

NATIONAL INSTITUTE OF TECHNOLOGY SRINAGAR

DEPARTMENT OF ELECTRICAL ENGINEERING

Criteria 6: P20 file

List of new program specific facility created in the Department of Electrical Engineering

Sr. No	Item Name	Specifications
1.	Numerical Relay Development Environment	<p>The unit is equipped with following features:</p> <ul style="list-style-type: none"> • 8 Analog Input Channels configurable as Voltage and Current channels. • 4 Digital Binary programmable I / O Channels. • 4 Relay based potential free programmable Outputs. • 4 LED based programmable indicators. • 3 Inbuilt Keys programmable. • In system hard reset option. • Programmable RS 232 communication port. • Programmable display through 4 X 20 LCD. • Power Supply — Included. • DAC Setup for Lab based simulation. • Analysis Software Package. • CT PT Card for Real Scenario implementation. • Packaged Software Library with IDE (Downloadable). <p>The unit has the below capabilities:</p> <ul style="list-style-type: none"> • Any relay algorithm can be implemented and tested for applicability in real time environment. • Use of software simulated data as inputs. Hence any condition can be simulated. • Suitable for research activities. • Can used for simulation of COMTRADE file generated by relay in field. • Once the Relay Algorithm is developed and coded using a PC, same will be uploaded to H/W Setup using RS232 Port. • LCD Display, Soft push buttons and Status Indicator LED's all are programmable using RS232 port provided for data exchange. • Required Voltage and Current Waveform can be generated using Computer software and DAC Card provided. Same has to be fed into H/W Main unit using 8 Analog input channels provided based on the requirements. • Relay operation for respective algorithm and Analog Inputs can be seen using LCD Display and LED Status indicators • There is also a provision for stopping input signal using I-1/W Relay trip command. • Digital input is provided to take external trigger command if required by the algorithm.

		<p>The unit is equipped with following Hardware components:</p> <p>DAC card to convert the output of PC-based waveform into analog signals 100k sample/s and voltage range of +/- 10 Vp PC based waveform can be generated through any EMTP type simulation package or from COMTRADE file Data acquisition is carried out through 8 analog input channels Two 3q channels Two lip channels (can be any analog data) The A/D converts analog signal into samples and the Fourier technique is applied to compute the magnitude of the signal Implementation is based on very high speed DSP controller Serial interface for programming the relay algorithm Output options 4x20 LCD Display 4 Status LED 4 Digital trip command (will stop the input signal) Digital trip command can also be configured to PC through the DAC card Flash memory (planned enhancement) Waveform capture — similar to disturbance recorder in relays Variable capture — to save the variable in algorithm. Will help to access the performance of the scheme. Serial port to exchange the files in Flash memory. Digital inputs The algorithm can take external trigger command through this. Optional GPS time synchronization.</p>
2.	ETAP Software Package	<ol style="list-style-type: none"> 1. Base package (50 Bus Capability). <ol style="list-style-type: none"> i. Equipment Evaluation ii. Cable Ampacity and Sizing — IEEE, ICEA, NEC. iii. Wind Turbine Generator and PV array. iv. HVDC Elements. 2. Load Flow/Voltage Drop. 3. Short circuit (ANSI/IEC). 4. Protective Device Coordination/Selectivity and sequence (Star). 5. Optimal power flow (Economic Load Dispatch). 6. Transient Stability. 7. Harmonic Analysis (10 user license)
3.	OPAL RT-4510	<ol style="list-style-type: none"> 1. High-Performance Real-time High-Speed Connectivity 2. Open and Optimized for Power Electronics 3. Low Cost Entry-Level 4. Compact, Portable and Large Number of Robust I/O Channels 5. Faster processor up to 3.5 GHZ 6. FPGA Kintex7 able to process up to 410 K Cells 7. Active/passive PCIe, CANbus, GPS time synchronization (IEEE 1588) 8. Optional optical and SFP modules 9. Optional RS422, fiber optic or synchronization modules 10. Interconnectable with other OPAL-RT simulators or expansion units

4.	MiPower	<ol style="list-style-type: none"> 1. Icons of all power system components. 2. Multi-Layering of objects to view, select edit and present the results. 3. Multi-level nesting of sub-systems. 4. Realtime zooming facility for the diagram to any fractions of a zoom level. 5. GPS Interface 6. Enhanced database creation including detailed modeling of power system components. 7. Customized Design of Governors, AVR'S, SVC'S, HVDC/FACTS/STATCOM controllers are possible 8. AutoCAD Interface 9. Ground Mat Design 10. DC Network Solution module <p>Applications</p> <ol style="list-style-type: none"> 1. Steady State Analysis 2. Stability Assessment 3. Transient Studies 4. Security Monitoring, Assessment & Control 5. Protection Coordination 6. Planning Studies
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