



## **EXPRESSION OF INTREST**

**No. IITDH/MMD/EoI/EE/2023-2024/01**

**EXPRESSION OF INTEREST (EoI) FOR SUPPLY AND SETUP OF  
ELECTRICAL MACHINES LABORATORY**

## 1. Introduction

IIT dhArwAD is an Institute of National Importance created by an Act of Parliament in 2016. IIT dhArwAD has been steadily establishing its operations in its new permanent campus which is located at ChikkamalligawAD village, dhArwAD, KarnATaka. Simultaneously, the institute is employing bright young and accomplished faculty. A number of unique research and development programs are on the anvil. The institute now needs to raise the levels of the capacity with the best of the facilities and infrastructure. This will provide highly talented and accomplished faculty to pursue not only their research but also think of innovative way of introducing instructional/teaching/learning solutions to practical problem of the students.

## 2. Objective

The objective of this invitation of Expression of Interest (EoI) is to seek responses from eligible Vendors for SUPPLY, INSTALLATION, COMMISSIONING, DEMONSTRATION and TRAINING OF ELECTRICAL MACHINES LABORATORY AS PER ANNEXURE-I

## 3. Timelines

3.1 Major activities in the procurement process will be as given below: -

SI No	Activity	Remarks
(a)	Pre-Bid Meeting	To clarify the issues/ queries raised by interested firms to facilitate preparation and submission of bids. This will be strictly an In-person meeting Vendors must visit the lab premises in IIT- dhArwAD campus to take measurements, clarify queries and determine any other information necessary to help them prepare the bid.
(b)	Deadline for submission of EoI	Till 11.00 AM on 22/02/2024
(c)	Issue of Tender Document	Only to the vendors who submit the response to the EoI. Limited Enquiries will be issued to the vendors through CPP portal
©	Submission of Tender Documents	Deadline for bid submission 08/03/2024, 11.00 hrs based on updated specifications and tender document
(d)	Evaluation of Technical Bids	About 2 weeks (Tentative)
(e)	Opening of Commercial Bids	The shortlisted bidders will be intimated by e-mail the schedule of opening of the commercial bids
(f)	Award of Contract	The selected vendor will be awarded the contract.

Interested firms are requested to send their sealed EOI under a sealed envelope superscribed with “Expression of Interest (EOI) for PROCUREMENT AND SETUP OF ELECTRICAL MACHINES LABORATORY.” by post or handed over to the Asst. Registrar (MMD), IIT Dharwad on or before 22<sup>nd</sup> Feb 2024 by 11:00 am.

The EOI Proposals will be opened on 23<sup>rd</sup> Feb 2024 at 10:00 a.m. in the Machines lab, Room No. 012 Ground Floor, CIL Building, IIT Dharwad, Chikkamalligawad Village, Dharwad-580007 in the presence of authorized representative of the firms.

Clarifications, if any, may be sought from the Asst. Registrar (MMD), IIT Dharwad.

The Institute will examine the credentials of the firms, based on the submitted documents as per the eligibility criteria.

As a part of shortlisting exercise, vendors will be required to make a focused presentation on company, expertise, experience and proposed solution for providing services to IIT Dharwad not exceeding 15-20 minutes duration to the Technical Committee of IIT Dharwad.

Based on the proposed acceptable solution, RFP/Tenders may be issued based on which the vendors are supposed to submit their two part (Part A: Technical and Part B: Commercial) offers as per Institute rules.

The Institute reserves the right to issue Request For Proposal (RFP)/Tenders to vendor if deems eligible and qualified based on the evaluation of the EOI submitted by the bidders, vendor presentations, etc. The decision of the Institute in this regard shall be final.

The Director, Indian Institute of Technology Dharwad reserves the right to reject any or all the offers without assigning any reason. The Institute also reserves the right to amend the scope of the work at any point of time. Any attempt on the part of any firm to influence, negotiate directly or indirectly with the Institute will lead to exclusion from consideration.

Please note: This is not a Request for Proposal (RFP) and commercials are not to be submitted with EOI. If any financial element is found in submitted EOI document, the document will not be taken into consideration for further processing.

Sd/-

Registrar for Director, IIT Dharwad

1. Institute Website
2. CPP Portal

## 1. INTRODUCTION & BACKGROUND

### Annexure-I

## Electrical Machines Laboratory for IIT dhArwAD

### 1. Overview

Executive summary: The laboratory will have 15 sets of machine worktables. Each electrical machine worktable will have four electrical machines (one DC shunt machine, one DC Composite Machine, one Three phase Induction machine and one Synchronous machine) where brake drum setup is connected to DC Shunt machines at one end as shown in fig. 1.1, a three phase transformer (Capable to do single phase experiments), single phase/ three phase Auto transformers, load banks, Rheostats, associated instrumentation facilities, a worktable, relevant switchgear and inter-connection wires.

### Brief Technical specifications:

Each work table will consist of:

1. one **DC Shunt machine (DCSH)**,
2. one **DC Compound machine** (Should work as Shunt, Series and compound) (**DCCM**),
3. one **Three-phase induction machine (IM)**, one **synchronous machine (SM)** and
4. one **Three Phase Transformer(TF)** (Can be used as a single phase transformer).
5. Additionally:
  - a. For starting of DC Shunt Machine a 3-point starter should be used.
  - b. For three-phase induction (IM) machines a VFD speed control and Auto transformer starter facility should be provided.
  - c. A dark lamp method and Synchroscope method should be used for synchronizing the synchronous machine with the grid.

Therefore on each table, there should be four machines. Of these, the DC Shunt machine should be connected to the DC Compound machine with a propeller shaft (PS) with double universal joints coupling (the end user should be able to couple and decouple the machines as needed). This constitutes set-1. The remaining two machines constitute Set 2 - i.e. Induction machine and Synchronous machine, which should be similarly coupled using another propeller shaft identical to that in set 1.

The two sets (i.e. Set-1 and Set 2) should be coupled to each other by Electromagnetic coupling (EC). Therefore the machines should be co-axial, in order, DC Shunt machine, DC compound machine (DCCM), Three phase Induction Machine (IM) and Synchronous Machine (SM) as shown in fig 1.1 with maximum permissible dimensions as shown in fig 1.2.

All these machines are to be mounted on a single CNC machined frame as depicted in fig 1.1. For measuring torque, Spring balance brake drum arrangement should be provided on the left side of the DC Shunt machine and torque sensor should be placed between three phase induction machine and synchronous machine.

The setup should have one slotted disc mounted in between Set-1 and Set-2 for speed measurement. If an optical sensor is used, the casing must be IP 54 (not shown in fig 1.1 and fig 1.2). The overall assembly is to be restricted strictly to the maximum dimensions shown in fig 1.2 (this refers to maximum dimensions of the entire machine setup including rails, bed, etc). The setup must be rated for operation at least 2500 rpm.

Detailed technical specifications are listed below in Section 3. Technical compliance will be judged against each of the items listed in Section 3.

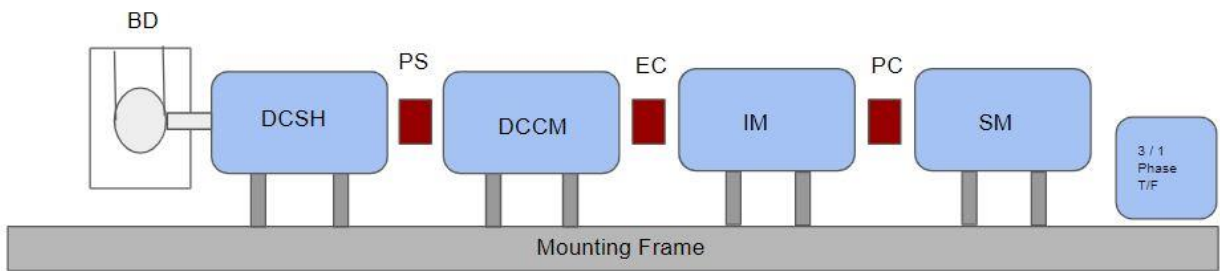


fig 1.1:

Spring balance Brake drum setup (BD), Propeller shaft with double universal joints coupling (PS), DC Shunt Machines (DCSH), DC Compound Machine (DCCM), Electromagnetic coupling (EC), Three Phase Induction Machine (IM), Synchronous Machine (SM),

Top View

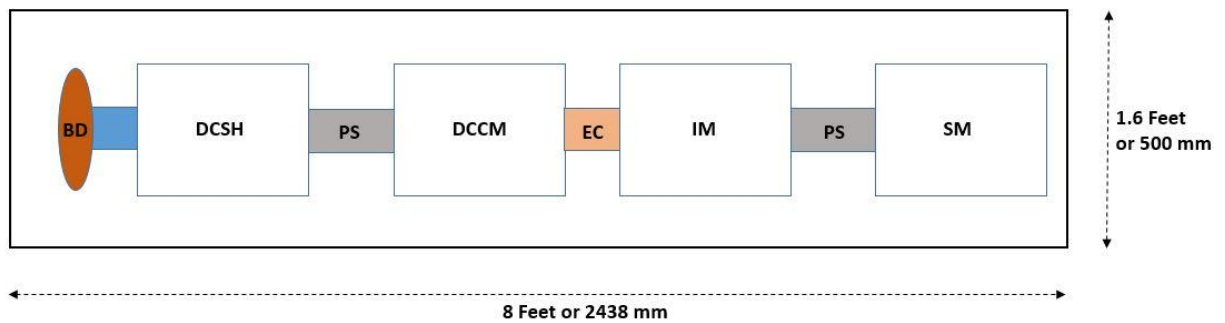


fig 1.2

Note : The setup should be strictly within the above mentioned dimensions.

## 2. Scope of the Tender/EoI

This tender deals with the following main items:

- A. Supply of electrical machines, related instrumentation and accessories as per the plans provided in this Document.
- B. Civil works i.e., preparing of machine bed (If required) and subsequent mounting of machines on metal frame.
- C. Electrical wiring including proper earthing for machines.
- D. Installation and commissioning of machines, related instrumentation and accessories.
- E. Training, Calibration and on-site testing
- F. Support and Maintenance

Note: Bidder has to provide all details including drawing for the same and may request to change at any point of time if required from IIT Dharwad side.

### 3. Detailed Technical Specifications:

#### Electrical machines, related instrumentation, and accessories

##### 3.1 Technical Specifications of Each Machine:

<b>I. DC Shunt Machine (DCSH)</b>	
(a) Quantity	15
(b) Machine type	Shunt
(c) Power rating	3 HP
(d) Armature Voltage	220 V
(e) Field voltage	220 V
(f) Type	Separately Excited
(g) Maximum field current	1 A
(h) Number of poles	4
(i) Efficiency	At least 80% armature efficiency
(j) Current	As per rating
(k) Speed	1500 RPM
(l) Modes of operation	Constant torque and constant power
(m) All winding terminals should be brought out to the front panel on the workbench (fig. 2 and 3)	
(n) Approved motor makers: SIEMENS, ABB, GENERAL ELECTRIC CO, BALDOR, KIRLOSKAR ELECTRIC CO, INTEGRATED ELECTRIC CO, TERCO, CROMPTON GREAVES, DELORENZO	

<b>II. DC Compound Machine (DCCM)</b>	
(a) Quantity	15
(b) Machine type	Shunt/Series
(c) Power rating	3 HP
(d) Operating Voltage in series	220 V
(e) Number of poles	4
(f) Efficiency	At least 80% armature efficiency
(g) Current	As per rating

(h) Speed	1500 RPM
All winding terminals should be brought out to the front panel on the workbench (fig. 2 and 3)	
(j) Approved motor makers: SIEMENS, ABB, GENERAL ELECTRIC CO, BALDOR, KIRLOSKAR ELECTRIC CO, INTEGRATED ELECTRIC CO, TERCO, CROMPTON GREAVES, DELORENZO	

<b>III. Synchronous Machines (10 No. Salient Pole and 5 No. Cylindrical pole) (SM)</b>	
(a) Quantity	10 + 5
(b) Machine type	AC Machine
(c) Power rating	3 HP
(d) Voltage	380 - 450 V, star connected
(e) Type	Salient Pole/cylindrical rotor. Note that we wish to have 10 machines of salient pole type and 5 machines having a cylindrical rotor.
(f) Field current	Maximum 1 A
(g) Efficiency	≥ 80%
(h) Frequency	47 - 53 Hz
(i) Speed	1500 RPM
(j) Short Circuit current	Greater than 3 times full load current
(k) Number of phases	3 phase
(l) Field Excitation	220 V DC Supply with max 1 A
(m) Total harmonic distortion (THD)	Less than 4%
All winding terminals should be brought out to the front panel on the workbench (fig. 2 and 3)	
(o) Approved motor makers: SIEMENS, ABB, GENERAL ELECTRIC CO, BALDOR, KIRLOSKAR ELECTRIC CO, INTEGRATED ELECTRIC CO, TERCO, CROMPTON GREAVES, DELORENZO	

<b>IV. Induction Machines (IM) (10 No. squirrel cage and 5 wound rotor type) (SM)</b>	
(a) Quantity	10 + 5
(b) Connection type	Star connected
(c) Rotor type	10 Squirrel cage + 5 wound rotor
(e) Power rating	3 HP
(f) Speed	1400 - 1500 RPM

(g) Stator Voltage	380 - 450 V
(h) Number of Phases	3
(i) Number of poles	4 for squirrel cage Induction machine
(j) Full load slip in the range	4 to 6%
(k) Efficiency	At least 80% at full load
(l) Power factor	At least 0.8 at full load
(m) Frequency	47 - 53 Hz
(n) Loading type	Induction machine will be loaded with a synchronous machine or Load Brake drum through Electromagnetic clutch.
All winding terminals should be brought out to the front panel on the workbench (fig. 2 and 3)	
(p) The concrete bed and machine assembly should also have a facility to lock the rotor of the induction machine while doing Blocked rotor test.	
(p) Approved motor makers: SIEMENS, ABB, GENERAL ELECTRIC CO, BALDOR, KIRLOSKAR ELECTRIC CO, INTEGRATED ELECTRIC CO, TERCO, CROMPTON GREAVES, DELORENZO	

Note : For Wound rotor type induction machines (5 No.), the bidder has to supply a rotor controller resistive box separately.

<b>V. Three - Phase Transformers (TF)</b>	
(a) Quantity	15
(b) Connection type	Open terminals (15 terminals to be provided in a terminal box / panel on the transformer)
(c) Power rating	1 KVA per phase (minimum)
(d) Input Voltage Rating	230 V for each winding (i.e. in delta configuration)
(e) Out Voltage Rating	Multiple taps: 115 V and 230V terminals
(f) Frequency	50 Hz
(g) Efficiency	At least 95% at full load
(h) Regulation	Less than 4 %
(i) Connection type	All terminals should be provided: i.e. 6 terminals for primary 6 terminals for secondary and 3 taps This should enable use of this transformer in star or delta configuration with both turns ratios.
(j) Core material	CRGO steel for high efficiency



(k) Insulation	Class F with temperature rise limited to Class B
(l) Isolation Voltage (b/w Primary/Secondary)	3000V
(n) (i) The Transformer should be provided with an internal fuses (one per primary winding, i.e. 3 fuses) for overcurrent protection (ii) Tapping must be provided with a Copper Wire for the Secondary sides for the 115V i.e. 50%)	
<b>VI. DC Power Supply</b>	
(b) Connection type	Centralized Master / Slave control
(c) Power rating	Bidder must design for peak load of minimum 5 DC machines running continuously.
(d) Input Voltage Rating	Standard Indian three phase supply with input power factor better than 0.95.
(e) Out Voltage Rating	0-400 V
(f) Efficiency	At least 80% at full load
(g) Regulation	Less than 5 %
(h) Parallel Operation	Master / Slave control configuration
(i) Feature Expansion	It has to support feature expansion with master-slave configuration.
Technical specification	Please refer Appendix 1

### 3.2 Technical specifications for Electrical Machines Accessories

<b>VII. VFD Drive for three-phase Induction machine</b>	
(a) Quantity	15
(b) Input Voltage range	380 - 480
(c) Power kW	3HP Minimum
(d) Control modes	V/f (linear, square law)
(e) Line filter	With integrated line filter for environments according to IEC 61800-3 Category C3/C2/C1
(f) Communication	Modbus RTU/Serial/Ethernet (Optional)

<b>VIII. Electromagnetic clutch (EC)</b>	
(a) Quantity	15
(b) Type	Dry type
(c) Speed	2500 rpm (max)
(d) Torque	30 Nm or better

(e) DC voltage	24V
(f) Engaging Current	2-4 A
(g) Cooling	Natural Air Cooled
(h) The clutch must be operated from the front panel using a key-operated switch.	
(i) The electromagnetic clutch and Propeller shaft with double universal joints coupling covered with a protective safety shield (coupling guard).	

<b>IX. Slotted disc based speed measurement</b>	
(a) Quantity	15*2 = 30
(b) Accuracy	1% or better
(c) Precision	1 rpm or better

<b>X. Resistor load Bank (5 kW Resistive Load bank Single/Three Phase)</b>	
(a) Quantity	15
(b) Element type	Non-inductively wound resistor
(c) Power rating	5 kW continuous duty With cooling fan controlled by on-off switch Fan should be supplied by 230V mains power
(d) Voltage	220V DC, 230 per Phase AC / 415 V Line Voltage with star connection.
(e) Number of steps in each phase	Minimum 6 or better.
(f) Phase	DC/ 1 Phase / 3 phase: Should be configured as three resistors with six terminals all of which should be brought out on a panel on the load.
(g) Frequency	DC / 50 Hz
(h) Terminations	Banana socket of current rating 10 A
(i) Mounting	4x Castor Wheels
(i) it is important that the load bank has to be balanced always (i.e. the resistance is changed equally on all the phases when the selector switch is moved). The 5-position switch used for the load bank must switch all three phases at the same time. It should be able to be used for DC/ 1 Phase loads	

<b>XI. Dimmerstat: Single Phase Dimmerstat</b>	
(a) Quantity	15
(b) Input Voltage	230

(c) Output Voltage	0 - 250
(d) Output Current	10A AC (Minimum)
(e) Power Rating	2.5 KVA (Minimum)
(f) Phase	1 Phase
(g) Frequency	50 Hz
(h) Terminations	Banana sockets of current rating 10 A

<b>XII. Dimmerstat: Three Phase Dimmerstat with wheels</b>	
(a) Quantity	15
(b) Input Voltage line to line (VLL)	400-440
(c) Output Voltage	0 - 500 VLL
(d) Power Rating	5 KVA (Minimum)
(e) Phase	3 Phase
(f) Frequency	50 Hz
(g) Terminations	Banana sockets of current rating 10 A

<b>XIII. Rheostat 500Ω</b>	
(a) Quantity	30
(b) Rating	500 ohms
(c) Voltage Rating	220V AC/DC
(d) Current rating	2 A

<b>XIV. Rheostat 250Ω</b>	
(a) Quantity	30
(b) Rating	250 ohms
(c) Voltage Rating	220V AC/DC
(d) Current rating	10 A

<b>XV. Rheostat 50Ω</b>	
(a) Quantity	20
(b) Rating	50 ohms

(d) Current rating	10 A
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<b>XVI. Moving Coil Voltmeter (0-150/300)</b>	
(a) Quantity	15*3 = 45
(b) Voltage measurement	0-150 / 0 0-300 V
(c) Type	Moving Coil (DC)
(e) Terminations	Banana Female Socket Binding Post Nut Connector

<b>XVII. Moving Iron Voltmeter (0-150/300/600)</b>	
(a) Quantity	15*3 = 45
(b) Voltage measurement	0-150 / 0-300 / 0-600 V
(c) Type	Moving Iron (AC)
(e) Terminations	Banana Female Socket Binding Post Nut Connector

<b>XVIII. Moving Coil Ammeter (0-5/10/20)</b>	
(a) Quantity	20
(b) Voltage measurement	0-5 / 0-10 / 0-20 A
(c) Type	Moving Coil (DC)
(e) Terminations	Banana Female Socket Binding Post Nut Connector

<b>XIX. Moving Iron Ammeters(0-5/10/20/) A</b>	
(a) Quantity	15*3 = 45
(b) Voltage measurement	0-5 / 0-10 / 0-20 A
(c) Type	Moving Iron (AC)
(e) Terminations	Banana Female Socket Binding Post Nut Connector

<b>XX. moving Coil Ammeters (0-1/2/) A</b>	
(a) Quantity	15*2 = 30
(b) Voltage measurement	0-1 / 0-2 A
(c) Type	Moving Coil (DC)
(e) Terminations	Banana Female Socket Binding Post Nut Connector

<b>XXI. Moving Iron Ammeters (0-½ A)</b>	
(a) Quantity	30
(b) Voltage measurement	0-1 / 0-2 A
(c) Type	Moving Iron (AC)
(d) Approved make	AE
(e) Terminations	Banana Female Socket Binding Post Nut Connector

<b>XXII. LPF Wattmeters (75/150/300 V, 1/2A)</b>	
(a) Quantity	18*1 = 18
(b) Voltage ranges	75/150/300 V
(c) Current ranges	1/2 A
(c) Type	LPF Dynamometer
(d) Approved make	AE
(e) Terminations	Banana Female Socket Binding Post Nut Connector

<b>XXIII. LPF Wattmeters (150/300/600V, 5/10A)</b>	
(a) Quantity	18*2 = 36
(b) Voltage ranges	150/300/600 V
(c) Current ranges	5/10 A
(c) Type	LPF Dynamometer
(d) Approved make	AE
(e) Terminations	Banana Female Socket Binding Post Nut Connector

<b>XXIV. UPF Wattmeters (150/300/600V, 5/10/20A)</b>	
(a) Quantity	18*2 = 36
(b) Voltage ranges	150/300/600 V
(c) Current ranges	5/10/20 A
(c) Type	UPF Dynamometer
(d) Approved make	AE
(e) Terminations	Banana Female Socket Binding Post Nut Connector

<b>XXV. Power factor meter (150/300/600V, 5/10A)</b>	
(a) Quantity	18*1 = 18
(b) Voltage ranges	150/300/600 V
(c) Current ranges	5/10 A
(c) Type	Dynamometer
(d) Approved make	AE
(e) Terminations	Banana Female Socket Binding Post Nut Connector

<b>XXVI. Tachometer</b>	
(a) Quantity	15
(b) Ranges	0-3000 RPM
(c) Type	Contact and Non Contact dual type Digital

<b>XXVII. Multimeters</b>	
(a) Quantity	15
(b) Type	Hand held
(c) AC volts (40 Hz to 500 Hz)	Range: 600.0 mV to 600.0 V Resolution: 0.1 mV (600.0 mV), 0.1 V (600.0 V) Accuracy: 3.0 % $\pm$ 3 digit
(d)DC volts	Range: Upto 600.0 V Resolution: 0.1 V (at 600.0 V)

	Accuracy: 0.5 % $\pm$ 3 digit
(e) Resistance ohms	Range: Upto 40.00 M $\Omega$ Resolution : (at 40.00 M $\Omega$ ) Accuracy: 1.5 % $\pm$ 3 digit (at 40.00 M $\Omega$ )
(f) Continuity (audible)	Yes
(g) CAT rating	CAT III 600 V
(h) Auto shutoff	Yes
(i) Approve make	Fluke, Megger, Hioki

### 3.3 Technical Specifications for Work Table and Work Table Instrumentation

#### 3.3.1 Technical Specifications for Work Table

fig.2 shows an indicative design and details of the worktable and worktable instrumentation. Bidders must design and develop details for the table according to the machine configuration and dimensions, in particular, the length of the setup. As the length of the instrument panel is long, the bidder has to plan unutilised space of the instrumental panel for a whiteboard where the student/instructor can utilise it for writing.

**Note :** The setup should be strictly within the dimensions as mentioned in fig 1.2

##### i. Work Table

Quantity = 15

The indicative front view of the worktable instrumentation area is given in fig 3. The structure of Table/desk should be made from steel square tubing. The worktable has a wooden table top and a wooden top shelf. The instrumentation cabinet (wiring area on the backside of the table which is not shown in figure) is made of powder coated steel. Note there should be 60 degrees slanted portion in the lowermost part of the instrumentation panel for machine terminals as shown in fig 2.

Please refer fig.4 to fig.6 for indicative photos of similar setups at other institutions. Note that these are only provided for reference and do not necessarily meet all present criteria.

(a) Length	2400mm or less Maximum length of one setup should NOT exceed 2400mm (approximately 8 feet) under any circumstances.
(b) Total height	Total height of the entire setup (from ground to top shelf) should not exceed 1700 mm
(c) Height of the Top shelf above the working bench	Should be less than or equal to 800 mm from the main working bench.

(d) Depth of top self above panel	350 mm
(e) Main Work surface	900 mm above floor level. Minimum depth of 750mm
(f) Number legs	6 legs
(g) Wooden table top and wooden top shelf must be made of rubber wood or double sided laminated plywood. Table top must be at least 0.75 inch thick, whereas the top shelf must be at least 0.75 inch.	
(h) Powder coated steel tubing for work table structure must have a square cross section of at least 1 inch. Thickness must be 16 SWG or thicker.	
(i) Sheets for the instrumentation cabinet must be powder coated with thickness of 16 SWG steel or thicker.	

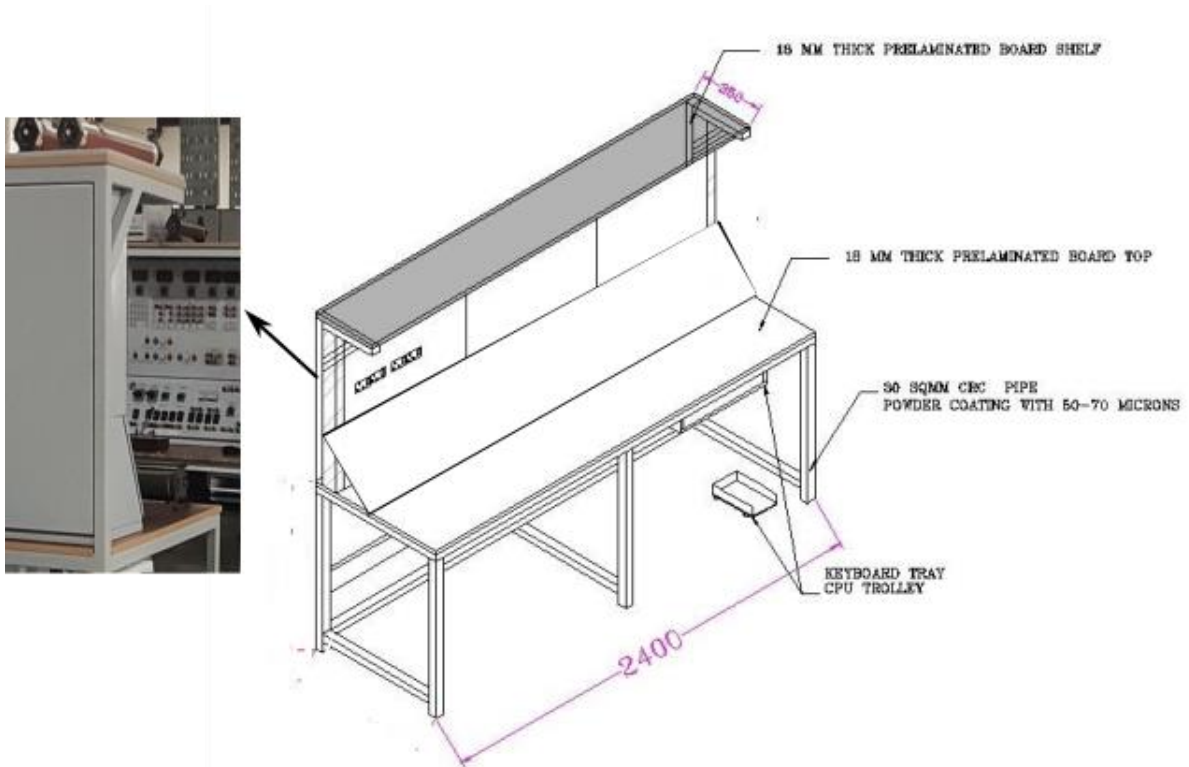


fig 2



### 3.3.2 Technical Specifications Front Panel Instrumentation

Details regarding Front Panel Terminals and Display:

The bidder has to provide 10% extra components that will act as spares for all types/ratings of each of the following: switches, fuses, isolators, indicator lamps, displays, banana sockets, BNC terminals. For indicative front Panel Terminals and Display is shown in fig. 3.

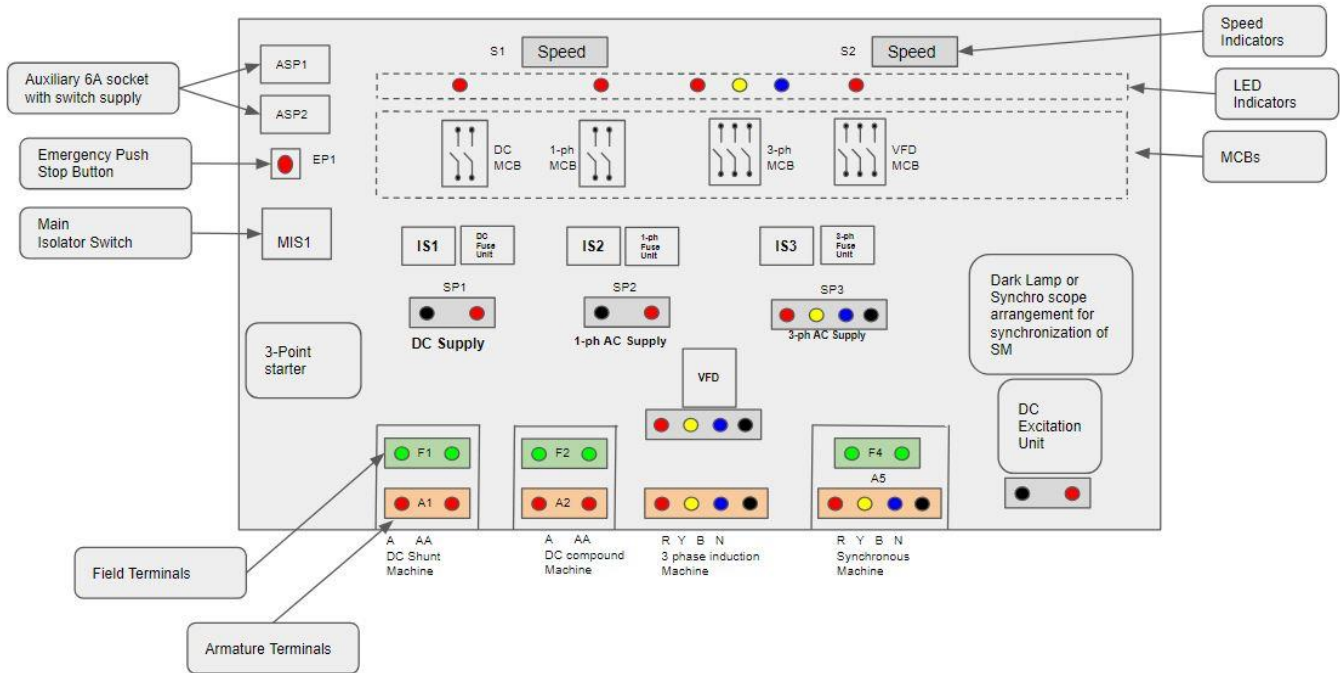


fig : 3

**Note:** i. Proper labeling should be done on the panel to easily identify the terminals. Bidder has to discuss with IITDH and should send the draft layout of the front panel to finalize the layout. Labeling should not be done with stickers.

ii. Out of 15 Induction machines, 5 machines should be of wound rotor type and their rotor terminals should be brought out to the front panel termination box (the same is not shown in fig. 3).

#### (a) Panel Terminals

Sl. No	Item	Quantity and Type
1	DC Shunt machine terminals (A, AA, F, FF)	4 Banana Sockets
2	DC Series machine terminals (A, AA, F, FF)	4 Banana Sockets
3	Three Phase Induction machine terminals (R, Y, B, N)	4 Banana Sockets
4	Synchronous machine terminals (R, Y, B, N, X, XX)	4 + 2 Banana Sockets

5	DC Supply terminals ( + , - )	2 Banana Sockets
6	1- ph AC supply ( P, N )	2 Banana Sockets
7	3-ph AC supply along with neutral (R, Y, B, N)	4 Banana Sockets
8	VFD driver terminals (R, Y, B, N)	3+1 Banana Sockets
9	Dark lamp method terminals along with TPS (RYB, RYB)	3+3 Banana Sockets + Lamp holders
11	Variable DC Excitation unit (0-250V), 2A	2 Banana Sockets
12	Auxiliary 1-Phase supply along with switch	2 Sockets along switch
	Bidder has to provide any other fixturs if required to meet the lab experiments	

Note: All banana female sockets should be minimum of 10 A rating

(b) Display

Item	Quantity and Type
Speed display (S1, S2)	2 quantity and 3 1/2 digit

(c) Other fixtures (per panel)

Item	Number and specification
DC Supply Indicator Lamps	1 (I1)
Single phase Supply Indicator Lamps	1 (I2)
Three phase Single Supply Indicator Lamps	1 (I3)
VFD on/off Indicator	1 (I4)
DC circuit breaker	1 (Depends on machines rating)
1-ph AC circuit breaker	1 (Depends on machines rating)
3-ph AC circuit breaker	1 (Depends on machines rating)
3-ph circuit breaker connected to input VFD	1 (Depends on machines rating)
1-ph Auxiliary power (ASP1, ASP2)	2 (6 A sockets)
DC Isolators (IS1)	1
1-ph AC Isolators (IS2)	1
3-ph AC Isolators (IS3)	1
DC Fuses unit	1 (Depends on machines rating)

AC Fuses unit	1 (Depends on machines rating)
3-ph AC Fuses unit	1 (Depends on machines rating)
Dark lamp method setup (lamp holders setup)	1
Bidder has to provide any other fixtures if required to meet the lab experiments	

(d). Front Panel Wiring Details:

Design of front panel wiring layout should be planned and carried out by the bidder. Before execution of the plan, the plan details need to be sent to IIT Dharwad for approval.

(e). Cables

Entire cable works should be carried out by the bidder with certified electricians from installation to commissioning.

**4. Civil works for mounting of machines**

The bidder will have to take care of the civil works (but not necessarily limited to) in order to mount the electrical machines on CNC machined rails to ensure perfect alignment. These rails should be mounted to the metal frame using anti-vibration mounts. Bidders should account for floor not being uniformly flat and even.

It is the responsibility of the bidder to bring all the materials related to civil works and complete the installation of the machines. IIT Dharwad will not support any kind of materials and man-power in support of the above-mentioned work.

**5. Electrical wiring including proper earthing for machines**

(5.1) IIT Dharwad will provide an incomer of:

i. 415V, 3 phase and 230 V 1-Phase points from Distribution panels on the walls where the bidder has to draw the electrical wires via Trenches under the floor where ever necessary. For DC Supply the bidder has to draw a DC supply line through the trench from the Rectifier units to all the panels. Proper gauge wire should be used depending on load on each setup.

(5.2) The Bidder will have to take care of all other electrical wiring requirements via a certified electrical contractor. Specifically, the following ones but not limited to these:

- i. To draw a DC power supply line to reach each table from main DC Power supply
- ii. Connections from the machines to the instrumentation panels must be routed through a junction box mounted on the machine bed. These connections must use FRLSH wires / unarmored cables from Finolex, Havells or VGuard. These connections must be housed within easily serviceable metal/plastic Ductwork.
- iv. Wiring should not be exposed.

v. The bidder must construct a sufficient number of copper plates based on earth pits as per Indian Standard IS-3043. Copper wire (thicker than 10SWG) must run from the earth pits to an earth-bus located on each machine bed via the floor trenches. Each of the machines and each of the instrumentation cabinets/panels must be connected to this earth bus.

## **6. Installation, commissioning, and maintenance of machines, related instrumentation and accessories**

**Note: Prior to participation in the bidding process or before the last date of bid, the bidder must visit the site and examine the Site of work, its surroundings and obtain all first-hand information of site condition, requirements and possible constraints that are necessary to consider for preparing the tender. Prior permission should be taken for such a visit and the costs incurred for the same shall be borne by the bidder. Nothing extra shall be payable on this account. Participation in the bid without site inspection will lead to technical disqualification.**

6.1 The bidder who meets all the conditions and is approved by the selection committee should set up one complete and functional prototype unit in their own premises as per the specifications herein within a stipulated period of time as mentioned in the quotation, which the bidder has to adhere to. IIT Dharwad has full rights to cancel the bid who did not meet the above mentioned criteria.

### **6.2 Factory Acceptance Test**

(a) The IIT Dharwad team will inspect the setup for safety and fitness. Special importance will be given to the propeller shaft with double universal joints for sturdiness and safety.

(b) The following tests shall be done in the presence of the IIT Dharwad team to verify the working of the overall setup. The necessary set up for experimentation and observations shall be in the scope of the bidder. The bidder must give the test reports of all the machines in the unit conforming to specifications.

- i. No-load, blocked-rotor and load tests on the induction machine.
- ii. DC motor speed-torque characteristics, DC generator characteristics,
- iii. Synchronous machine OC/SC tests, synchronization of the machine to ac grid by Dark lamp or synchroscope, and determination of V and inverted V-curves.
- iv. OC SC and load test on single/three phase transformer
- v. Break test on DC shunt and series motors.

(c) On successful completion of these tests, the prototype shall be type-approved. The bidder shall, for every setup, conduct tests to satisfy themselves of proper operation and certify the completion.

6.3 Care must be taken that all electrical connections between the machines and the instrumentation cabinet, and all wiring within the instrumentation cabinet must be tagged on both ends with a label maker.

6.4 The bidder has to provide the CAD files for the electrical wiring and mechanical setups. The tags used for the wiring of setups must match the labels on the CAD files.

6.5 Final acceptance of all units after delivery, installation and commissioning at IIT Dharwad will be upon successful completion of the above mentioned tests (i, ii, iii, iv, and v) by IIT Dharwad technical staff in the IIT Dharwad machines laboratory and after receipt of proper CAD files and relevant documents. Bidders need to mandatorily follow the above mentioned guidelines, failing which may lead to cancellation of the bid.

6.6 IIT Dharwad engineers will have to be trained by the bidder for 5 days for maintenance of the lab.

6.7 The bidder needs to provide the complete turnkey solution.

6.8 Warranty and support:

The bidder has to provide a minimum of 5 years of warranty and free service

6.9 Entire scope of the work will be carried out by the bidder and IIT Dharwad is not liable to any additional charges or services.

6.10 The bidder needs to plan the movement and shifting of heavy machines and no man power, no other services will be provided from IIT Dharwad during execution of works.

6.11 IIT Dharwad has the right to cancel the bid if found any deviation in abide by the above mentioned points.

## Appendix 1

### Technical Specification of Programmable DC Power supply

S. No	Requirement	Rating / Specification
1.	Input supply	Standard Indian Three phase mains, Star / Delta, 400V <sub>L-L</sub> ±10%, 50Hz, Single Unit
2.	Input frequency	47-63 Hz
3.	Input Power factor	0.9 or better
4.	Output Voltage	0-400 DC
5.	Output Current	Sufficient to run atleast 5 DC machine experiments at full rating continuously
6.	Output Constant Power Mode	Should allow independent setting of the max voltage, current and power.
7.	Foldback	Programmable for automatic changeover between CV & CC modes, or cut-off
8.	Load regulation	Voltage: ± 0.05% of full scale or better Current: ± 0.15% of full scale or better
9.	Line Regulation	Voltage Mode: ± 0.05% of full scale or better Current Mode: ± 0.05% of full scale or better
10.	Ripple on output (rms)	not more than 20mV
11.	Noise on output (peak-to-peak)	not more than 60mV
12.	Load Transient response	shall not exceed 1mS, to recover within 1% of rated output voltage for load step change 50% of rated output Current
13.	Protection	Overload, Current Limit, Output Over Voltage, Over temperature
14.	Operating Temperature & Humidity	0-50 degC & up to 95% RH (non-condensing)
15.	Efficiency	more than 85%
16.	Remote control interfaces	Ethernet (LXI compliant) and RS232
17.	Dimensions	Should be standard Rack mountable
18.	Cooling	Forced air cooling
19.	Settings Memory	The power supply should be able to remember multiple operation setups, which can be recalled during its manual operation
20.	Regulatory & Safety Compliances	IEC/EN 61010-1, EN 61326:1998, must be CE Compliant
21.	Computer software	Vendor shall provide suitable software, and LabVIEW drivers for controlling the power supply from remote computers.
22.	Warranty	5 years
23.	service centre	Bidder should specify OEM India service centre address located in India
24.	Country of origin	Non-China
25.	Others	<ol style="list-style-type: none"> <li>1. Vendor has to provide all the necessary cables, connectors and other items required for the product installation, and required softwares.</li> <li>2. Vendor has to install the product and demonstrate the working.</li> <li>3. Vendor has to provide training on usage on the product.</li> </ol>



Indicative photos of similar setups at other institutions:



fig.4 Side view of the panel



fig.5 front view of the panel

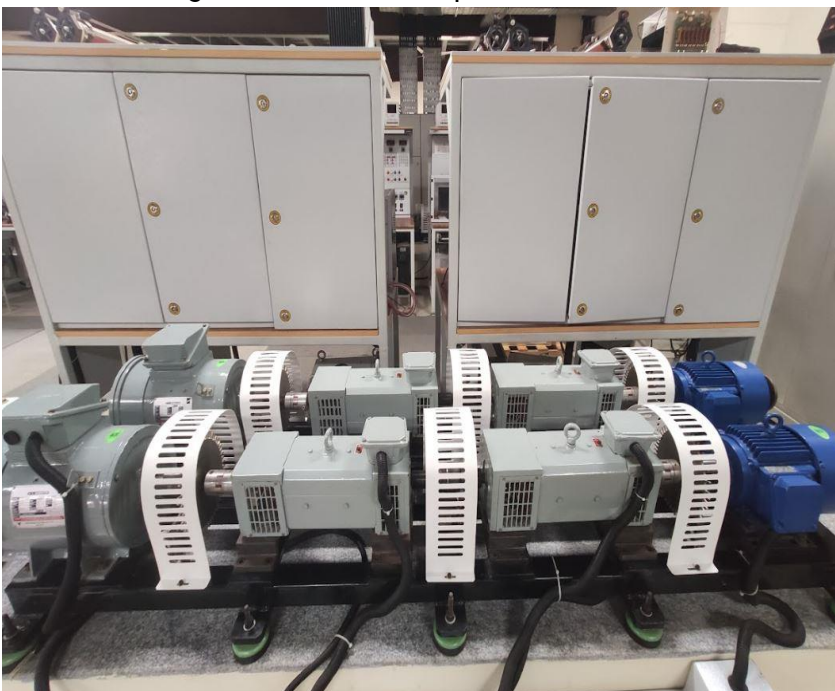


fig.6 back view of the panel

## 6. EOI SUBMISSION ADDRESS

Registrar  
Indian Institute of Technology Dharwad  
Chikkamalligawad Village Dharwad-580007, India



## DRAFT LETTER FOR SUBMISSION OF EOI

From: (The name & Address of the Company)

To,  
The Registrar  
Indian Institute of Technology Dharwad  
Chikkamalligawad, dhArwAD, PIN – 580007  
Email: [mmd.office@iitdh.ac.in](mailto:mmd.office@iitdh.ac.in)

Sub : **Submission of Eoi for SUPPLY AND SETUP OF ELECTRICAL MACHINES  
LABORATORY**

Sir,

Having examined the details given in EOI document for the above work. I/We hereby submit the EOI document and other relevant information.

1. I/We hereby certify that all the statements made and information supplied and accompanying statements are true and correct.
2. I/We have furnished all information and details necessary for pre-qualification and have no further pertinent information to supply.
3. I/We submit the requisite certified solvency certificate and authorise the Authority, to approach the Bank issuing the solvency certificate to confirm the correctness thereof.
4. I/We also authorise the Authority to approach individuals, employers, firms and corporation to verify our competence and general reputation.
5. I/We shall abide by the rules & regulations of the Institute in regard to the selection process of the agency and the final decision.

## **ORGANISATIONAL STRUCTURE**

- 1) Name & Address of the applicant with Telephone  
No. / Fax No. / E mail
  
- 2) a) Year of Establishment  
  
b) Year of commencement of business
  
- 3) Legal status of the applicant (attach copies of  
original document defining the legal status)
  - a) A proprietary firm
  - b) A firm in partnership
  - c) A limited company or Corporation

- 4) Particulars of registration with various Government bodies (attach attested photo- copies)

Organization / Place of registration

Registration No.

i)

ii)

iii)

- 5) Names and Titles of directors' or partners and officers with Designation with organisation chart
- 6) Designation of individuals authorized to act on behalf of the organization.
- 7) Was the applicant required to suspend any project for a period more than six months continuously after commencement of planning? If so, give the name of the project and reasons of suspension of project.
- 8) Has the applicant or any constituent partner in case of-partnership firm, ever abandoned the awarded project before its completion? If-so, give name of the Project and reasons for abandonment.
- 9) Has the applicant or any constituent partner in case of partnership firm, ever been debarred/black listed for competing in any organization at any time? If so, give details.
- 10) Has the applicant or any constituent partner in case of partnership firms, ever been convicted by a court of law? If so, give details.
- 11) In which field does the applicant has specialization and interest?
- 12) Details of Professional tax registration & Income tax return, PAN, Cess details etc.
- 13) Any other information considered necessary but not included above.

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Signature of agency with seal

**FORM – 'B'**

**DETAILS OF SIMILAR PROJECTS COMPLETED DURING LAST FIVE YEARS ENDING 31.03.2017**

SL. NO.	NAME OF PROJECT & LOCATION	DETAILS OF THE PROJECT	OWNER OR SPONSORING ORGANISATION	COST OF PROJECT (CRORES)	DATE OF COMMENCEMENT AS PER CONTRACT	STIPULATED DATE OF COMPLETION	ACTUAL DATE OF COMPLETION	NAME, ADDRESS & TELEPHONE No. OF OFFICER TO WHOM REFERENCE MAY BE MADE	REMARKS
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)

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Signature of Agency with seal

**FORM – 'C'**

**PROJECTS UNDER EXECUTION OR AWARDED**

SL. No	NAME OF PROJECT & LOCATION	DETAILS OF THE PROJECT	OWNER OR SPONSORING ORGANISATION	COST OF PROJECT (CRORES)	DATE OF COMMENCEMENT AS PER CONTRACT	STIPULATED DATE OF COMPLETION	UPTO DATE PERCENTAGE OF PROGRESS OF PROJECT	SLOW PROGRESS IF ANY AND REASONS THEREOF	NAME, ADDRESS & TELEPHONE NO. OF OFFICER TO WHOM REFERENCE MAY BE MADE	REMARKS
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

\_\_\_\_\_  
 Signature of Agency with seal

**FORM – 'D'**

**LIST OF MAJOR / IMPORTANT PROJECTS EXECUCED BY THE FIRM  
 SINCE INCEPTION**

SL. No.	NAME OF PROJECT & LOCATION	DETAILS OF THE PROJECT	OWNER OR SPONSORING ORGANISATION	COST OF PROJECT (CRORES)	DATE OF COMMENCEMENT AS PER CONTRACT	STIPULATED DATE OF COMPLETION	ACTUAL DATE OF COMPLETION	NAME, ADDRESS & TELEPHONE NO. OF OFFICER TO WHOM REFERENCE MAY BE MADE	REMARKS
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)

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Signature of Agency with seal

**FORM – 'E'**

**DETAILS OF TECHNICAL & ADMINISTRATIVE PERSONNEL TO BE DEPLOYED  
FOR THIS PROJECT**

SL. No.	DESIGNATION	TOTAL No.	No. AVAILABLE FOR THIS PROJECT	NAME	QUALIFICATION	PROFESSIONAL EXPERIENCE & DETAILS OF PROJECTS CARRIED OUT	HOW WOULD THEY BE INVOLVED IN THE PROJECT	REMARKS
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

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Signature of Agency with seal

**Annexure -I**

*To be provided on the stationary of the bank*

**Solvency Certificate**  
[Format for Solvency Certificate]

To  
The Registrar  
Indian Institute of Technology Dharwad

**Solvency Certificate**

This is to certify that to the best of our knowledge and information, M/s..... (address) ..... a customer of our bank is respectable and be treated as good for an engagement up to a sum of Rs..... (Solvency amount) ..... only as on..... (Date of Certificate).

This Certificate has been issued without any risk and responsibility on the part of the Bank or any of its officers. This certificate is issued at the specific request of the customer.

Yours Sincerely,

For..... Bank

Signature of Bank Officer  
Designation  
(with seal)



### **DETAILS OF PRE-BID MEETING**

To clarify the issues/queries raised by interested firms and to facilitate in submission of bids, the pre-bid meeting would be held as follows:

Place	Time	Date
Machines lab, Room No. 012 Ground Floor, CIL Building, IIT Dharwad, Chikkamalligawad Village, Dharwad-580007	9.30 am to 04.00 pm	23/02/2024

### **PROCEDURE FOR SUBMISSION OF RESPONSE TO THE EoI**

The hard copy of the response to the EoI should reach IIT Dharwad on or before 22/02/2024 by 11.00 hrs on the following address:

Registrar, IIT Dharwad  
Indian Institute of Technology dhArwAD  
Permanent Campus, ChikkamalligawAD,  
dhArwAD – 580 007, KarnATaka

Or can be forwarded by e-mail at [mmd.office@iitdh.ac.in](mailto:mmd.office@iitdh.ac.in) on or before 22/01/2024 by 11.00 hrs.

Or through CPP portal.

For any queries, you may reach us at [mmd.office@iitdh.ac.in](mailto:mmd.office@iitdh.ac.in)

Please acknowledge the receipt of this invitation for EoI

Sd/-  
(Registrar, IIT Dharwad)