Specifications for 80 channel PC based Data Acquisition System

i. **Real time Data Acquisition from 80 channels** (expandable upto 128 channels or more) sampled at user selected interval and logging the data on to hard disk without breaks in data and offline processing of the acquired data. The user should be able to programmatically select the type of measurement, set the gain, select filter, number of channels for data acquisition, sampling rate and duration of acquisition for logging and display.

The 80 channel data acquisition system should have 48 channels for ¼, ½, and full bridge strain gauges, 8 channels for LVDT, 8 channels for accelerometers, 8 channels for analog voltage input, and 8 channels for potentiometric transducers with the following specifications:

(a) 48 channels for ¼, ½, and full bridge strain gauges

- Strain module – 120/350 ohms (full bridge / half bridge / quarter bridge)
- Variable input excitation voltage 1- 5 volts
- Facility for shunt calibration
- Simultaneous and parallel sampling at a sample rate of minimum 2000 samples/s/channel (8 channel mode)
- Measurement Range: ±10 mV to ± 80 mV (freely programmable)
- The voltage drops across both end of the cables must be measured, compensated and fed back to the excitation unit
- Bessel/ Butterworth Filter for noise filtering
- Dynamic measurement frequency range 1 Hz – 500 Hz

(b) 8 channels for LVDT

- Measuring/ Input Range: 0.1 mV/V to 1000 mV/V
- Carrier frequency based amplifier module > 4kHz
- Suitable connectors (preferably Lemo or D-Sub) for transducer connection

(c) 8 channels for accelerometers

- Accelerometer module with a facility to accept ICP/IEPE Accelerometer type
- Suitable connector (preferably Lemo or BNC) for Transducer connection
- TEDS Enabled Facility

(d) 8 channel for analog voltage input

- Multichannel module for acquisition of physical quantities like voltages, current, etc.
- Should accept ±10 V

(e) 8 channel for potentiometric transducer

- Measurement Range: ± 500mV/V
- Excitation Voltage: 5V
- Bessel/ Butterworth filter for noise filtering

(f) Specific Features for Data Acquisition System

- Parallel and simultaneous sampling on all channels at the sampling rate of 1 kHz per channel
- Independent sampling rates for all individual channels
- Dynamic calibration through simultaneous sampling
- Dynamic measurement frequency range: 1 Hz – 500 Hz
- Signal conditioner with programmable gain

- 24 bit A/D converter (all modules)
- Digital filter with high damping with anti-aliasing features
- Save data at specified samples, at specified time intervals, or for each trigger
- Should be capable of redundant, fast interfaces to Laptop through USB/ Fast Ethernet 10/100/1000 Mbps/ PCMCIA
- Support for High Speed Controller Area Network (CAN 2.0) bus port
- Auto-checking and auto-calibration function to eliminate temperature influence on the amplifier

All required accessories, 05 (five) metre length cables to connect transducers to the data acquisition system and connectors shall be supplied separately for all 80 input channels.

ii. <u>Data acquisition client (Rugged Laptop to be supplied)</u>

Specifications of Data acquisition client:

- Compatible with the above mentioned data acquisition system
- Should be rugged
- Processor: Intel core i7 or better
- RAM: 8 GB (4 GB X 2 preferable) DDR4 or more
- Hard disk: 480 GB SSD or higher
- Ports: 2 or more USB ports
- Ethernet port: Giga bit or better
- Operating System: Windows 10 Professional or latest
- Wireless Keyboard and Mouse
- Minimum 13" display

iii. <u>Software for signal conditioning, data acquisition and signal analysis compatible with above DAS and also toolkit for MATLAB</u>

- Necessary application software for basic experimental setup, sensor/signal conditioning, data acquisition, signal analysis/processing, report generation (output in Engg Units) and also with portability of acquired data files (ASCII, Excel, Binary & universal file format) to standard application software like MATLAB, VC++ , etc.
- Convenient channel parameterization using TEDS and Sensor Database, Live data analysis, complete post-process analysis, etc.
- The software should have features on online monitoring, visualization of measurements (data presentation, graphing)
- Should have feature for Video Integration and synchronization.

<u>Specific Conditions</u>

- The system should have capability to configure the data acquisition, display, data storage and retrieval using the Laptop/PC as a control unit with compatible software, with automatic recognition of installed acquisition cards/ Components / modules. Vendor should supply the application software for performing the above mentioned operations and demonstrate the integration of hardware and software. The equipment once supplied should be in ready to use condition and there should not be any on site program development etc. The vendor should provide installation, commissioning and training at CBRI
- The data acquisition system should be modular in nature, should be rugged to withstand field conditions and tropicalized. The system should have provision to expand number of channels to the required module for the measurement of strain, load/force, voltage/current, temperature, inductive transducers, pressure (Piezo

resistive and piezoelectric) acceleration (piezoelectric ICP type) etc. The modular design should suit any combination for future requirement.

- Necessary accessories to be supplied along with data acquisition system - such as cables, terminal extension boards, connectors, power supplies, laptop etc. for ready field usage as a packaged LAPTOP based Data Acquisition System
- The supplier should be prepared to make a presentation at CSIR-CBRI, if called for, on the feasibility and technical features of the quoted Data Acquisition System
- All special features of the quoted system should be highlighted along with detailed technical specifications and information brochures enclosed with the quotation. The vendor should supply and integrate all the compatible hardware and software components, necessary software, cable, connectors etc. and demonstrate the full capabilities.