



भारतीय प्रौद्योगिकी संस्थान तिरुपति

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Tender No. IITT/ELE/2020-21/204

15 July, 2021.

**NOTICE INVITING TENDER FOR SUPPLY, INSTALLATION, TESTING AND COMMISSIONING OF REAL TIME SIMULATOR**

**(E-PROCUREMENT MODE ONLY)**

Indian Institute of Technology Tirupati (IIT Tirupati) invites online bids (e-tender) in Two bid system from eligible **Class-I, Class-II & Non Local Suppliers** in line with Government Public Procurement order No.P-45021/2/2017-BE-II dated: 04.06.2020 for the following:

Item Description	Quantity (approx.)	Estimated Cost (Rs.)	Tender Fee (Inclusive of all taxes in Rs.)
Supply, installation, testing and commissioning of Real time simulator	01 Set	1,49,51,700/-	1500/-
<b>Total</b>		<b>1,49,51,700/-</b>	<b>1500/-</b>

The Tender Document can be downloaded from Central Public Procurement (CPP) Portal <http://eprocure.gov.in/eprocure/app> and bid is to be submitted online only through the same portal up to the last date and time of submission of tender.

**Critical Dates of Tender:**

1	Date and time of Online Publication/Download of Tenders	15.07.2021	18.00 hrs
2	Bid submission start date & time	15.07.2021	18.00 hrs
3	Bid submission close date & time	29.07.2021	15.00 hrs
4	Closing date & time for submission of EMD/Tender fee	29.07.2021	15.00 hrs
5	Opening of Technical bids	30.07.2021	15.00 hrs

## 1. About IIT TIRUPATI:

Indian Institute of Technology Tirupati (IIT Tirupati) is an Autonomous Institute under Ministry of Education, Govt. of India.

## 2. Technical Specifications: Schedule of requirement

### Real Time Digital Power System Simulator- 01 Set

#### INTRODUCTION

The Power System Simulator must be a digital system able to perform electromagnetic transient simulations continuously in real time (frequency range DC to ~3kHz). Since one of the main purposes of the simulator will be to test physical controllers and protection devices, it must be equipped with sufficient analogue and digital input and output facilities as well as have the ability for high level communication capabilities (e.g. IEC 61850, IEEE C37.118, IEC 60870, DNP3, Modbus, Aurora etc.).

#### 1 REAL TIME

For the purpose of this specification, real time simulation shall be interpreted as hard real time simulation as per the following definition –

- The calculation time for the entire power system model, including the time required for communication and servicing of I/O, is completed with respect to real world time in less than the timestep selected for a particular simulation case.
- Each simulation timestep is equidistant from the next with respect to real world time.

#### 2 SIMULATION ALGORITHM

##### 2.1 Nodal Analysis

The real time simulation must use nodal analysis to solve the main circuit node voltages and branch current as outlined by Dr. Herman Dommel in his famous paper published in the IEEE Transactions on Power Apparatus and Systems (Volume: PAS-88, Issue 4) in 1969 and implemented in EMTP, PSCAD, etc.

The nodal approach finds the solution of the node voltages by solving the equation  $[V] = [Y]^{-1} \times [I]$  where Y is the corresponding admittance matrix of the network. The solution requires the inversion or decomposition of the Y matrix. The superiority of this simulation methodology has been identified particularly when the network solution used is able to decompose the Y matrix every simulation timestep. It facilitates the inclusion of continuously variable admittance elements which is advantageous for embedding component models into the main network solution to avoid the need for numerical interfaces.

##### 2.2 Real Network Solution

The impedance matrix used for the nodal analysis must be reformulated from the admittance matrix every timestep (i.e. the admittance matrix must be decomposed or otherwise inverted every timestep). Furthermore, the size of the admittance matrix which is decomposed every timestep must be a minimum of 300 x 300 elements. Therefore 300 single-phase main circuit nodes must be allowed in one tightly coupled subsystem (i.e. no decoupling elements are allowed within the subsystem) and continuously varying admittance elements must be permitted at and between each and every node. It shall be possible to include no fewer than 500 single-phase switches within each subsystem (i.e. network solution).

It shall also be possible to simulate radial feeders, such as those typical of distribution networks, with a maximum size of 1200 single-phase circuit nodes within one tightly coupled subsystem. No decoupling elements shall be allowed within the subsystem.

These requirements allow flexibility for the complex network simulations anticipated.

#### 3 HARDWARE

The simulator should have 32 x fibre SFP ports to connect to other simulator units as well as input/output cards. The simulator should also have a touchscreen for setup, viewing diagnostics information, etc..

The simulator must be modular in design to allow future expansion and upgrading of the system.

The basic module of the simulator must perform three functions:

- 1) Computation (i.e. solution) of the power and control system algorithms
- 2) Ethernet communication to allow control of the simulator via a standard computer workstation
- 3) Dedicated, high speed communication to allow expansion of the simulator using additional modules

### **3.1 Computational Units**

The power and control system computation within each module shall be performed by a multicore RISC

processor housed on a printed circuit board. The processor cores shall not be dedicated to simulating specific models and the function of each core shall be completely defined by software.

To prevent adverse effects caused by communication restrictions, it shall be possible to connect high accuracy, 16-bit digital to analogue and analogue to digital converters, plus digital input and output, directly to the computational units.

### **3.2 Ethernet Communication**

The basic simulator module shall have ability to connect directly to a 100/1000BaseT Ethernet Local Area Network (LAN) so that it can be accessed remotely by a large group of users.

It shall also be possible via the simulator software and the Ethernet communication to control, monitor and interact with simulations during execution. This is a key aspect of the simulator, allowing the user to “operate” the simulated power system in a manner similar to that of a real power system (i.e. the simulator operator must have continuous communication with and control of the simulator during real time simulations).

### **3.3 Global Time Synchronization**

It shall be possible for the simulation timestep to be synchronized to a 1 Pulse Per Second (1PPS), IEEE 1588 or IRIG-B time reference signal provided by an external device (i.e. GPS clock). Synchronization of the simulation timestep to an external time reference is necessary for Phasor Measurement Unit (PMU) benchmark testing and it is advantageous for IEC 61850-9-2 sampled value output. The simulation of a constant phase angle shall not drift whatsoever over time with respect to the external GPS reference signal and shall exhibit a jitter not larger than 1 microsecond.

### **3.4 Expandability**

It shall be possible to expand the simulator by adding additional modules to the system. Dedicated communication shall be used between simulator modules so that the simulation timestep is not affected in a negative way.

Additionally, if multiple modules are used in the simulator, a precision optical communication channel shall be used to ensure absolute synchronization of computation in all modules.

To facilitate future expansion for large scale real time simulations, it shall be possible to extend the simulator capacity to accommodate up to twelve thousand three-phase buses (equivalent to approximately thirty six thousand single-phase nodes).

It is well understood that to enable real time simulation of large scale systems the electrical network is broken into smaller parts called subsystems. The simulator design shall allow direct communication between all subsystems for maximum flexibility and efficiency of the hardware usage.

### **3.5 Input / Output Capabilities**

The simulator shall provide the following minimum input/output capabilities:

1) Analogue Output (high resolution / optically isolated) - a minimum of 24, 12 or 16-bit analogue output channels shall be available on the simulator to facilitate connection to external devices. For standard simulations operating with timesteps in the range of 50 microseconds, at least 12 analogue outputs signal shall be oversampled at a rate of 1 microsecond.

The analogue output shall be equipped with a “watch dog” circuit to ensure the output voltage is set to zero within 1 millisecond of a simulation being stopped. The zeroing of the d/a output shall be within 1 millisecond regardless of how the simulation is terminated, either intentional or accidental.

2) Analogue Input (high resolution / optically isolated) - a minimum of 12, 12 or 16-bit analogue input channels shall be available on the simulator to facilitate importing analogue signals from external sources.

3) 250 Vdc Digital Output Interface - a minimum of 16 dry contact outputs shall be available to allow the connection status signals, etc. to external devices at station level voltages (i.e. up to 250 Vdc).

4) Digital Input (optically isolated) — a minimum of 64 optically isolated digital input channels shall be available to allow the connection of multiple external devices to the system. At least 60 of the 64 digital inputs shall be capable of providing a digital input timestamp with an accuracy of 250 nanoseconds or better.

5) The simulator shall have overall capability for Ethernet protocol-based communications (GOOSE, PMU, DNP3, etc.) IEEE C37.118 PMU output, IEC 61850 GOOSE messaging, IEC 61850-9-2/IEC 61869-9 Sampled Values, DNP3, IEC 60870-5-104. COMTRADE Playback, Modbus, and TCP/UDP protocols should all be included in the scope of supply. The minimum capability of each protocol is described elsewhere in the document. Two protocols must be able to be operated simultaneously in a single real time simulation.

6) The simulator shall have the ability to communicate via the high-speed serial protocol, Aurora. Four (4) fibre ports must be available for Aurora. Each fibre port must be capable of 64 inputs and outputs (each a 32-bit float/int) from either the small timestep or main timestep areas.

### **3.5.1 Remote Location of I/O Cards**

It shall be possible to locate any and all of the I/O described above up to 100 metres away from the simulator processing elements. The data transfer shall be facilitated via optical fibre connection(s). Remote location of the I/O components is necessary to minimize the distance electrical signals are transmitted to equipment under test which in some cases must be physically removed from the simulator processing elements.

## **4 SIMULATION REQUIREMENTS**

### **4.1 Simulator Capacity and Simulation Timestep**

The simulator shall be capable of representing, in real time with a digital timestep of less than 30 microseconds, the power system defined in Appendix 1. Any of the breakers in the circuit must be able to be opened or closed at any time while the simulation is running. Furthermore, the simulation must be one tightly coupled subsystem (i.e. no decoupling elements are allowed within the subsystem).

### **4.3 Numerical Stability**

The simulator shall be capable of simulating the systems shown in Appendix 1 continuously in real time for a minimum duration of twelve (12) hours with a maximum simulation timestep of 30 microseconds. The operator shall manually apply faults at random times during the test to ensure the numerical stability and continuous operation of the system.

### **4.4 Power Electronic Simulation**

#### **4.4.1 Line Commutated Power Electronic Converters**

The simulator shall be capable of representing line commutated power electronic converter (i.e. HVDC, SVC, TCSC) with an effective firing accuracy of 1 microseconds or better. The accuracy shall always be maintained and regardless of whether the firing pulses are generated internally by a

simulated controller or externally by a physical controller. Furthermore, it is required that these converters be solved as embedded parts of the main network solution and not as isolated subsystems. This is important to ensure maximum numerical stability and the proper representation of harmonics. These models shall also allow the representation of internal faults.

#### **4.4.2 Voltage Source Converter (VSC) Based Power Electronic Schemes**

##### **4.4.2.1 VSC Subnetworks**

VSC based power electronic schemes typically operate with higher frequency switching, particularly when driven by Pulse Width Modulation (PWM) control. Depending on the power level and application, PWM frequencies typically range from approximately 1 – 10 kHz (with frequencies in the 50 kHz range for some applications) and the dynamics of these schemes cannot be accurately represented using a timestep in the range of 25-50 microseconds.

Therefore the simulator shall have the ability to represent the VSC schemes as special subnetworks that operate with timesteps in the range of 1 – 3 microseconds. It shall be possible to interface the VSC subnetworks to the main simulation so that the interaction of the VSC with a large scale network can be represented and studied. The VSC subnetworks shall be freely configurable through the simulator's standard graphical user interface and able to include a minimum of 60 nodes, with the potential to include a discrete switching device at each node (an IGBT – Back Diode pair shall count only as one device).

The VSC subnetworks must operate based on nodal analysis via the same fundamental algorithm as the main network simulation – specifically, a full decomposition of the subnetwork admittance matrix must take place during each 1 – 3 microsecond timestep.

Furthermore, there must be models available to the user which represent common VSC topologies using switched resistances. These VSC models must represent switch ON/OFF statuses using switched resistances instead of an L/C associated discrete circuit. Additionally, the models must allow the user to define the switching losses. This requirement recognizes that models using L/C associated discrete circuits may result in unrealistic artificial power loss as well as fictitious current oscillations leading to noise in the simulation results. Switched-resistance models must be available for at least the following convertertopologies:

2-level VSC

3-level VSC – both T-type and NPC

Buck converter

Boost converter

In addition to power electronic components, it shall also be possible to include any model from the standard power system library in the VSC subnetworks, including transformers, transmission lines, cables, permanent magnet synchronous machines, double fed induction machines, breakers, filters, etc. It shall also be possible to interconnect multiple VSC subnetworks via traveling wave transmission line or cable models. Travel times as low as the VSC subnetwork timestep (i.e. 1 – 3 microseconds) shall be allowed. The interconnection of subnetworks via traveling wave models will be exploited to expand the network represented with timesteps in the range of 1 – 3 microseconds. Using the same simulation hardware as the main timestep simulation, and without physical reconfiguration of the hardware, it must be possible to run a standalone VSC network running entirely in the 1 – 3 microsecond range.

##### **4.4.2.2 Testing of External Controls for 2- and 3-Level Converters**

The subnetworks containing the VSCs are required to accurately represent converter behavior with switching for PWM frequencies in the order of >50 kHz for both 2- and 3-level converters.

The VSC converter models shall be capable of testing the firing pulse controllers (i.e. averaging models are not acceptable) for 2- and 3-level bridges. Therefore the simulator's analogue output and digital input hardware must be respectively capable to send out and read new values every subnetwork timestep (i.e. in the range of 1 – 3 microseconds) and the loop delay must be minimized.

## **5 SOFTWARE**

## 5.1 Graphical User Interface

All aspects of the simulator operation, from construction of simulation cases, to operation of the simulator, to post analysis of results must be controlled by a single Graphical User Interface (GUI). The GUI shall consist of modules for the following functions:

- 1) Circuit Construction - a module to allow the construction of simulation circuits. It shall be possible to use predefined modules from a library of components to assemble new simulation cases. It shall be possible to construct the diagram in either three-line or single-line diagram format and it shall be possible to toggle between the two different views of the same circuit.
- 2) Transmission Line and Cable Constants – a module to calculate the traveling wave and pi-section parameters for transmission lines and cables. It shall be possible to input the physical parameters of transmission lines and cables to calculate the parameters. Alternatively for overhead transmission lines it shall be possible to input positive and zero sequence data for 3 and 6 conductor transmission lines to calculate the parameters.
- 3) Simulator Operation – a module for operation of the simulator and the retrieval of simulation results. This module shall allow simulation cases to be started and stopped. The operation of the power system (i.e. changing of set-points and breaker operations), fault applications, monitoring of system status (e.g. RMS voltages and currents), and the retrieval of details simulation results (similar to a fault recorder) must be possible without interrupting the simulation (i.e. while it is running).
- 4) Storing of Results - it shall be possible to save simulation results directly from the GUI in ASCII, jpg, emf (vector format), pdf or COMTRADE format.
- 5) Post analysis of simulation results

## 5.2 Batch Mode Operation

Software shall be provided to allow the user to program a series of simulations to run automatically (i.e. batch mode). The batch mode software shall be capable of nested looping (e.g. if, for and while) to allow adaptive algorithms to be used during automatic operation. The batch mode software shall also be capable of recording key results in ASCII format and selectively printing or storing simulation results.

The batch mode software shall have the ability to embed text and simulation results (in jpg or emf format) directly into Microsoft® Word™ documents.

The batch mode software will be used to conduct automated relay testing where many hundreds or thousands of cases may be simulated during a day.

## 5.3 Power System Models

A minimum of the following power system models shall be available for the simulator:

- Traveling wave and pi-section multi-phase (max. 18 conductors), coupled transmission line and cable models. It shall be possible to embed breakers in each end of the transmission line models with a maximum of 6 conductors. The nodes introduced by the breakers shall be solved by the transmission line model and shall not count as part of those solved by the main network solution.
- A phase domain frequency dependent transmission line model shall be available to represent a minimum of 12 coupled conductors.
- Transformers with 2 or 3 windings and autotransformers with an optional tertiary winding. It shall be possible to include saturation with hysteresis, and online tap changers in the models. It shall also be possible to represent the transformers with internal turn-to-turn and winding to ground faults.
- Synchronous machines (standard and permanent magnet). The synchronous machine models must be solved as part of the main network and are not allowed to be numerically interfaced to the network solution. The synchronous machine model shall optionally allow the unit transformer and/or stator side breaker to be embedded as part of the model so the transformer secondary nodes or breaker nodes do not reduce the number available in the network solution (i.e. if breaker and/or transformer are embedded to the machine model, no extra nodes need be counted as solved by the network solution). Also, the possibility of initialization of the machine based on the load flow results, as well as entering the machine parameters in both “R & X” and “impedance and time constant” formats,

and inclusion/exclusion of magnetic saturation and saliency must be provided. A synchronous machine model must be available that will allow a true stator-ground fault. The machine model must also be solved as part of the main network and is not permitted to be interfaced or decoupled from the network solution. It shall be represented in the network solution as continually varying admittance elements. The model shall also make the field winding available as power system nodes to allow faults to be placed on the field.

- Multi-phase synchronous machines. A multi-phase synchronous machine model with access to the neutral point and both ends of the stator windings must be available. Modelling of the machine with any number of phases (up to 12 phases) including ones that are not a multiple of 3, such as 5, 7 or 11 must be possible. Disabling/enabling damper windings must also be available. Multi-phase (3-12) control components (e.g. ABC to DQ transformation) must also be available for use.

- Induction machines (squirrel cage and double fed)

- DC machines

- Voltage sources with definable equivalent impedances, source magnitude, frequency and phase

- Passive Resistive, Inductive and Capacitive components (including various filter configurations)

- Circuit breakers & fault switches

- Bus arrestors

- Series capacitors with ZnO arrestors and bypass switches

- Thyristor Controlled Series Capacitors (TCSC) with ZnO arrestors and bypass switches

- HVDC valve groups for transmission and back-to-back schemes. The HVDC valve groups shall include 6-pulse and 12-pulse configurations. The 12-pulse configurations shall be fed from a 3-winding transformer with an option to include a 4th winding for the freely configurable connection of filters and or reactive power compensation. The valve group models shall support internal valve faults and shall be solved as part of the main network solution. It is not acceptable that the valve groups are numerically decoupled from the network solution or interfaced to the network solution.

- Filter bank model to allow multiple banks of up to 12 switchable filters to be added to simulations without reducing the number of switches or nodes available in the main network solution

- Static VAR Compensators (SVC) including TCR and TSC branches. The TCR and TSC branches shall be embedded in the network solution as continuously variable conductance elements.

- Instrument transformers including current transformers (CT), inductive voltage transformers (PT), and capacitive voltage transformers (CVT) with full support for saturation and hysteresis loop modeling

- Voltage Source Converters: STATCOM, UPFC, SSSC, VSC-based HVDC, DFIG wind generation, etc.

- 2- and 3-level VSC bridges using switched resistances to represent ON/OFF statuses

- Boost and buck converter models

- COMTRADE and ASCII Playback. It shall be possible to playback COMTRADE, or ASCII, data files.

The switches representing HVDC, SVC, and TCSC thyristor valves must be embedded in the main network solution and not solved as independent subsystems.

#### **5.4 Control System Models**

A minimum of the following control system components shall be available for the simulator:

- User-Input - Slider, switch, button, dial, etc.
- Constants – integer, floating point, PI
- Data conversion- deg-rad, rad-deg, int-float, float-int
- Math functions – gain, exp, log, ln, ex, xy, sqrt, inverse, abs, sum, multiply, divide, max, min, etc.
- Complex math functions – multiply, divide, add, subtract, etc.
- Trigonometric functions – sin, arcsin, cos, arcos, tan, arctan, arctan2

- Standard control blocks - deadband, pulse generator, edge detector, time, counter, ramp, ramplimits, limiters, phase-locked loop (PLL), flip-flops, fourier transform, integrator, lead-lag, wash-out, lookup table, non-linear gains, etc.
- Logic functions – and, or, nor, bit shift functions, bit -> word, if-then-else, etc.
- Meters – real and reactive power, RMS (single- and three-phase), angle difference, frequency
- Signal processing – sample & hold, down sampler, moving average, FIR, DFT, ABC-DQ0, DQ0-ABC, ABC- $\alpha\beta$ ,  $\alpha\beta$ -ABC, vector rotator, etc.
- Generator controls – exciters (IEEE Type 1 to 5, AC1 to 4, ST1 to 3, X1, X2, 2A, SCR, DC2, IVO, etc.), governors (IEEE Type 1-3, IVO, European BGOV1, Gas turbine, steam turbine, hydro turbine, etc.), power system stabilizers (PSS2A, IEEEEST, IEEE2ST)
- On-Load Tap Changer control
- Relay models – as a minimum the following relay models shall be available
  - - line distance protection
  - - differential protection
  - - generator protection
  - - overcurrent protection
- Phasor Measurement Unit (PMU) – model which will operate in a manner similar to commercial PMU devices typically found in power systems and according to the performance and structure defined by IEEE C37.118. Both P and M type devices shall be represented with selectable reporting rates from 1 – 240 frames per second.

### **5.5 User Defined Models**

It shall be possible for the user to create power and control system models for the simulator to run in real time together with standard models provided by the supplier. The facility provided shall allow custom icon graphics and input menus to be created for the new component. Furthermore, the facility shall allow high level programming (for example C code) of the real time simulation algorithm and the facility shall include all necessary compilers.

### **5.6 Load Flow Initialization**

The software shall include a load flow calculation which can be used to initialize the simulation components before the real time electromagnetic transient simulation is begun.

### **5.7 PSS/E Conversion**

It shall be possible for the simulator to import and convert PSS/E data for simulation in real time. Once converted, the PSS/E system must also be available in picture format for modification.

### **5.8 PSCAD Conversion**

It shall be possible for the simulator to import and convert PSCAD network data for simulation in real time.

### **5.9 CYME Conversion**

It shall be possible for the simulator to import and convert CYME distribution network data for simulation in real time.

### **5.10 Software Licensing**

The software shall be provided with a site license so that it is possible to install all software included with the simulator supply on any number of desktop or laptop computers. If a site license cannot be provided a minimum of twenty independent licenses shall be provided for all software provided with the simulator.

## **6 Communication protocols**

The simulator can be utilized to model modern Smart Grid and Distributed Generation scenarios and as such must be able to provide high level Ethernet based communication as a minimum via the protocols described below.

### **6.1 Generic Socket Communications**



The simulator shall be able to both send and receive generic UDP/TCP packets via an Ethernet based socket connection to external equipment (e.g. computer or controller).

### **6.2 IEC 61850 GOOSE Messaging**

The simulator shall be able to both publish and subscribe to IEC 61850 GOOSE formatted messages for binary (e.g. trip and breaker status) and analogue signals. The simulator shall be able to publish and subscribe to GOOSE messages and be able to act as a minimum of 4 separate Intelligent Electronic Devices (IEDs). Each of those IEDs shall be able to publish and subscribe to a minimum of 32 points, either Boolean or floating point, plus quality bitmaps for each point (64 points if quality bitmaps are not required). This totals 256 points for publishing and 256 points for subscribing.

The simulator shall also be able to subscribe to GOOSE messages from a minimum of 16 separate IEDs.

It shall further be possible to manipulate the quality bits, “test” bit and “needs commissioning” bit of the GOOSE messages to test the response of the external protection and control devices.

### **6.3 IEC 61850-9-2 Sampled Value Messaging**

The simulator shall be capable of providing a minimum of two IEC 61850-9-2 sampled value data streams (i.e. two sets of 4 x voltage and 4 x current channels) to protection and control equipment. The sampled values shall be provided at 80 or 256 samples per cycle for a single data stream. It shall be possible to manipulate the quality bits of the sampled value messages to test the response of the external protection and control devices.

It shall also be possible to subscribe to a minimum of one IEC 61850-9-2 sampled values data stream at 80 or 256 sample per cycle as input to a simulation.

### **6.4 IEC 61869-9 Sampled Value Messaging**

The simulator shall be capable of providing a minimum of one IEC 61869-9 sampled value data streams (with up to 24 channels of voltage or current) to protection and control equipment. The sampled values shall be provided at 80 samples per cycle for a single data stream.

### **6.5 IEEE C37.118 PMU Data Stream Output**

The simulator shall be capable of simulating and providing synchro phasor data stream output for a minimum of twenty-four (24) Phasor Measurement Units (PMU's) with individually assignable frame-rates of up to 50/60 frames per second.

### **6.7 SCADA Interface**

The simulator shall be capable of acting as a slave unit for communication with SCADA equipment using the DNP 3.0 or IEC 60870-5-104 protocol. The system shall communicate with one DNP/IEC 60870-5-104 master and accommodate the following minimum communication capacity:

- Binary simulation status (i.e. breaker position)  
1024 (scan rate 1000 Hz)
- Binary simulation control (i.e. breaker commands)  
512 (scan rate 1000 Hz)
- Analogue status (i.e. output from simulator)

### **6.8 Modbus**

The simulator shall be able to operate as a Modbus server (slave) communicating to a Modbus master station (either an IED on dedicated hardware or a computer workstation running a Modbus master API). Communication shall be over TCP/IP networks and shall support Modbus TCP, Modbus RTU over TCP, and Modbus ASCII over TCP.

## **7 AVAILABILITY AND MAINTAINABILITY**

The real time simulator will be a combination of both hardware and software, but for the purpose of the specification it shall be considered one entity. Furthermore to ensure fast and comprehensive support, the entire simulator shall be designed and manufactured by one supplier. The manufacturer shall offer a maintenance program to extend the hardware warranty and provide software updates.

The manufacturer must further guarantee to provide maintenance, including replacement components, for the system for a minimum of 10 years.

#### **8 INSTALLATION AND TRAINING**

The proposal should include on-site installation and one-week training conducted by experienced engineers and should accommodate up to 10 participants (staff, faculty and students). The training should encompass all hardware and software modules including third party modules supplied as part of the simulator. If this cost is not included with the supply, please itemize the additional cost or clearly state non-availability of the service and the reason for the same.

#### **9 TECHNICAL SUPPORT**

The simulator should include unlimited technical support on hardware and software for the lifetime of the simulator. The technical support should cover all the software and hardware supplied as part of the simulator irrespective of whether the software or hardware was manufactured by the simulator vendor or purchased from third parties. If this cost is not included with the supply, please itemize the additional cost or clearly state non-availability of the service and the reason for the same. The simulator vendor shall demonstrate their expertise for supporting third party software and hardware, now and in the future.

#### **10 SOFTWARE MAINTENANCE AND UPDATES**

The simulator should include unrestricted updates (all releases including major and minor releases) and maintenance (patches and fixes) for the lifetime of the simulator. The upgrade and maintenance should cover all the software modules supplied as part of the simulator whether the software module was manufactured by the simulator vendor or purchased from third parties. Please identify third party software/modules and provide details (such as transferable contracts from original manufacturer) to support vendor's ability to offer maintenance, upgrade coverage and guarantee compatibility for the requested period. The Institute shall request contact information of existing client sites to verify the history of satisfactory execution of such extended maintenance on vendor developed and third party products. If this cost is not included with the supply, please state non-availability of the service and the reason for the same.

#### **11 HARDWARE WARRANTY**

The proposal should include a "repair or replace hardware warranty" that covers parts and labor for at least 1 year with zero deductible. The warranty should cover all the hardware supplied as part of the simulator whether the hardware was manufactured by the simulator vendor or purchased from third parties including off-the-shelf processor boards, power supplies, I/O modules, etc. Please identify all third party hardware boards and provide details (such as transferable contracts from original manufacturer) to support simulator vendor's ability to offer the warranty coverage for the requested period. The Institute shall request contact information of existing client sites to verify the history of satisfactory execution of such extended maintenance on vendor developed and third party products. If this cost is not included with the supply, please state non-availability of the service and the reason for the same.

#### **12 HARDWARE UPGRADES AND COMPATIBILITY**

The vendor should provide a clear and demonstrated path for a cost effective hardware upgrade with full backward compatibility. From upgrade cost point, please describe any hardware exchange program offered by the vendor to offset the cost of hardware upgrade including percentage discount offered on exchange and any annual enrolment fee for the exchange discount program. In the case of third party components including off-the-shelf processor boards, I/O modules, etc. included with the simulator, please describe in sufficient detail, including any limitation, as to how upgrade with full backward compatibility is assured. The compatibility is also important for effective collaboration with other institutions and sponsors that may have a different version of hardware and/or software. If this cost is not included with the supply, please state non-availability of the service and the reason for the same.

#### **13 QUALIFICATION**

In order to qualify as a potential supplier and demonstrate a well-established product, the manufacturer must provide references for at least 03 simulator installations with the same hardware proposed, in the field of electrical power systems, delivered to end customers within the last five years.

**Spares & Service support availability: Minimum 05 years**

**All offered products technical Specifications and Brochures are to be submitted along with the Technical Bid.**

### **3. TENDER FEE & BID SECURITY DECLARATION DETAILS:**

**3.1 Tender Fee of Rs.1500/- (Rupees fifteen hundred only)** should be submitted through ECS (Bank transfer / NEFT / RTGS) in favour of Indian Institute of Technology Tirupati.

**3.2 Bank A/c Details for crediting Tender Fee:**

**Name : Indian institute of Technology Tirupati Main Account**  
**Bank : State Bank of India**  
**Account No : 35523338208**  
**IFSC Code : SBIN0006677**

**3.3 Tender Fee and Bid Security Exemption:**

**I) Micro and Small Enterprises (MSEs):**

Micro and Small Enterprises (MSEs) as defined in MSE Procurement Policy issued by Department of Micro, Small and Medium Enterprises (MSME) **for goods produced and services rendered**, are exempted from Tender fee and Bid Security. However, they have to enclose **valid self-attested registration certificate(s)** along with the tender to this effect.

Accordingly, MSEs shall be required to submit **Udyam Registration Certificate** for availing benefit under MSE Procurement Policy. Enterprises registered prior to 30 June 2020 and who are not re-registered with Udyam Registration, shall continue to be valid for a period up to 31 Mar 2021. Such enterprises shall submit **EM Part-II** or **Udyog Aadhar Memorandum (UAM)** for availing aforesaid benefit.

**The benefit as above to MSEs shall be available only for Goods produced and services rendered by MSEs. However, traders are excluded from the purview of MSE Procurement Policy.**

**II) Startup(s):**

Startup(s) as recognized by **Department for Promotion of Industry and Internal Trade (DPIIT)**, Govt. of India, are exempted from Tender fee and Bid Security.

However, they have to enclose *valid self-attested registration certificate(s)* along with the tender to this effect.

**Eligible MSE and startup bidders who seeks exemption from Tender fee/Bid Security as per clause no. (c) above, if they withdraw or modify their bids during the period of validity, or if they are awarded the contract and they fail to sign the contract, or to submit a performance security before the deadline defined in the request for bids document, they will be suspended for the period of three years or as decided by the competent authority from being eligible to submit bids for contracts with the entity that invited the bids.**

### **3.4 Other than eligible MSE and Startup bidders, Bid Security Declaration:**

**Bidders should have to submit the Bid Security Declaration (As per the format attached in annexure-II) in duly filled and signed condition.**

**3.5** The Bidders will have to upload scanned copy of Payment details towards tender fee and the same will be accepted only on verification and confirmation by the Institute. Any delay in credit will not be entertained by the Institute. **(As per the format attached in Annexure – I)**

## **4. ELIGIBILITY CRITERIA**

### **4.1 Other Important Documents (OIDs)**

**Firm Incorporation Certificate, PAN details, GST details are to be provided.**

### **4.2. Statutory Documents:**

- I) The Bidder should give self-declaration certificate for acceptance of all terms & conditions of tender documents. A duly completed certificate to this effect is to be submitted as per the Annexure-I.
- II) The firm should be neither blacklisted / debarred by any Central / State Government / Public Undertaking / Institute nor is any criminal case registered / pending against the firm or its owner / partners anywhere in India. A duly completed certificate to this effect is to be submitted as per Annexure-III.

### **III) Experience and Past Performance:**

The bidder/OEM should have supplied minimum of 15 similar systems worldwide or 03 similar systems during past five financial years **i.e. during 2015-16 to 2019-20** in India to Central / State Govt/ PSU/ CPSEs/ Educational R&D Institutions. Vendor should provide satisfactory installation certificates with product details as proof with customer contacts email and phone number as per the **Annexure-IV**.

IV) The Annual Turnover should be at least 30% of the estimated cost **and be profitable** during each of the previous three financial years **i.e. during 2017-18 to 2019-20**. Copies of duly signed trading and profit & loss accounts / CA Certificate are to be submitted as per the **Annexure-V**.

V) **In case the bidder is a Class-I / Class-II/ Non-Local Supplier in line with the Public Procurement (Preference to Make in India) Order 2017 No. P-45021/2/2017-PP (BE-II) dated 04 Jun 2020 as amended from time to time. A Self-Declaration Certificate regarding “Class-I/Class-II/Non local Supplier” for the tendered items as per the Annexure-V is to be submitted.**

**As per the OM of Department of Promotion for Industry and Internal Trade No. P-45021/102/2019-BE-II-Part(1) dated: 04.03.2021. The bidders can't claim themselves as Class-I local suppliers/Class-II local suppliers by claiming the services such as transportation, insurance, installation, commissioning, training and after sales service support like AMC/CMC etc. as local value addition.**

- a. ‘Local Content’ means the amount of value added in India which shall, unless otherwise prescribed by the Nodal Ministry, be the total value of the item procured (excluding net domestic indirect taxes) minus the value of imported content in the item (including all custom duties) as a proportion of the total value, in percent.
- b. ‘Class-I local supplier’ means a supplier or service provider, whose goods, services or works offered for procurement, has local content equal to or more than 50% as defined under this order.
- c. ‘Class-II local supplier’ means a supplier or service provider, whose goods, services or works offered for procurement, has minimum local content of 20% but less than 50%, as defined under this order.
- d. ‘Non-local supplier’ means a supplier or service provider, whose goods, services or works offered for procurement, has local content less than 20%, as defined under this order.
- e. Complaint redressal mechanism: In case any complaint received by the procuring agency or the concerned Ministry/Department against the claim of a bidder regarding local content/domestic value addition in an electronic product, the same shall be referred to STQC.
- f. The bidder shall be required to furnish the necessary documentation in support of the domestic value addition claimed in an electronic product to STQC. If no information is furnished by the bidder, such laboratories may take further necessary action, to establish the bonafides of the claim.
- g. A complaint fee of Rs. 2 lakh or 1% of the value of the domestically manufactured products being procured (subject to a maximum of Rs.5 lakh), whichever is higher, to be paid by Demand Draft to be deposited with STQC. In case, the complaint is found to be incorrect, the complaint fee shall be forfeited. In case, the complaint is upheld and found to be

substantially correct, deposited fee of the complainant would be refunded without any interest.

- h. False declarations will be in breach of the Code of Integrity under Rule 175 (1)(i)(h) of the General Financial Rules for which a bidder or its successors can be debarred for up to two years as per Rule 151 (iii) of the General Financial Rules along with such other actions as may be permissible under law.

VI) The bidder should be OEM or OEM authorized Dealers / Channel partners / Distributors of reputed brand having authorization for sales and after sales support. Valid OEM authorization letter is required to participate in this tender.

**VII) Prior Registration and / or Screening of bidders:**

Any bidder from a country which shares a land border with India will be eligible to bid in this tender only if the bidder registered with the competent authority. **The concerned bidder(s) are required to attach the relevant valid Registration Certificate along with the bid for consideration.**

“Bidder” (including the term ‘tenderer’, consultant or service provider in certain contexts) means any person or firm or company, including any member of a consortium or joint venture (that is an association of several persons, or firms or companies), every artificial juridical person not falling in any of the descriptions of bidders stated hereinbefore, including any agency branch or office controlled by such person, participating in a procurement process.

“Bidder from a country which shares a land border with India” for the purpose of this Order means :-

- An entity incorporated, established or registered in such a country; or
- A subsidiary of an entity incorporated, established or registered in such a country or
- An entity substantially controlled through entities incorporated, established or registered in such a country; or
- An entity whose beneficial owner is situated in such a country; or
- An Indian (or other) agent of such an entity; or
- A natural person who is a citizen of such a country; or
- A consortium of joint venture where any member of the consortium or joint venture falls under any of the above.

The detailed terms & conditions issued from time to time in this regard by Government of India will be applicable.

**VIII) Authorized Representatives:**

Bids of bidders quoting as authorised representative of a principal manufacturer would also be considered to be qualified, provided:

- (i) Their principal manufacturer meets all the criteria above without exemption, and
- ii) The principal manufacturer furnishes a legally enforceable tender-specific authorisation assuring full guarantee and warranty obligations as per the general and special conditions of contract;  
and
- iii) The bidder himself should have been associated, as authorised representative of the Principal Manufacturer for same set of services as in present bid (supply, installation, satisfactorily commissioning, after sales service as the case may be) for same or similar item for past three years ending on bid opening date.

### 4.3 TECHNICAL CRITERIA

Bidders should comply the specification of the tendered item in all respect. The detailed format is attached at Annexure-VII. The bidder is to complete the same in all respect and submit accordingly

### 5. FINANCIAL BID DETAILS

5.1 Financial bid i.e. BOQ given with tender (in **Excel format**) to be downloaded first and uploaded after filling all relevant information strictly as per the format failing which the offer is liable for rejection. Kindly quote your offer on FOR IIT Tirupati (inclusive of all taxes and charges) for indigenous bidders. CIF Chennai airport for foreign bidders. **Vendor should quote prices in BOQ only, offers indicating rates anywhere else shall be liable for rejection.**

5.2 Concessional Custom Duty / Concessional GST is applicable to IIT Tirupati as a Research Institution. Necessary Certificate to this effect shall be provided by IIT Tirupati to the supplier.

### 6. TIME SCHEDULE:

S. No.	Particulars	Date	Time
a.	Date of Online Publication of Tender	15.07.2021	18.00 hrs
b.	Bid Submission Start Date	15.07.2021	18.00 hrs
c.	Bid Submission Close Date	29.07.2021	15.00 hrs
d.	Closing Date & Time for Submission of EMD & Tender Fee	29.07.2021	15.00 hrs
e.	Opening of Technical Bids	30.07.2021	15.00 hrs

### 7. AVAILABILITY OF TENDER

The tender document can be downloaded from <http://eprocure.gov.in/eprocure/app> and be submitted only through the same website.

## 8. BID VALIDITY PERIOD

The bid will remain valid for 120 days from the date of opening as prescribed by IIT Tirupati. A bid valid for a shorter period shall be rejected, being non-responsive.

## 9. BID SUBMISSION

### 9.1 Instruction to Bidder

- I) Bidders are required to enrol on the e-Procurement module of the **Central Public Procurement Portal (URL: <https://eprocure.gov.in/eprocure/app>)** by clicking on the link "**Online Bidder Enrolment**" on the CPP Portal. **The registration is completely free of charge.**
- II) Possession of a valid Class II/III DSC in the form of smart card / e-token is a prerequisite for registration and participating in the bid submission activities. DSCs can be obtained from the authorised certifying agencies recognized by CCA India (e.g. Sify/TCS/nCode/eMudhra etc).
- III) Bidders are advised to register their valid email address and mobile numbers as part of the registration process. These would be used for any communication from the CPP Portal.
- IV) Only one valid DSC should be registered by a bidder. Please note that the bidders are responsible to ensure that they do not lend their DSCs to others which may lead to misuse.
- V) The Bidders are required to log in to the site through the secured log-in by entering their respective user ID / password and the password of the DSC.
- VI) The CPP portal also has user manuals with detailed guidelines on enrolment and participation in the online bidding process. The user manuals can be downloaded for reference.

### 9.2 TENDER CLARIFICATION

- I) In case the bidders require any clarification regarding the tender documents, they are requested to contact our office Ph. no: 0877-2503572, Email ID: [purchase@iittp.ac.in](mailto:purchase@iittp.ac.in) on or before due date.
- II) Technical and Specifications related Clarifications contact our office No : 08772503263, Email ID: [vigneshv@iittp.ac.in](mailto:vigneshv@iittp.ac.in) on or before due date.

Any queries relating to the process of online bid submission or queries relating to CPP



Portal in general may be directed to the 24x7 CPP Portal Helpdesk.

### 9.3 ONLINE BID SUBMISSION PROCEDURE

**Cover-1:** The file should be saved in a PDF version numbered sequentially and should comprise of the following items:

**Packet-1:**

Duly Completed Scanned PDF copy of, PAN, GST, Firm Registration certificate and Annexure-I to VIII with relevant supporting documents

**Only the relevant documents as per the tender clauses are to be uploaded along with duly completed checklist as per the annexure-IX. Uploading of other than the required documents may liable for rejection of the bid.**

**Cover-2:**

A standard BOQ format has been provided in excel format. Bidders are required to download the BOQ excel file and fill their financial offer on the same BOQ format. After filling the same, submit it online in excel format, without changing the financial template format.

**Note:**

If the bid is incomplete and / or non-responsive it will be rejected during technical evaluation. The bidder may not be approached for clarifications during the technical evaluation. So, the bidders are requested to ensure that they provide all necessary details in the submitted bids.

### 10. BID OPENING

- 10.1 Technical Bids will be opened on **30.07.2021 @ 15.00 Hrs.**
- 10.2 Financial Bids of the eligible bidders will be opened on a later date. The date and time for opening of Financial Bids will be announced later.
- 10.3 **Bids should be summarily rejected, if tender is submitted other than through online or original tender fee/Bid security declaration are not submitted within stipulated date / time.**

### 11. BID EVALUATION

Based on results of the Technical evaluation IIT Tirupati evaluates the Commercial Bid of those Bidders who gets qualify in the Technical evaluation. The Commercial Bid with the lowest price will be the highest evaluated bid.

#### 11.1 Purchase Preference

- I) **Micro and Small Enterprises (MSEs):**

Micro and Small Enterprises (MSEs) as defined in MSE Procurement Policy issued by Department of Micro, Small and Medium Enterprises (MSME) **for goods produced and services rendered**, may be provided following purchase preference:

<b>Item wise Quantity</b>	<b>Price Quoted by MSE</b>	<b>How the tender shall be finalized</b>
Cannot be split	L1	Full Order on MSE
Cannot be split	Not L1 but within L1 + 15%	Full Order on MSE subject to matching L1 Price

## II) Preference to Make in India

- a) In procurement goods or works which are covered under by para 3(b) of the extant Public Procurement (Preference to Make in India) Order 2017 dated 04 June 2020 and which are **divisible** in nature, the “Class-I Local Supplier” shall get purchase preference over “Class-II Local Supplier” as well as “Non-Local Supplier” as per following procedure:
  - i) **Among all qualified bids, the lowest bid will be termed as L1. If L1 is “Class-I Local Supplier”,** the contract for full quantity will be awarded to L1.
  - ii) **If L1 bid is not a “Class-I Local Supplier”,** 50% of the order quantity shall be awarded to L1. Thereafter, the lowest bidder among the “Class-I Local Supplier” will be invited to match L1 price for the remaining 50% quantity subject to the Class-I Local Supplier’s quoted price falling within the margin of L1 + 20%, and contract for that quantity shall be awarded to such “Class-I Local Supplier” subject to matching the L1 price. In case such lowest eligible “Class-I Local Supplier” fails to match L1 price or accepts less than the offered quantity, the next higher “Class-I Local Supplier” within the margin of L1 + 20% shall be invited to match the L1 price for remaining quantity and so on, and contract shall be awarded accordingly. In case some quantity is still left uncovered on Class-I local suppliers, then such quantity may be ordered on the L1 bidder.
- b) In procurement goods or works which are covered under by para 3(b) of the extant Public Procurement (Preference to Make in India) Order 2017 dated 04 June 2020 and which are **not divisible** in nature, and in procurement of services where the bid is evaluated on price alone, the “Class-I Local Supplier” shall get purchase preference over “Class-II Local Supplier” as well as “Non-Local Supplier” as per following procedure:
  - i) **Among all qualified bids, the lowest bid will be termed as L1.**  
**If L1 is “Class-I Local Supplier”,** the contract will be awarded to L1.

ii) **If L1 is not a “Class-I Local Supplier”,** the lowest bidder among the Class-I Local Supplier, will be invited to match the L1 price subject to Class-I Local Supplier’s quoted price falling within the margin of L1 + 20%, the contract shall be awarded to such Class-I Supplier subject to matching the L1 price.

iii) **In case such lowest eligible Class-I Local Supplier fails to match the L1 price, the “Class-I Local Supplier”** with the next higher bid within the margin of L1 + 20% shall be invited to match the L1 price and so on and contract shall be awarded accordingly. In case none of the of Class-I Local Supplier within the margin of L1 + 20%, the contract may be awarded to the L1 bidder.

iv) **Class-II Local Supplier/Non local supplier will not get purchase preference.**

## 12. PAYMENT TERMS

### **For Indian bidders:**

No advance payment will be made in any case. Bills in Duplicate should be sent and the payment shall be released generally within 30 days, only after it is ensured that the items / quality of the items supplied are to the entire satisfaction of IIT Tirupati and completed the entire work within the stipulated delivery schedule. If any item is found defective, or not of the desired quality etc., the same should be replaced by the firm(s) immediately for which no extra payment shall be made.

### **For Foreign bidders :**

For imported items payment will be made through irrevocable Letter of Credit (LC) & wire transfer. 90% of LC will be opened on **CIF Chennai airport value** and will be released against the proof of despatch documents and balance 10% will be released after the successful installation, commissioning and demonstration, training of the equipment at IIT Tirupati site through wire transfer.

**Bank charges on LC within India to applicant account and outside India to beneficiary account.**

**The charges for any LC amendments requested by the vendor will have to be paid by the vendor.**

## 13. WARRANTY OF QUALITY AND QUANTITY

13.1 The awardee shall give minimum **1year onsite warranty** on successful completion of supply, and acceptance of supplied items.

13.2 The awardee shall give warranty that all items are as per specification(s), conforming to the specified design and there are no defects in the process of manufacturing, packaging, transportation and delivery.

13.3 Upon receipt of notice from IIT Tirupati for defective material, the firm shall **within 15 days** of receipt of the notice, replace the defective material, free of cost at the destination. The firm shall take over the defective material at the time of their replacement. No claim whatsoever shall lie on IIT Tirupati for the replaced goods thereafter. If the firm fails to replace the defective goods within a reasonable period, IIT Tirupati may proceed to take such remedial actions as may be necessary, at the company's risk and expense.

#### **14. LIQUIDATED DAMAGES**

In case of delay in Supply by the stipulated date, IIT Tirupati reserves the right of imposing penalty @0.5% per week on the value of the undelivered items subject to maximum 10% of the cost of undelivered items.

#### **15. DELIVERY SCHEDULE**

15.1 The successful bidder should execute the order successfully i.e. Supply, Installation of ordered items within **8-16 weeks** at IIT Tirupati from the date of issue of the purchase order. In case of any damage/Broken/Expired items found, the item(s) should be replaced **within 15 days** at IIT Tirupati. The bidder has to make own arrangement for unloading and positioning of items at the desired location of IIT Tirupati.

#### **16. PERFORMANCE SECURITY DETAILS**

16.1 The successful tenderer will have to deposit the performance security valid **for 15 Months** in the form of DD / TDR / FDR / Bank Guarantee **@03% of the total order value** at the earliest from the date of issue of the award letter. No interest will be paid by IIT Tirupati on the deposit.

16.2 Performance Security will be refunded to the supplier, after it duly performs and completes the contract/warranty period in all respects.

16.3 Performance Security will be forfeited if the firm fails to perform/abide by any of the terms or conditions of the contract.

16.4 In case, the firm fails to execute the order successfully, within specified delivery period, the same goods/items will be procured from open market and the difference of cost, if any, will be recovered from Performance Security or from pending bill(s) of the defaulting firm or from both in case the recoverable amount exceeds the amount of Performance Security.

#### **17. TERMS AND CONDITIONS**

### **17.1 Termination for Insolvency**

- I) The IIT Tirupati may at any time terminate the Contract by giving a written notice to the awarding firm, without compensation to the firm, if the firm becomes bankrupt or otherwise insolvent as declared by the competent Court, provided that such termination will not prejudice or affect any right of action or remedy, which has accrued or will accrue thereafter to the department.
- II) IIT Tirupati and/or the firm are entitled to withdraw/cancel the rate contract by serving one-month notice on each other. However, once a purchase order is placed on the supplier for supply of a definite quantity in terms of the rate contract during the validity of the rate contract, that purchase order becomes a valid and binding contract.
- III) The courts of Tirupati alone will have the jurisdiction to try any matter, dispute or reference between the parties arising out of this purchase. It is specifically agreed that no court outside and other than Tirupati Court shall have jurisdiction in the matter

### **17.2 Force Majeure**

- I) Should any force majeure circumstances arise, each of the contracting parties be excused for the non-fulfilment or for the delayed fulfilment of any of its contractual obligations, if the affected party within 15 days of its occurrence informs in a written form the other party.
- II) Force Majeure shall mean fire, flood, natural disaster or other acts such as war, turmoil, sabotage, explosions, epidemics, quarantine restriction, strikes, and lockouts i.e. beyond the control of either party.

### **17.3 Arbitration**

- I) All disputes of any kind arising out in connection with the executing the order shall be referred by either party (IIT TIRUPATI or the bidder) after issuance of 30 days' notice in writing to the other party clearly mentioning the nature of dispute to a single arbitrator acceptable to both the parties. The venue for arbitration shall be IIT TIRUPATI India. The jurisdiction of the courts shall be Tirupati, Andhra Pradesh, India.

### **17.4 Other Conditions**

- I) The bidder has to upload the relevant & readable files only as indicated in the tender documents. In case of any irrelevant or non-readable files, the bid may be rejected.
- II) IIT Tirupati will not be liable for any obligation or supplies made unless the Official Purchase Order has been placed by the Purchase Department.

- III) IIT Tirupati reserves the right to accept or reject any or all the tenders in part or in full or may cancel the tender, without assigning any reason thereof.
- IV) IIT Tirupati reserves the right to relax / amend / withdraw any of the terms and conditions contained in the Tender Document without assigning any reason thereof. Any inquiry after submission of the quotation will not be entertained.
- V) IIT Tirupati reserves the right to modify/change/delete/add any further terms and conditions prior to issue of purchase order.
- VI) In case the bidders/successful bidder(s) are found in breach of any condition(s) at any stage of the tender, Performance Security shall be forfeited.
- VII) False declaration/documents will be in breach of the Code of Integrity under Rule 175(1) (h) of the General Financial Rules for which a bidder or its successors can be debarred for up to two years as per Rule 151 (iii) of the General Financial Rules along with such other actions as may be permissible under law.
- VIII) Repeat Order: IIT Tirupati reserves the right to place repeat order up to 100% of the quantities within a period of 12 months from the date of successful completion of purchase order at the same rates and terms subject to the condition that there is no downward trend in prices.  
**To take care of any change in the requirement during the currency of the contract, a plus/minus option clause for 25 per cent is incorporated in the tender document, reserving purchaser's right to increase or decrease the quantity of the required goods up to that limit without any change in the terms and conditions and prices quoted by the tenderers.**
- IX) Conditional tenders will not be considered in any case.
- X) In case of doubt in material, the expenditure on testing of equipment will be borne by the tenderer.
- XI) Institute reserve the right to increase/decrease the order quantity at any period of times during the validity of the contract.
- XII) **IIT Tirupati may issue amendment/corrigendum to tender documents before due date of submission of bid. Any amendment/corrigendum to the tender document if any, issued by IIT Tirupati will be posted on CPP Portal. For the bidders, submitting bids on downloaded tender document, it is 'bidders' responsibility to check for any amendment/corrigendum on the website of IIT Tirupati or check for the same CPP Portal before submitting their duly completed bids.**

## UNDERTAKING

To  
**The Registrar,**  
 Indian Institute of Technology  
 Tirupati-Renigunta Road, Settipalli post,  
 Tirupati 517506.

Tender No. IITT/ELE/2020-21/204 dated: 15.07.2021.

**Name of the Tender/Supply :** Notice Inviting Tender for Supply, installation, testing and Commissioning of Real Time Simulator.

Sir,

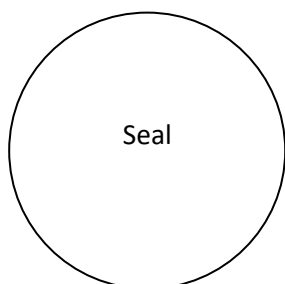
I /we hereby submit our bid for Supply, installation, testing and Commissioning of Real Time Simulator.

I/ We enclosed here with the following in favor of Indian Institute of Technology Tirupati towards Tender Fee.

Particular	Amount	Payment Reference Details	Payment Date
Tender Fee (Including Tax)	1500/-		

1. I / We hereby reconfirm and declare that I / We have carefully read, understood & complying the above referred tender document including instructions, terms & conditions, scope of work, schedule of quantities and all the contents stated therein. I / We also confirm that the rates quoted by me / us are inclusive of all taxes, duties etc., applicable as on date.
2. I /we have gone through all terms and conditions of the tender document before submitting the same.

**Date:**  
**Place:**



**Authorized Signatory**

**Name:**

**Designation:**  
**Contact No :**

**On Company Letter Head**

**Bid Security Declaration**

To  
**The Registrar,**  
Indian Institute of Technology  
Tirupati-Renigunta Road, Settipalli post,  
Tirupati 517506.

Tender No. IITT/ELE/2020-21/204 dated: 15.07.2021.

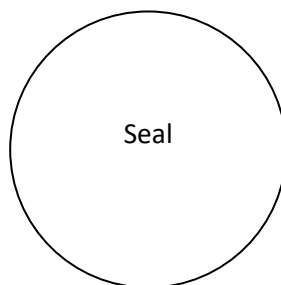
**Name of the Tender/Supply :** Notice Inviting Tender for Supply, installation, testing and Commissioning of Real Time Simulator.

Sir,

We, the undersigned declare that

1. We understood that, according to the tender conditions, bids must be supported by a Bid Security Declaration.
2. We accept that we will automatically be suspended from being eligible for bidding in any contract with the Institute for the period of **3 years** starting from the bid closing date, if we are in breach of our obligation(s) under the bid conditions, because we;
  - (a) have withdrawn our bid during the period of bid validity specified in the letter of bid; or
  - (b) having been notified of the acceptance of our bid by the institute during the period of bid validity, (i) fail or refuse to execute the contract, if required, or (ii) fail or refuse to furnish the performance security, in accordance with the tender conditions.

**Date:**  
**Place:**



**Authorized Signatory**

**Name:**

**Designation:**  
**Contact No :**

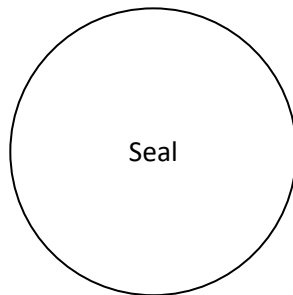


**CERTIFICATE  
(To be provided on letter head of the firm)**

I hereby certify that the above firm neither blacklisted / debarred by any Central/State Government/Public Undertaking/Institute nor is any criminal case registered / pending against the firm or its owner / partners anywhere in India.

I also certify that the above information is true and correct in every respect and in any case at a later date it is found that any details provided above are incorrect, any contract given to the above firm may be summarily terminated and the firm may be blacklisted.

**Date:**



**Place:**

**Authorized Signatory**

**Name:**

**Designation:**

**Contact No.:**

**ANNEXURE – IV**

**a) Experience: (As per tender Clause No.4.2 (III))**

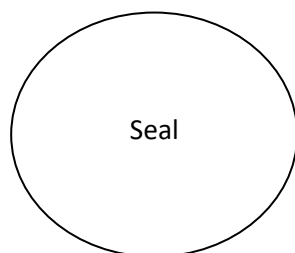
<b>Year</b>	<b>Name of the Item with Specification (Technical specification brochure to be attached)</b>	<b>Purchase Order No. &amp; Date (Copy of the Orders to be attached)</b>	<b>Date of successfully completion of SITC of ordered Item (copy of report from client to be attached)</b>	<b>Contact Details of Client</b>
2015-16				
2016-17				
2017-18				
2018-19				
2019-20				

**b) Past Performance: (As per tender Clause No.4.2 (III))**

<b>Year</b>	<b>Purchase Order No. &amp; Date (Copy of the Orders to be attached)</b>	<b>Quantity</b>	<b>Date of successfully completion of SITC of ordered Item (copy of report from client to be attached)</b>	<b>Whether supplied item(s) is in successful operation for at least one year (Certificate from client to be attached)</b>	<b>Contact Details of Client</b>
2015-16					
2016-17					
2017-18					
2018-19					
2019-20					

Date :

Place :



Authorized Signatory

Name:

Designation:

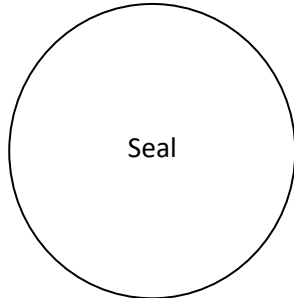
Contact No.:

**ANNEXURE – V**

**Annual Turnover and Profit Details:**

<b>Evaluation Criteria</b>				<b>Remark</b>	<b>Specific page no. where the proof of documents are enclosed</b>
<b>Bidder's Annual Turnover and Profit for last three financial years</b>	<b>Financial Year</b>	<b>Turnover in Rs.</b>	<b>Annual Profit in Rs.</b>	-	
	<b>2019-20</b>			<b>Supporting Documents are to be attached along with the Annexure-V</b>	
	<b>2018-19</b>				
	<b>2017-18</b>				

Date:



Place:

Authorized Signatory:

Name:

Designation:

Contact No.:

**Format for Self-Declaration under preference to make in India order**

In line with Government Public Procurement Order No. P-45021/2/2017-BE-II date. 15.06.2017 & P-45021/2/2017-PP (BE-II) dated: 04 June 2020. We hereby certify that we M/s. \_\_\_\_\_ (supplier name) are **CLASS-I/Class-II/Non-local (Please specify clearly)** supplier for the material against Enquiry No. IITT/ELE/2020-21/204 dated 15.07.2021.

Details of location at which local value addition will be made as follows: (Complete address to be mentioned)

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Percentage of Local Content: \_\_\_\_\_

*(As per the OM of Department of Promotion for Industry and Internal Trade No. P-45021/102/2019-BE-II-Part(1) dated: 04.03.2021. The bidders can't claim themselves as Class-I local suppliers/Class-II local suppliers by claiming the services such as transportation, insurance, installation, commissioning, training and after sales service support like AMC/CMC etc. as local value addition)*

We also understand, false declarations will be in breach of the Code of Integrity under rule 175 (1) (i) (h) of the General Financial Rules for which a bidder or its successors can be debarred for up to two years as per Rule 151 (iii) of the General Financial Rules along with such other actions as may be permissible under law.

Seal and signature of Supplier

Date :

Place :

## ANNEXURE – VII

**Technical Compliance statement**

Description	Qty	Complied (Yes/No)	Remarks, if any	Offered Make & Model	% of Local Content as per Tender Clause No.4.2(V)	Country of Origin
Real Time Simulator as per the tender specifications of clause No.2	01 Set					
<b>Warranty: 1year onsite warranty</b>						
Spares & Service support: Minimum 05 years						

## COMPANY DETAILS

<b>Name of the bidder</b>		
<b>Date of Incorporation /</b>		
<b>PAN Number</b>		
<b>GST Registration Number</b>		
<b>Bidder's Bidding Capacity for the tendered items (As a Manufacturer/ Trader/ dealer / channel partner / system integrator, etc.)</b>		
<b>Bank Details</b>	<b>Account Number</b>	
	<b>IFS Code</b>	
	<b>Bank Name</b>	
	<b>Branch Name</b>	
<b>Registered Office Address</b>		
<b>Authorized Signatory Details (Company/Firm Authorization by the competent authority, to be attached)</b>	<b>Name</b>	
	<b>Designation</b>	
	<b>Email</b>	
	<b>Phone</b>	
<b>Details of Contact other than Authorized Signatory</b>	<b>Name</b>	
	<b>Designation</b>	
	<b>Email</b>	
	<b>Phone</b>	

Date:

Signature and Seal of the Tenderer:

Place:

Name in Block Letter:

Designation:

Contact no.

**CHECKLIST FOR BIDDERS TO BE SUBMITTED IN DULY FILLED AND SIGNED**

Tender Clause No.	Name of the Document	Document Particulars	Submitted (Yes/No)	Page No. of the attached Document
3.1	Tender Fee			
3.4	Bid security Declaration (Annexure-II)			
3.3	Valid Tender Fee / EMD Exemption Certificate			
4.1.	PAN Card			
	Incorporation/Registration certificate of company			
	GST Registration copy			
4.2.(I)	Tender acceptance letter (Annexure I)			
4.2.(II)	Non-Blacklisting undertaking (Annexure III)			
4.2.(III)	The bidder/OEM should have supplied minimum of 15 similar systems worldwide or 03 similar systems during past five financial years <b>i.e. during 2015-16 to 2019-20</b> in India to Central / State Govt/ PSU/ CPSEs/ Educational R&D Institutions. Vendor should provide satisfactory installation certificates with product details as proof with customer contacts email and phone number as per the <b>Annexure-IV</b> .			
4.2.(IV)	The Annual Turnover should be at least 30% of the estimated cost <b>and be profitable</b> during each of the previous three financial years <b>i.e. during 2017-18 to 2019-20</b> . Copies of duly signed trading and profit & loss accounts / CA Certificate are to be submitted as per the <b>Annexure-V</b> .			
4.2.(V)	<b>In case the bidder is a <u>Class-I / Class-II/ Non-Local Supplier</u> in line with the Public Procurement (Preference to Make in India) Order 2017 No. P-45021/2/2017-PP (BE-II) dated 04 Jun 2020 as amended from time to time. A Self-Declaration Certificate regarding “Class-I/Class-II/Non local Supplier” for the tendered items as per the Annexure-V is to be submitted.</b>			
4.2.(VI)	The bidder should be OEM or OEM authorized Dealers / Channel partners / Distributors of reputed brand having authorization for sales and after sales support. Valid OEM authorization letter is required to participate in this tender.			
4.2.(VII)	Any bidder from a country which shares a land border with India will be eligible to bid in this tender only if the bidder registered with the competent authority. <b>The concerned bidder(s) are required to attach the relevant valid Registration Certificate along with the bid for consideration.</b>			
4.3	Technical Compliance Statement : Annexure-VII.			

11.1 (I)	Purchase Preference: (if applicable) Micro and Small Enterprises (MSEs):			
11.2 (II)	Purchase Preference: Make in India			
12	Payment Term: Within 30 days after SITC for Indian bidders & 100 % (90+10) through irrevocable letter of credit for foreign bidders.			
13.	Warranty: <b>1year onsite warranty</b>			
15	Delivery: FOR IIT Tirupati within <b>8-16 weeks.</b>			
8	Bid validity: 120 days from the date of opening of the tender			
	Company details : Annexure-VIII			

**Note: Submission of tender without the above mentioned documents will lead to rejection/disqualification of the tender.**

Signature of the bidder with stamp