ANNEXURE: I

TECHNICAL BID PROFORMA

Item Name: System for quantum control and measurements

1.0 Bidder Eligibility Criteria:

I	**Bidder Eligibility Criteria-I (Public Procurement – Preference to Make in India)**	**Class I / Class II**	**Local Content value**	**Reference, Page No.**
I	Only 'Class-I local suppliers' and 'Class-II local suppliers', as defined under DIPP, MoCI Order No. P-45021/2/2017-PP (BE II) dated 16th September 2020 and other subsequent orders issued therein.			
2.0	**Bidder Eligibility Criteria-II**	**Complied/Not Complied**	**Reference Page No.**	**Remarks, If any**
1	Customer's information, contact details for at least 5 should be provided to whom similar product has been supplied by the vendor within a year			

3.0 Technical Compliance

SI.No	specifications	Complied/ Not Complied	Reference Page No.
1	We need an integrated FPGA based hardware, firmware, and software system designed for pulsed quantum control and measurement, with the following capabilities and specifications:		
2	It should have at least 10 independent oscillators to generate at least 5 IQ signal pairs, which can be combined together as needed.		
3	It should possess real time fully parametric dynamic pulse generation and manipulation capabilities (including amplitude, phase, frequency, and duration) with real-time processing of the acquired data with feedback latency of < 300 ns.		
4	Ability to switch back and forth between frequencies, while preserving the phase coherence (i.e., the rotating frame) of each frequency.		
5	The system should have at least 5 analog output channel and 2 analog input channels.		
6	The system should also come with local oscillators and mixers to allow generation of passband signals from 2 GHz-18 GHz. The unit should also have autocalibration of the mixers for carrier and side band suppression.		
7	The system should provide at least two channel capable of time-tagging measurements with $\leq$ 50 ps resolution, with both counts and timestamps array available for further real-time processing and real-time feedback.		
8	The instrument must be capable of control flow of quantum algorithms in real time, conditioned on measurements which can require feedback control involving all input (measurement) and output channels.		

9	System should come with an embedded compiler for compiling from a high-level programming language and should not require low-level VHDL programming of the FPGA.		
10	The software package must also include a hardware simulator for pre-preparing and debugging the code.		
11	Extensive math libraries must be provided to perform real-time ultrafast execution of arbitrary mathematical functions (e.g.: Bayesian estimates) using measurement data.		

The required technical specifications for the input and output channels are as follows:

A.Baseband:

S.No	Property	Output channels	Input channels	Complied/Not Complied	Reference Page No.
1.	Number of channels	5 or more	2 or more		
2.	Bandwidth	Greater than or equal to 400 MHz	Greater than or equal to 400 MHz		
3.	Vertical Resolution	Greater than or equal to 16 Bits	Greater than or equal to 12 Bits		
4.	Sampling Rate	Greater than or equal to 1 GS/s	Greater than or equal to 1 GS/s		
5.	Rise/Fall Times (10% to 90%)	1 ns	NA		
6.	Jitter	Less than 1ps	NA		
7.	Skew between channels	Less than or equal to 75ps	NA		
8.	Noise Floor ($0.5V_{PP}$, 50 Ω load)	Less than or equal to 10 nV/√Hz	Less than or equal to= 10 nV/√Hz		
9.	Worst harmonic component (100MHz)	-50 dBc or better	NA		
10.	Phase Noise floor (100MHz, Greater than or equal to200kHz)	-150 dBc or better	NA		
11.	Total Harmonic	60 dBc or better	70 dB or better		

	Distortion (100MHz)				
12.	IP3 10MHz between carriers (150MHz)	20 dBm or better	NA		
13.	SFDR (100MHz)	60 dB or better	NA		

B.IQ mixers for up and down conversion with internal local oscillator with fast (~1 ms) automated image rejection and LO leakage calibration with the following specifications

S.No	**RF I/O**	**Output (up-conversion)**	**Inputs (down conversion)**	**Complied/Not Complied**	**Reference Page No.**
14.	Number of channels	5 or more	2 or more		
15.	Frequency Range	2 GHz to18 GHz or wider	2 GHz to 18 GHz or wider		
16.	Phase Noise (@ 4 GHz)	-100 dBc/Hz or better (for 1 kHz offset and more)	NA		
17.	Phase Coherence	Less than or equal to 50 mrad/hour	NA		
18.	Power	Greater than or equal to 5 dBm	-40 to 20 dBm or more		
19.	Harmonics	25 dBc or better	NA		
20.	Rise time	Less than or equal 25 ns	NA		
21.	Switch Isolation	Greater than or equal to 60 dB	NA		
22.	Channel Isolation	Greater than or equal to 60 dB	NA		

S.No	Other Terms and Conditions	Complied/Not Complied	Reference Page No.
1	Minimum warranty of 1 Year should be provided.		
2	After-sales service support for repair/ replacement of non-functional parts should be provided by the vendor (including all services under warranty).		
3	The warranty will commence from the date of the satisfactory installation and vendor should give the warranty declaration.		
4	Setup charges for the full system including installation and training should be included by the vendor.		
5	All necessary documentation and user guides (in English language), both hardcopy and pdf files should be provided		

(Note: It is mandatory for the bidders to provide the compliance statement in tabular column format along with catalogue page number (comply/not comply) for the above points with document proof as required. Failing which bidders will be technically disqualified)

SIGNATURE OF BIDDER ALONG WITH SEAL OF THE COMPANY WITH DATE