full-wave half-controlled rectifier with different types of load. Single-phase SCR gate pulse and other control signals.	➢ Both controlled (SCR based), as well as uncontrolled (Diode based) rectification is available for performance investigation. ➢ Various experimentation on single-phase rectifiers with an output ports for observing current waveform on DSO. ➢ The experimental kit also includes step-down power supply, control circuit, power circuit, and different types of loads. ➢ The module typically operates with 230 V, 50 Hz, AC supply and other low power supplies required for the operation is derived internally. ➢ Step down supply voltage with load resistance and load inductance with their combination should be provided. ➢ Proper isolation between control and power circuit should be provided with necessary equipment which ever required for smooth operation of experiment. ➢ Freewheeling diode should be provided to provide path to the trapped energy in case of R-L load.	**1**		
		5.	**Kit for study and investigate the operation of Three Phase Rectifier (AC-DC).** Following experiments can be performed with this experimental module: Three-phase half-wave uncontrolled rectifier with different types of load; Three-phase full-wave uncontrolled rectifier with different types of load; Three-phase half-wave controlled rectifier with different types of load; Three-phase full-wave controlled rectifier with different types of load; Three-phase semi-converter with different types of load; and Three-phase SCR's gate pulse generation and other control signals.	➢ Both controlled (SCR based), as well as uncontrolled (Diode based) rectification is available for performance investigation. ➢ Various experimentation on three-phase rectifiers with an output ports to display current waveforms on DSO. ➢ The experimental module consist step-down power supply, control circuit, power circuit, and different types of load arrangements. ➢ The given experimental kit operates effectively with 415 V, 50 Hz, AC supply. ➢ Step-down three-phase supply voltage with load resistance and load inductance with their combination should be provided. ➢ Proper isolation between control and power circuit should be provided with necessary equipment which ever required for smooth operation of experiment.	**1**		

		6.	**Kit to test the performance of DC-DC Chopper and understand the difference between DC-DC chopper and DC-DC converter.** Following experiments can be performed with this experimental module: Study of different chopper controlling methods; Study of gate pulses require for Class-A, Class-B, Class-C1, Class-C2, Class D, and other four types of Class E; Study of Fist quadrant / Type A Chopper with different types of Load. Study of two-quadrant chopper with different loads; Study of four-quadrant chopper with different loads; and Study of step-up chopper with different loads Study of regeneration technique with four quadrant chopper.	➢ Various chopper configurations with a provision of observing current waveforms on DSO is integrated in the experimental module. ➢ The experimental kit typically includes step-down power supply, control circuit, power circuit, and different types of load arrangements. ➢ The kit works with 230 V, 50 Hz, AC supply and other low power supplies required for the operation are derived internally. ➢ Proper isolation between control and power circuit is provided. ➢ Loading arrangements for experimentation as a part of kit with R Load and R-L Load are provided. ➢ Step-down supply voltage with load resistance and load inductance with their combination should be provided in accordance with experiment successful operation. ➢ Moreover, significant battery is provided for demonstrating regeneration mode. ➢ Microcontroller based control circuit with LCD and keyboard interfacing is provided for selecting different operating modes.	**1**		
		7.	**Kit to study and analyze the performance of Single-phase AC Voltage regulator.** Following experiments can be performed with this experimental module: Study of AC voltage controller controlling methods; Study of gate pulses generation for AC voltage controller; Single-phase half-wave AC Voltage controller with different types of loads; Single-phase full-wave AC Voltage controller with different types of loads; and Study of TRIAC based controller(Fan regulator circuit) circuit.	➢ Single-phase AC voltage regulator circuit with provision of performing different experiments. ➢ Single-phase half controlled and fully controlled configurations are integrated. ➢ TRIAC based controller (application of Fan regulator circuit) section is provided. ➢ The experimental module generally includes step-down power supply, control circuit, power circuit and different types of load arrangements. ➢ Moreover, the kit operates directly with 230V; 50Hz, AC supply. ➢ Requisite step down supply voltage with R, R-L combinations should be provided at power level. ➢ Proper isolation between control and power circuit should be provided with necessary equipment which ever required for smooth operation of experiment.	**1**		
		8.	**Kit to study and analyze the performance of Three-phase AC Voltage regulator**. Following experiments can be performed with this experimental module: Study of gate pulse generation and their control methods; Three-phase, four-wire line controlled AC voltage controller with star loads;	➢ Three-phase AC voltage regulator with provision of performing various experiments. ➢ All possible configurations of three-phase AC voltage regulator are integrated in the module. ➢ The module works efficiently with three-phase 440V; 50Hz AC supply and all measuring meters connected externally. ➢ Step-down three-phase supply voltage of 30 V AC, three load resistance of order of at least200 E, and three-phase load inductance of order of at least 120 mH	**1**		

			Three- phase AC voltage controller with inside delta controlled loads; Study of Three-phase, three-wire line controlled AC voltage controller with star loads; and Three phase line controlled AC voltage controller with delta loads.	should be provided. ➢ Proper isolation between control and power circuit should be provided. ➢ Test points for observing intermediate waveforms of gate pulse generation are provided for observation.			
		9.	**Kit to study and evaluate the performance of Single Phase Inverter (DC-AC).** Following experiments can be performed with this experimental module: Study of single phase half bridge inverter with different types of loads. Study of single phase full bridge inverter with different types of loads. Study of FFT analysis of square wave inverter; Study of Quasi Square Wave (Q.S.W.) inverter; Study of Sinusoidal Pulse Width Modulated (SPWM) inverter; Study of T.P.W.M.,M.P.W.M., UNIPOLAR & BIPOLAR PWM inverter; and Study of Gate pulses for IGBT's in different types of Modes.	➢ Most popularly methods like Square Wave, Quasi Square Wave, Multiple PWM, Trapezoidal PWM, UNIPOLAR & BIPOLAR PWM can be performed. ➢ The experimental kit typically composed of step-down power supply, control circuit, power circuit, and different types of load arrangements are provided internally. ➢ The module works with 230 V, 50 Hz AC supply and other low power supplies required for the operation are derived internally. ➢ Proper isolation between control and power circuit with DC link fuse should be provided with necessary equipment which ever required for smooth operation of experiment. ➢ In addition, step-down supply voltage of at-least 24 V DC, load resistance order of 100 E or higher, load inductance 100 mHor higher should be in experiment. ➢ Microcontroller based control circuit with LCD and keyboard interfacing is provided for selecting different operating modes. ➢ Test points may be arrange.	**1**		
		10.	**Kit to study and investigate the operation of Three Phase Inverter (DC-AC).**Following experiments can be performed with this experimental module: Study of gate pulses for different control techniques; Study of three-phase120-degree mode inverter with R load / R-L load; Study of three-phase180-degree mode inverter with R load / R-L load; Study of FFT analysis of 120/180 degree mode square wave inverter; Study of Sinusoidal Pulse Width Modulated (SPWM) inverter; and Study of Space Vector modulated (SVM) inverter.	➢ Most popular controlling methods like 120° mode, 180° mode sinusoidal PWM ,square and space vector modulation are experimented. ➢ Cortex M4 32-bit Microcontroller based gate pulse generating circuit. ➢ The experimental module composed of step-down power supply, control circuit, power circuit and different types of load internally. ➢ The module operates directly with 230 V, 50 Hz AC supply and other low power supplies required for the operation are derived internally. ➢ Proper isolation between control and power circuit with DC link fuse should be provided with necessary equipment, test points which ever required for smooth operation of experiment. ➢ Step down supply voltage of 24 V DC, load resistance of three-phase 200 E, load inductance three-phase 120 mH are provided or equivalent / higher.	**1**		
		11.	**Kit to study and analyze the performance of Non-Isolated Switch Mode DC-DC Converter.**	➢ The module demonstrates basis three topologies of DC-DC conversion i.e. Buck, Boost, and Buck-Boost converter. ➢ Switching frequency in the range of 40 kHz or equivalent.	**1**		

			Following experiments can be performed with this experimental module: Study of gate pulse generation circuit for DC-DC converter; Study of Buck converter designing; Study of Buck converter circuit operation in CCM/DCM modes; Study of Boost converter designing; Study of Boost converter circuit operation in CCM/DCM modes; Study of Buck-Boost converter designing; and Study of Buck-Boost converter circuit operation in CCM/DCM modes.	➢ The module typically includes step-down power supply, control circuit, power circuit and different types of load arrangements. ➢ The experimental kit works directly with 230 V, 50 Hz, AC supply. ➢ Proper isolation between control and power circuit is provided. ➢ Step-down supply voltage with fixed and variable load resistors/ rheostat, inductance of requisite value should be provided. The load values should be strictly match with the experiment need and CCM/ DCM operation requirements. ➢ Loading arrangements as a part of trainer and experimentation for continuous current mode (CCM) and discontinuous current mode (DCM) operation are provided.			
		12.	**Kit to study and investigate the operation of Single-phase Cycloconverter.** Following experiments can be performed with this experimental module: Study of single-phase Cycloconverter gate pulse generating circuit; Study of single phase Cycloconverter with R Load; and Study of single phase Cycloconverter with R-L Load.	➢ Input: 1-phasesupply 230V AC, 50 Hz. ➢ Output: 30-35 V, Center-tap transformer of 15-0-15 VAC or suitable for operation of kit. ➢ Step-down supply voltage with load resistance and load inductance with their combination should be provided in accordance with experiment successful operation. ➢ Modes of operation: f, f/2, f/3, f/4. ➢ Firing angle control should be provided with display facility, if possible. ➢ Test points: CV, Vsync, VG1, VG2, VG3, VG4 with respect to ground and others as required. ➢ Microcontroller based control circuit with LCD and keyboard interfacing isprovided. ➢ Proper inbuilt isolation between power and control circuit.	**1**		
		13.	**Kit for study and investigate the performance of Three Phase Diode Clamped Multilevel Inverter.** Following experiments can be performed with this experimental module: 9. Study of gate pulse generating circuit for multilevel inverters; 10. Study of multilevel inverter in square wave mode with R-load; 11. Study of multilevel inverter in square wave mode with R-L load; 12. Study of voltage control in multilevel inverter controlled with SPWM inverter; 13. Study of voltage control in multilevel inverter controlled with SVM inverter; 14. Study of v/f control in multilevel inverter	➢ An experimental module with 3-level diode clamped multilevel inverter. ➢ Cortex M4 32-bit based Microcontroller for pulse generation or equivalent. ➢ Different control technique: 4. Square wave mode 5. Sinusoidal Pulse Width Modulation (SPWM) 6. Space Vector Modulation (SVM) ➢ Different mode of control: 4. Only Voltage control 5. Only frequency control 6. Voltage – frequency (v/f) control ➢ Input Voltage range: Step-down supply voltage upto48 V DC or equivalent. ➢ Load: Three load resistance in the range of 100 E and three-phase inductance having value 120 mH or equivalent. Load values should be compatible with successful operation of experiment. ➢ Three current transformers (CTs) are internally integrated to observe the inverter output current waveforms. ➢ 12 IGBTs modules or equivalent with proper heat-sink and snubber arrangements. ➢ 12 nos. of high speed opto-isolator provided for IGBT PWM inverter.	**1**		

			controlled with SPWM inverter; 15. Study of v/f control in multilevel inverter controlled with SVM inverter; and 16. Comparative study of SPWM and SVM control in multilevel inverter	➢ Requisite IGBT gate driver IC provided for IGBT gate driving. ➢ One no of input DC power supply for gate driver card. ➢ 3 phase outputs and DC input terminals are terminated on the front panel. ➢ All are mounted on a nice cabinet with stickered front panel. ➢ Proper isolation between control and power circuit is provided with essential test point's facility.			
		13.	**Kit for analyze and understand the operating principle of 12-pulse Multi-pulse Converter.** Following experiments can be performed with this experimental module: 7. Study of firing pulse generation for 12-pulse converter; 8. Study of 12-pulse uncontrolled converter; 9. Study 12-pulse controlled converter; 10. Study of source voltage waveform of 12-pulse uncontrolled converter; 11. Study of source current waveform of 12 Pulse controlled converter; and 12. Comparison of supply Power Factor of 6-pulse and 12-pulse converter.	➢ Three-phase 415 V: 30V: 30V, 500 VA (Star – Star / Delta supply Transformer). ➢ 12-pulse diode rectifier configuration is composed of 2 numbers of six-pulse diode rectifiers. ➢ 12-pulse thyristor rectifier configuration consists of 2 numbers of six pulse thyristor rectifiers. ➢ 12-pulse rectifier with provision to study output voltage, transformer secondary currents, and transformer primary current. ➢ Firing module - 12 nos. of isolated gate pulses for thyristor converter. ➢ Firing angle control: 3. Potentiometer to vary firing angle in analog mode; 4. 8051 controller or equivalent controller to vary firing angle in digital mode. ➢ Necessary test points are provided for intermediate stage control for display. ➢ Power circuit – 12 nos. of diode, 12 nos. of SCR with snubber. ➢ Proper isolation between control and power circuit is provided.	**1**		
		14.	**Kit for study the Performance investigation of Single-phase Dual Converter.** Following experiments can be performed with this experimental module: 6. Study of gate pulse generating circuit for dual converters; 7. Study of non-circulating mode of operation of dual converter with R load; 8. Study of circulating mode of operation of dual converter with R load; 9. Study of non-circulating mode of operation of dual converter with R-L load; and 10. Study of circulating mode of operation of dual converter with R-L load.	➢ SST89E516RD 8-bit MCU clocked @18.432MHz based Microcontroller with gate pulse generation circuit. ➢ Observation of intermediate stage waveforms of gate pulse generation. ➢ Selector switch for circulating and non-circulating mode of operation will be provided. ➢ Experimentation with both R and R-L loads is possible. ➢ Firing modules: 8 nos. of isolated gate pulses for positive and negative group of thyristors. ➢ Inductors are internally fabricated for circulating current mode operation. ➢ Keyboard and LCD display as user interface for adjusting firing angle. ➢ One DPDT switch for selection of Dual converter with circulating non-circulating current mode of operation. ➢ MCB protection for input power ON/OFF and protection. ➢ Potentiometer to vary the firing angle. ➢ Proper isolation between control and power circuit is provided.	**1**		
		15.	**Kit ti study and test the operation of Isolated DC-DC Converter**. Following experiments can be performed with this experimental module: 8. Study of gate pulses of	➢ The experimental module typically operates with 230V, 50Hz AC supply. ➢ Step-down supply voltage upto 24 V DC and variable load rheostat will be provided for experimentation. ➢ Three topologies of isolated DC-DC converters are integrated in the experimental kit: 4. Flyback converter;	**1**		

			Flyback, Forward, and push-pulls converter; 9. Study of Flyback converter designing; 10. Study of Flyback converter circuit operation; 11. Study of Forward converter designing; 12. Study of Forward converter circuit operation; 13. Study of push-pull converter designing; and 14. Study of push-pull converter circuit operation.	5. Forward converter; and 6. Push-Pull converter. ➢ Microcontroller based gate pulse generation circuit. 4. STM32F407VGT MCU @168MHz; 5. Buffered I/O Ports using 74HC573; and 6. 2 DAC outputs including all necessary features. ➢ Variable resistive load for open-loop and closed loop control demonstration. ➢ Stabilized DC supply 24 V DC or equivalent supply as per strictly suitable for the smooth operation of experiment.			
2.		**16.**	**Kit of IGBT based SMART Power Module**	This power module should be generalized and can be used for AC, DC, BLDC, PMSM Motor application by proper external PWM controller interfacing (like Dspic , FPGA & DSP or equivalent). This Module consists of IGBT:-One Number of SPM-Smart Power Module Rating atleast@ 600V/20AModule should have suitable heat sink and snubber circuit for protection, IGBT Power circuit input and outputs are terminated by suitable rating banana connectors in front panel with necessary indication. DIODE RECTIFIER:- One number of diode rectifier (600V @ 35A) is provided to converter input AC voltage to DC Bus voltage with suitable filtering, Analogue DC Voltmeter 600V should be provided to measure DC Bus voltage. PWM ISOLATOR:- Six Number of PWM Isolator IC (6N137) is used to isolate All the six PWM signals input, One number of +15V@1amp fixed dc power supply is provided for PWM Isolator input side for power excitation, One number of +5V@1amp fixed dc power supply is provided for PWM Isolator Output side power excitation PWM Driver:- Built in IGBT Gate Driver is provided in SPM for IGBT Gate signal amplification SENSORS:- 3 numbers of Hall effect current sensor @ 25A is provided for 3Ø output AC/DC Current measurement, 1 numbers of Hall effect current sensor @ 25A is provided for Input DC bus Current measurement .Op-Amp based Signal conditioner circuits are provided in all sensors for output current signals amplifications, All current sensor signal conditioner circuit outputs are terminated in front panel by suitable connectors	**1**		

				PROTECTION CIRCUIT:-One number of automatic trip circuit is provided for O/C protection. LED is provided for trip status indication, Reset switch is provided for TRIP RESET CONNECTORS:- One number of 34 pin FRC Connector is provided for PWM input signal input and feed back, Banana connectors are provided for AC input, Banana connectors are provided for 3 phase output or DC ,Test points are provided for PWM signal and Current wave form measurements, MCB is provided at input side for Input supply ON/OFF Broad Specification:Power Circuit: Input :0-230VAC, 50 HZ (or) 0-300VDC, Output : 3 Ø 230V (Phase voltage)@ 5A , Variable Voltage , Variable frequency (OR) 0 +/-280VDC, PWM Section, Number of PWM Input :6, Maximum PWM Frequency:15KHZ, PWM Level:0-5V (TTL) Power circuit and control circuit isolation should be provided internally. Note : Department already have different type of controller boards and dedicated programs for different motors in different topologies , supplier should supply the power modules , demonstrate and provide training using existing controller boards and motors in department			
3.	**Additional Terms & Conditions.**	1. Vendor must provide service engineer visit to Institute Premises every month till Warranty Period. 2. As Experience Criteria (Last 3 Years) Vendor must have to provide the proof of Past Performance with Completion of the similar work to the reputed organizations such as IIT/NIT/Govt. Universities. 3. The vendor must provide Pre-Technical Physical Inspection for the selected items at the MNIT Premises, during technical evaluation. Absence or failure of pre-technical inspection of the selected items would disqualify the vendor technically. 4. Quoted rates must be inclusive of all spares and accessories/ consumable, Including Training and Installation at MNIT Premises for 10 Working Days. 5. Need an Engineer as & when required to support during Warranty Period, within 24 hours of complaint, for all Equipment. 6. Escalation Matrix for Service Support: Bidder/OEM must provide Escalation Matrix of Telephone Numbers for Service Support.			
4.	Proof of Earnest money Deposit						
5.	Copy of GST Certificate and PAN						
6.	Leaflets catalogue (Brochure)						
7.	Non Blacklisting of Supplier and Price reasonabilitydeclaration						
8.	Required past Experience						
9.	Minimum average annual turnover of the bidder						
10.	After Sale Service Certificate						
11.	Manufacturer's Authorization Letter						
12.	Certificate - Bidder Not from/ from Country sharing Land border with India & Registration of Bidder with Competent Authority						
13.	Declaration of Local Content						

Signature of Bidder
Name:_____
Designation:_____
Organization Name:
Contact No.: _____

ANNEXURE-II

<< Organization Letter Head >>

DECLARATION SHEET

We,_____hereby certify that all the information and data furnished by our organization with regard to these tender specifications are true and complete to the best of our knowledge. I have gone through the specifications, conditions and stipulations in details and agree to comply with the requirements and intent of specification.

This is certified that our organization has been authorized (Copy attached) by the OEM to participate in Tender. We further certify that our organization meets all the conditions of eligibility criteria laid down in this tender document. Moreover, OEM has agreed to support on regular basis with technology / product updates and extend support for the warranty.

We, further specifically certify that our organization has not been Black Listed/De Listed or put to any Holiday by any Institutional Agency/ Govt. Department/ Public Sector Undertaking in the last three years.

The prices quoted in the financial bids are subsidized due to academic discount given to MNIT Jaipur and the rates quoted are not more than those quoted to any other Institution in India or abroad during the last one year.

Signature of Bidder
Name:_____
Designation:_____
Organization Name:
Contact No.: _____

ANNEXURE-III

Past Experience details

List of Organizations for whom the bidder has undertaken such work during last three years **(must be supported with Purchae orders)**			
Name of the organization	**Name of Contact Person**	**Contact No.**	**Copy of Purchase Orders (Page no.)**

Note: Without submission of relevant Purchase orders, experience will not be considered.

Signature of Bidder
Name:_____
Designation:_____
Organization Name: _____
Contact No.: _____

ANNEXURE – IV

AFTERSALE SERVICE CERTIFICATE

From:

To

The Registrar,
Malaviya National Institute of Technology (MNIT),
Jaipur

Whereas, we M/s (Bidder Name) are established & reputable manufacturers (Make of items) of [items name] having service offices at Delhi, Jaipur and in the state of Rajasthan. Details are as under:

Sr.No.	Address of Service Centre	Phone No.	Number of Engineers
1.			
2.			
3.			

We do hereby confirm that:

Services including repair/replacement of defective parts will be done by us. Replacement of defective Systems/parts will be done by equivalent or better systems/parts of the same make. We will attend all the complaints/service calls within 24 working hours and not beyond 3 working days. Down time will not exceed beyond 3 working days. In case, down time exceed 3 working days then we will extend the warranty period of that item(s) double of the down time.

Signature of Bidder
Name:_____
Designation:_____
Organization Name: _____
Contact No.: _____

ANNEXURE- V

MANUFACTURERS' AUTHORIZATION FORM

[The bidder shall require the Manufacturer to fill in this Form in accordance with the Instructions indicated. This letter of authorization should be on the letter head of the Manufacturer and should be signed by a person with the proper authority to sign documents that are binding on the Manufacturer]

.

Date: [insert date (as day, month and year) of Bid Submission] Tender No.: [insert number from Invitation for Bids]

To: [insert complete name and address of Purchaser] WHEREAS

We [insert complete name of Manufacturer], who are official manufacturers of [insert type of goods manufactured], having factories at [insert full address of Manufacturer's factories], do hereby authorize [insert complete name of Bidder] to submit a bid the purpose of which is to provide the following Goods, manufactured by us [insert name and or brief description of the Goods], and to subsequently negotiate and sign the Contract.

We hereby extend our full guarantee and warranty in accordance with Clause 4.23 of the Terms and Conditions, with respect to the Goods offered by the above firm. Further We also ensure to support on regular basis with technology / product updates.

Signed: [insert signature(s) of authorized representative(s) of the Manufacturer]
Name: [insert completename(s) of authorized representative(s) of the Manufacturer]
Title: [insert title]

Duly authorized to sign this Authorization on behalf of: [insert complete name of Bidder]

Dated on day of , [insert date of signing]

ANNEXURE VI

PERFORMANCE BANK GUARANTEE

(To be executed on Stamp Paper of Rs. 100/- or such higher value as per the Stamp Act of the State in which the Guarantee is issued. Stamp Paper should be in the name of the Bank Issuing the Guarantee.)

BANK GUARANTEE NO. :
DATED :

Dear Sirs,

1. THIS DEED OF GUARANTEE made on this ..... day of ..... …….. between **MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY, JAIPUR** (hereinafter called the "**MNIT**" which expression shall unless excluded by or repugnant to the context includes its successors and assignees) of the one part and the ..... (hereinafter called the "**Bank**" which expression shall unless excluded by or repugnant to the context include its successors and assignees) of the other part.

2. AND WHEREAS as per clause……..…… Of the purchase order in question the supplier shall furnish a Performance Bank Guarantee of 03% of P.O. Value i.e. Rs. …… (in words) …… only) valid for the period of two months beyond warranty period as and by way of security for satisfactory working of the …… AND WHEREAS at the request of the supplier, the Bank executes these presents.

3.0 THIS DEED WITHNESSETH AND IT IS HEREBY AGREED AND DECLARED BY AND BETWEEN PARTIES HERETO AS FOLLOWS:

3.1 The Bank hereby guarantees to the MNIT, Jaipur that the equipment / service contracted are capable of performing the work as demanded by the MNIT, Jaipur. In the event of equipment / service failing to perform to the satisfaction of the MNIT, Jaipur, which shall be final and conclusive of the factum of non-performance, the Bank shall indemnify and keep the indemnified to the extent of ..... of P.O. Value i.e. Rs. ..... (Rupees ....) valid for the period of two months beyond the warranty period against any loss or damage that may be caused to or suffered by the MNIT, Jaipur consequent to non-performance of the contracted equipment / services to be supplied by the supplier.

3.2 In consideration of the aforesaid premise and at the request of the supplier, we the Bank hereby irrevocably and unconditionally guarantee that the supplier shall perform in an orderly manner their contractual obligations in accordance with the terms and conditions set forth in the Purchase order dated ..... and in the event of the supplier's failure to do so, the Bank unconditionally pay to the MNIT, Jaipur on demand, any amount up to the value mentioned in Clause 3.1 above without any reference to the supplier and without questioning the claim.

3.3 The guarantee herein shall remain in full force for a period of two months beyond the warranty period from the date of certification by the MNIT, Jaipur of successful installation and commissioning of the equipment/ service contracted. Date of start of warranty period will be notified by MNIT, Jaipur to the Bank.

3.4 The decision of the MNIT, Jaipur regarding the liability of the Bank under the guarantee and the amount payable there under shall be final and conclusive and binding on us without question. The Bank shall pay forthwith the amount demanded by the MNIT, Jaipur not withstanding any dispute, if any, between the MNIT, Jaipur and the supplier.

3.5 The Bank further agrees that the guarantee herein shall remain in full force during the pendency of aforesaid period mentioned in Clause 3.3 above and also any extension of the guarantee which has been provided by the Bank for this purpose beyond the aforesaid period provided, further, that if any claim accrues or against the Bank by virtue of this guarantee, should be lodged with us within a period of 60 days from the date of expiry of the guarantee period.

3.6 This Guarantee shall not be affected by any change in constitution of the supplier, MNIT, Jaipur or us not shall it be affected by any change in constitution or by any amalgamation orabsorption or reconstruction thereof otherwise, but will ensure for and be available to and endorsable by the absorbing amalgamated company or concern.

3.7 The MNIT, Jaipur has the fullest liberty without affecting the guarantee to postpone at any time or from time any of the powers exercisable by it against the supplier, either to enforce or forbear the clause governing guarantee in the terms and conditions of the said contract and Bank shall not be released from its liabilities under the guarantee by any matter referred to or by reason of time being given to the supplier or any other forbearance, act or omission on the part of the MNIT, Jaipur or any material or things whatsoever which under the law relating to sureties shall but for the provisions hereof have the effect of so releasing the Bank from its liabilities.

3.8 We further agree that the MNIT, Jaipur shall have the fullest liberty without affecting in any way our obligations hereunder with or without our consent or knowledge to vary any of the terms and conditions of the said contract or to extend the time of delivery from time to time.

3.9 The Bank undertakes not to revoke this guarantee during its currency except with the previous consent in writing of the MNIT, Jaipur.

3.10 We further agree that in order to give full effect to the guarantee herein contained MNIT, Jaipur shall be entitled to act as if we were its principal debtors in respect of its claim against the Supplier hereby guaranteed by us as aforesaid and we hereby expressly waive all our rights of suretyship and other rights if any which are in any way inconsistent with the above provision of this Guarantee.

Notwithstanding anything herein before, liability of the Bank under this guarantee is restricted to Rs. ..... (Rupees ..... only) and it will remain in force up to the period specified in Clause 3.3 unless a suit to enforce any claim under the Guarantee is filed against the Bank before the period specified in Clause 3.4. All your rights under this Guarantee shall be forfeited and we shall be relieved and discharged from all liabilities thereunder.

COUNTERSIGNED

Signature	:	Signature	:
Name	:	Name	:
Designation	:	Designation	:
Organization	:	Organization	:

<On Organization Letter Head>

ANNEXURE-VII

No._____ Dated:_____

CERTIFICATE

I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India and hereby certify that the organization is not from such a country.

OR (whichever is applicable)

I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India and hereby certify that the organization is from_____(*Name of Country*) and has been registered with the Competent Authority. I also certify that the organization fulfills all the requirements in this regard and is eligible to be considered.

(Copy/ evidence of valid registration by the Competent Authority is to be attached)

Signature of Bidder/ Agent

Name:_____
Designation:_____
Organization Name: _____
Contact No. : _____

Annexure-VIII

DECLARATION OF LOCAL CONTENT

[For Local Content of Products, Services or Works]

(To be given on Company Letter Head – For tender value below Rs.10 Crores)

(To be given by Statutory Auditor/Cost Auditor/Cost Accountant/CA for tender value above Rs.10 Crores)

To,

The Registrar

MNIT Jaipur

Subject: Declaration of Local Content

Tender reference No._____

1. Country of Origin of Goods being offered:_____
2. With reference to Order No. P- 45021/2/2017-PP(BE-II) dated 16-09-2020 of DPIIT, Ministry of Commerce and Industry, Govt. of India, we fall under the following category of supplier (please tick the correct category) for the items for which this tender has been floated and being bided.

   - Class I local supplier – has local content equal to more than 50%. Local contents added at _____ (name of location).
   - Class II local supplier – has local content more than 20% but less than 50%. Local content sadded at _____(name of location).
   - Non-local supplier – has local content less than or equal to 20%. Local contents added at _____ (name of location).

3. We are solely responsible for the above mentioned declaration in respect of category of supplier. False declarations will be in breach of the Code of Integrity under Rule 175(1)(i)(h) of the General Financial Rules for which we may be debarred for up to 2 years as per Rule 151(iii) of the General Financial Rules along with such other actions as may be permissible under law.

Signature of Bidder/ Agent

Name:_____

Designation:_____

Organization Name: _____

Contact No. : _____

Annexure IX

PRICE BID FORMAT

1	2	3		4	5 Price per unit (Rs.)			6	7 Delivery Charges (Rs.)				8
Sl. No.	**Name of Goods**	**Part ItemSl. No.**	**Name of Part-Item**	**Accounting unit & quantity**	Ex-factory/ ex-warehouse/ ex-show room off-the shelf	GST payable	Overall Basic **unit price** (Col. a+b)	Total Item price	Packing and forwarding	Transit Insurance, Other duties and taxes, if any(*other than sales tax*) and incidental costs	Any other charges (please specify)	**Total Inland Trans-Portation**	**Total Bid Price (Rs.)**
					5(a)	**5(b)**	**5(c)= 5(a)+5(b)**	**6=4x 5(c)**	**7(a)**	**7(b)**	**7(c)**	**7= 7(a)+7(b)+7(c)**	(6)+(7)
1.		**1.**											
		2.											
		3.											
		4.											
		5.											
		6.											
		7.											
		8.											
		9.											
		10.											
		11.											
		12											
		14.											
		15.											
		16											
												GRAND TOTAL	

Total bid price (for Indian components) in Indian Currency*: **(in figures) :** **……..……**

(in words): **……..**

Signature of Bidder/ Agent

Name:_____
Designation:_____
Organization Name: _____
Contact No. : _____