Ref No.: SMR/TID/EOI/2021-22/01

EOI FOR MAGNETIC RESONANCE IMAGING (MRI)

EOI Date: 8th March 2022
Due Date: 21st April 2022

INVITATION OF EXPRESSION of INTEREST

For

ENGAGING INDIAN INDUSTRIES FOR MANUFACTURING OF MAGNETIC RESONANCE IMAGING (MRI) MACHINE

From

PRE-BID MEETING-I
Date: 29th March 2022
Time:
Venue: SAMEER, Mumbai

PRE-BID MEETING-II
Date: 12th April 2022
Time:
Venue: SAMEER, Mumbai

Society for Applied Microwave Electronics Engineering & Research (SAMEER), Mumbai

Contents

Expression of Interest

Society for Applied Microwave Electronics Engineering & Research, Mumbai (SAMEER herein after referred as "Authority-1") invites proposal for the purpose of ENGAGING INDIAN INDUSTRIES FOR CONVERTING VARIOUS TECHNOLOGIES INTO COMMERCIAL PRODUCTS AND INTEGRATING IT TO MANUFACTURING MAGNETIC RESONANCE IMAGING (MRI) from reputed Private / Public sector units (An Indian registered legal entity) with relevant experience preferably in the field of Radiology/High end medical equipment. The Bidders are required to submit their 'Expression of Interest' as laid down in this document. The EoI documents will be available on official website of SAMEER (www.sameer.gov.in), MeitY (www.meity.gov.in), CDAC (www.cdac.in) and IUAC (www.iuac.res.in), and also on https://eprocure.gov.in.

Acronyms:

Abbreviation	Description
EoI	Expression of Interest
GoI	Government of India
MeitY	Ministry of Electronics & Information Technology
SAMEER	Society for Applied Microwave Electronics Engineering and Research
MRI	Magnetic Resonance Imaging
EMD	Earnest Money Deposit
PDF	Portable Document Format
NSC	National Steering committee
TRAC	Technical Review And Advisory Committee
FPGA	Field Programmable Gate Arrays
PSD	Pulse Sequence decoding
GUI	Graphical User Interface
CFBCA	The committee formed by the competent authority
SI	System Integrator
SM	System Manufacturer
IEC	International Electrotechnical Commission
BIS	Bureau of Indian Standards

Chapter 1 - About this EoI

1.1. Introduction

Society for Applied Microwave Electronics Engineering & Research (SAMEER)

SAMEER is an autonomous R&D institution under Ministry of Electronics & Information Technology (MeitY), Government of India. In its five centers located at Mumbai, Chennai, Visakhapatnam, Guwahati and Kolkata, SAMEER pursues application-oriented research and development activities in the areas of Medical Linear Accelerator, RF and Microwave systems, Photonics, EMI/EMC Engineering, Antenna and Electromagnetics, Communications, Thermal Engineering, Radar Based Atmospheric Instrumentation and related software. SAMEER with focus on application-oriented R&D undertakes projects, customized product development and design consultancy in these specialized areas.

SAMEER in collaboration with other Indian Scientific Organizations is developing the first Indian Magnetic Resonance Imaging (MRI) Machine. SAMEER and its collaborating institutes have developed all the required sub-modules namely, Coil, FPGA Spectrometer, 16kW Amplifier, Pulse sequence generation module, GUI consisting of Image Reconstruction Module and Image virtualization Module. All these sub-components are tested and integrated with a procured 1.5Tesla Super-conducting Magnet along with Gradient Coil and images have been obtained from the integrated system. The fine tuning of images for different pulse sequences is going, which will be followed by animal trials. The mission of Indian MRI is developing MRI and its sub-components in India under the Prime Minister's Atma Nirbhar Bharat initiative of Govt. of India. The encouragement, and the positive feedback from eminent Radiologists across India has enthused SAMEER and its collaborating partners to take up the challenging task of making more such MRI sub-components through industry partnership and cater to country's need. Also the growing need of MRI scans and the high rate of cost per scan make the Indian MRI machine and its sub-modules production an urgent necessity.

SAMEER took up the challenge of making Indian MRI in 2015 and along with its partners developed various subsystems of the MRI machines. These sub-modules are also reviewed by international experts and the suggestions and valuable feedback given by the experts is also incorporated in the sub-modules. The main MRI magnet system is currently under development once it is developed, all the sub-modules will be integrated with it to have full-fledged Indian MRI Machine. Although, various crucial components of the superconducting MRI magnet and zero-boil-off 4K cryostat have been designed, developed and thoroughly tested at their operating condition. The MRI Magnet system is at the advanced stage fabrication and expected to be ready by this year or by Aug, 2022.

After completion of the fabrication, it will be integrated with its sub-modules and necessary testing will be done. SAMEER is also working on integrating the developed sub-components with a Magnet for extremities.

SAMEER, along with its collaborating partners i.e. Inter University Accelerator Centre (IUAC), New Delhi, Centre for Development of Advanced Computing (CDAC) Trivandrum & Kolkata centers is inviting Indian Industries to participate in developing a commercial model of MRI and setting up an eco-system for manufacturing Indian MRI to fulfill our country's need as well as create export markets for Indian MRI. SAMEER has already established an MRI Laboratory at SAMEER Powai center.

1.2. General Instructions and Important Dates

i. Bidding agencies are advised to study this EoI document carefully before submitting their proposals in response to the EOI Notice. Submission of a proposal in response to this notice shall be deemed to have been done after careful study and examination of this document with full understanding of its terms, conditions and implications.

ii. EoI shall be published on website www.eprocure.gov.in and on SAMEER website (www.sameer.gov.in) as well as CDAC (www.cdac.in), IUAC (www.iuac.res.in) and MeitY (www.meity.gov.in) website.

iii. Corrigenda: Corrigenda, if any to this EoI will be published on SAMEER (www.sameer.gov.in) as well as CDAC (www.cdac.in), IUAC (www.iuac.res.in) and MeitY (www.meity.gov.in) website. The bidders are advised to check any of these websites, before submitting the bid.

i. Even though the EOI will be published on CDAC, IUAC and MeitY websites, the bids should be submitted to SAMEER only by dropping it in the Tender Box.

ii. Bids dropped at CDAC, IUAC and MeitY will not be considered.

iii. Bids received via e-mail, fax and Late Bids will not be considered.

iv. Unsuccessful bidders will not be formally informed of the result of their bid.

v. This EoI document is not transferable.

vi. The response to this EoI should be full and complete in all respects. Failure to furnish all or correct/adequate information required by the EoI documents or submission of a proposal not substantially responsive to the EoI document in every respect will be at the bidder's risk and may result in rejection of its Proposal.

vii. Bidders interested in participating in pre-bid meetings must communicate about their participation at least two (2) working days before by e-mail. The information regarding persons participating in pre-bid meeting and their details should be communicated. The participants should carry letter of authorization from the company stating that they are authorized to attend the

pre-bid meeting on behalf of the company. Looking into COVID-19 pandemic, maximum two (2) persons per bidder will be allowed to take part in pre-bid meeting. The participants must strictly follow COVID-19 guidelines issued by the authority or by the GOI / State Government(s) during pre-bid meeting. In case number of participants exceeds the limit, pre-bid meeting may be arranged in staggered time/hours or as required by COVID protocols in effect at that time.

viii. Jurisdiction : Mumbai

Tentative Schedule		
1.	EoI Release Date	8th March 2022
2.	Last date for submission of written queries for clarifications for first pre-bid meeting	22nd March 2022
3.	Date of 1st pre-EoI meeting	29th March 2022
	Date of 2nd pre-EoI meeting	12th April 2022
4.	Last Date (Deadline) for submission of Bids	21st April 2022
5.	Opening of responses: Pre-Qualification Bids	22nd April 2022
6.	Contact person for queries	Tapas K. Bhuiya Scientist-E, Technology Innovation Division, SAMEER, Mumbai 400076 E-mail : tapas@sameer.gov.in
7.	Email Address for all Bid Correspondence	tapas@sameer.gov.in
8.	Addressee and Address at which proposal in response to EoI notice is to be submitted	The Purchase Officer, SAMEER IIT CAMPUS POWAI MUMBAI 400076
9.	EoI document fee (Non-refundable and Not exempted)	INR 5000/- by DD There will not be any 'EoI document Fee' if tender document is downloaded from the on-line portal.
10.	EoI document may be downloaded from websites www.sameer.gov.in, www.meity.gov.in , www.cdac.in and www.iuac.res.in and also from www.eprocure.gov.in	

Chapter 2 - Terms of Reference

2.1. Objective of the EoI

INDIAN MAGNETIC RESONANCE IMAGING MISSION has been initiated by Ministry of Electronics and IT (MeitY), Govt. of India for the development of Indian MRI for the people of our country. SAMEER along with its consortium partners has developed various sub modules of the machines which includes RF Coils, High Power RF Amplifier, FPGA based Spectrometer, Pulse sequence generator module, GUI consisting of Image Reconstruction module and Image visualization module. The 1.5 T Superconducting magnet is in the stage of fabrication and likely to be ready in next 12 months. Meanwhile, SAMEER has procured 1.5T Super-conducting Magnet with Gradient Coil and successfully integrated all the subsystems developed by SAMEER & CDAC. The images of phantoms and vegetables & fruits have been acquired from the system and demonstrated to the expert committee. After completion of the integration, the animal and human trials have been planned.

SAMEER along with its collaborators is planning to engage Indian Industries to develop engineering model of various subsystems as well as 1.5T MRI and create eco-system for manufacturing of MRI to meet the needs of our country as well as create export market for the same.

SAMEER along with its collaborating partners IUAC, CDAC (T&K) seeks proposals from bidders to participate in achieving the phase wise objectives as mentioned in the following paragraphs. This EoI will be awarded according to the Bid evaluation procedure. The bidder/s, who have successfully completed phase I, will only be considered for licensing for manufacturing of the subsystems and MRI. In phase II, the magnet being developed under IMRI programme will be offered to Bidder/s, who are interested in manufacturing. The magnet manufactured by them will be given to Bidder/s, who are already in process of building MRI with procured magnet and successfully completed manufacturing of MRI, to integrate the magnet with other subsystems to build completely manufactured Indian MRI.

2.2. Scheme of engaging Industry to achieve National Mission of building 1.5 T MRI and manufacturing in India.

i. Magnetic Resonance Imaging technology is a state of art non-invasive technologies to create 3-D images of human body parts with a very small slice thickness. It is a very complex system and involves various technologies to work to its strict specifications and also in sync with each other. It involves:

- 1.5 T Super-conducting Magnet with all its accessories & electronics
- Gradient System Coil & Amplifier
- High power RF Amplifier
- Various RF Coils and Front end system
- RF Spectrometer
- Integrated control system
- Patient couch
- Precision Mechanical Engineering
- Sophisticated Software for Pulse Sequence Generation, Image Reconstruction and Visualization including Graphical User Interface
- Integration of complete system to create clinically acceptable image

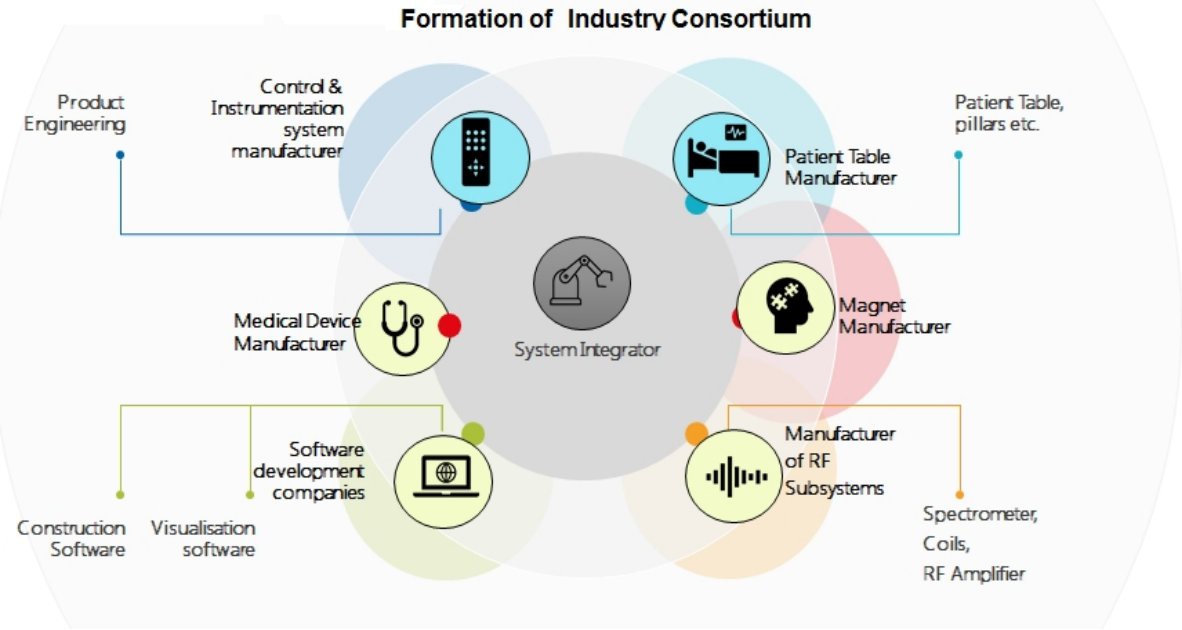
ii. In view of the same, it is proposed to have proposal from

- Subsystem manufacturers (SM) for manufacturing the sub systems.
- System Integrator (SI) for building the complete MRI

OR

System Integrator (SI) having his own consortium. In such case, the SI to submit the proposal on his and SM's behalf for building complete MRI and manufacturing of the sub-systems.

A representation is given in figure 1 below.



The Bids can be submitted by

1. Subsystems Manufacturers (SM)

Manufacturing of subsystems such as Magnet with Gradient system, RF Subsystems such as Coils, RF Amplifier and Spectrometer, Control & Instrumentation and develop software products relating to MRI.

2. **System Integrator (SI) alongwith SM as Consortium Partners**

Medical Device manufacturers having domain knowledge about the market requirement; infrastructure for manufacturing; installing & maintaining systems at hospitals.

iii. The execution of manufacturing of MRI by Industry will be done in two (2) phases.

1. **In Phase I:** SAMEER, along with collaborating institutions, will engage with interested Subsystem Manufacturers as well as System Integrators to manufacture different subsystems, integrate it with procured magnet and Gradient coils/Amplifiers. The system integrator has to arrange the Magnet, Gradient coil and Amplifier as per the specification given in the chapter 3. The subsystems manufactured under this agreement need to qualify relevant standards. The integrated MRI system will also be tested as per BIS standards. The system integrator will have to install this MRI at one of the government hospitals for further feedback and validation of the system.

   Note: A SI can come with his own consortium or Independent /standalone sub-system manufacturer(s) can also participate in the bidding process. Such sub-system manufacturer will be introduced to the System integrator in a later date and can become part of the consortium led by SI.

2. **Phase II** - In Phase 2, once magnet is developed, tested successfully and manufactured by Indian manufacturer, the procured Magnet system will be replaced by an indigenously developed system.

   Note : Refer 2.3.2 (a) for more details

2.3. Scope of work

2.3.1.The Bidder

(Bidder used interchangeably for Transferee/ Developer/ Manufacturer)

Extent of Work for Subsystem Manufacturers:

1. To develop/manufacture subsystems as per the design and to meet the specifications provided by SAMEER/CDAC/IUAC.
2. To satisfy Safety Standards & QA/QC provisions of IEC/BIS and any other related National and International standards.
3. In Phase 2- To developed 1.5T superconducting magnet as per the specification provided by IUAC. The SI will have to invest the infrastructure for the same.
4. To market MRI sub-systems both in India and abroad.
5. To service and maintain the MRI sub-systems at the end users site.

Extent of Work for System Integrator:

1. To create consortium of industries consisting of SM for developing marketable subsystems and also manufacture MRI Machine based on the technical knowhow provided by SAMEER/CDAC/IUAC.
2. In phase 1, system integrator to inform SAMEER and collaborating agencies which subsystem manufacturer/s will be interested in manufacturing magnet. Such sub-system manufacturer will be immediately linked to IUAC in phase 1 and will be required to participate in magnet manufacturing process in phase 2.
3. To establish an eco-system for manufacturing capabilities for MRI.
4. To obtain required approvals from the appropriate authorities to establish and make market acceptable MRI.
5. To integrate various sub-systems of MRI machine at the user Hospitals / Medical Research Centers, located in India and abroad.
6. To establish MRI Quality Assurance and Quality Control (QC) facilities to ensure compliance of the manufactured sub-systems to Safety Standards & QA/QC provisions of IEC and any other related National and International standards.
7. To upgrade the proposed manufacturing facility from time to time as per internationally acceptable guidelines/ benchmarks.
8. To offer comprehensive after sales service including troubleshooting (both online and offline via telephonic and email based support with minimum downtime) comprehensive maintenance and assured supply of spare parts for ten (10) Years.

2.3.2. The Roles and Responsibilities of SAMEER,

Collaborating partners CDAC (T&K), IUAC and SM and SI:

a) Role of SAMEER and collaborating agencies

a. To get engaged with industry, which are interested in developing different subsystems, for developing engineering model using technical knowhow generated for developing prototype of different subsystems and complete the quality assurance requirement of the sub-system.
b. To engage with system Integrator to develop a marketable 1.5 T MRI.
c. The available facility of established MRI Laboratory at SAMEER's Powai campus will be made available to the industry for testing of different subsystems for its performance.
d. SAMEER will also facilitate the industry for getting RF sub-systems approved as per IEC standards for its electrical as well as safety standards developed by them.
e. Provide full support to make the entire venture successful especially during the integration phase as it would necessitate multidisciplinary proficiency.
f. CDAC will provide training on the uses of software and also provide complete support for testing and validation of software with IMRI system as well as other platform.
g. In the Phase -I, IUAC would provide necessary training to the successful bidders i.e. the subsystem manufacturer interested in magnet manufacturing. The training includes lectures on the basic design methodologies, operational concepts, functionalities of all components of the 4K magnet system, development process, integration and test methodology, of various components/techniques of the whole-body superconducting MRI magnet system. The training to the successful bidder would be provided through non-disclosure agreement between the IUAC and the bidder. In addition, the successful bidder may actively participate into the ongoing activities of the final stage of the IMRI magnet development program till its testing at IUAC-Delhi/SAMEER-Mumbai. The expenses for such training need to borne by the bidders.

   In the Phase-I, IUAC would provide necessary technical support to the system Integrator in handling the Superconducting MRI magnet. If needed, IUAC would provide necessary training to the successful bidders i.e. the system integrator for the operation of the magnet. The training includes lectures on basic concepts of the magnet and its cryogenic system, operational aspects of the whole-body superconducting MRI magnet system. Necessary training on

cryogenics can also be given to the system integrator.

h. In the Phase -II, IUAC would work with hand-in- hand with the magnet manufacturer to build the magnet in-house in the factory. IUAC would provide all technical details necessary for building the magnet to the bidder for magnet manufacturing. The technical details related to IMRI magnet would be shared through NDA between IUAC and the magnet manufacturer. The expenses for TA/DA would be provided by the magnet manufacturer.

b) Role of SM / SI

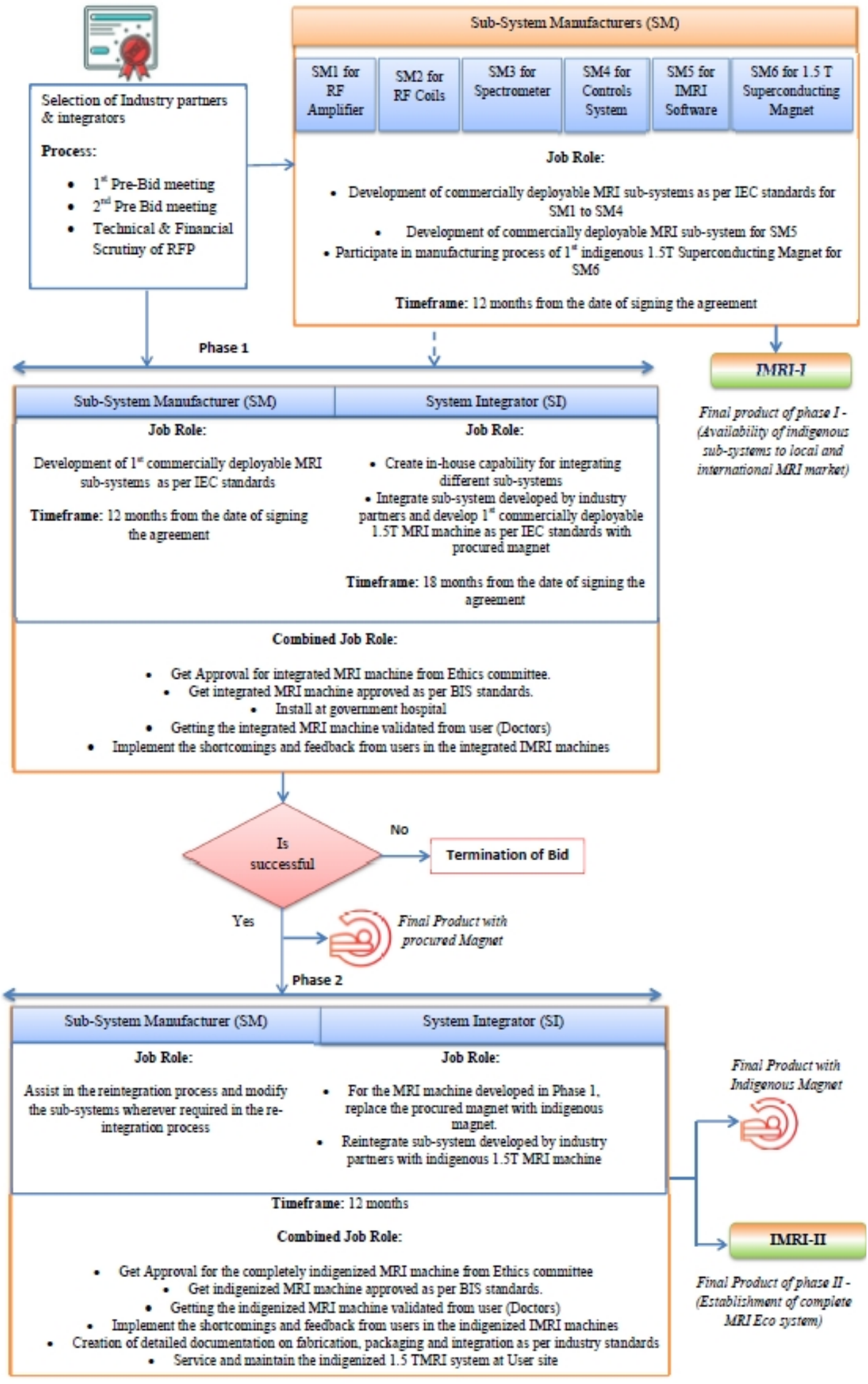
a. The Subsystem Manufacturer as a part of the consortium or independent is expected to develop one model of the 'regulatory approved' commercially deployable MRI subsystem/s within 12 months from the date of signing the agreement.
b. The System integrator is expected to develop one model of the 'regulatory approved' commercially deployable 1.5 T MRI within 18 months from the date of signing the agreement with the procured magnet and gradient system and integrating other hardware & Software developed by the consortium partners in the phase-1.
c. The integrator will be required to create in-house capabilities for integrating different subsystems, packaging and testing the complete MRI to its specifications.
d. The SI and SM will install the machine in government hospital. The shortcomings of the product will be overcome and the product developed by SI and SM will be improved.
e. The MRI system once built needs to be approved by ethics committee as well as BIS standards before installation at hospital. Once the MRI is installed at hospital, the doctors will validate the MRI system. (Support for BIS standards as and when required will be provided by SAMEER)
f. The selected Bidder/s is expected to prepare detailed documents of fabrication, development & testing of various sub-systems for getting quality approval. The selected Bidder should prepare the final documentation as per industry standards.
g. In the Phase-I, the successful bidder for the magnet manufacturing may avail the training from IUAC on the design concepts, basic design of MRI magnet system, operational concepts, technology involved, testing process etc.

   The bidder can also initiate the development of the new unit of magnet system along with the necessary training (in Phase I) of the magnet manufacturing as the magnet design has already been vetted by the foreign experts of MRI magnet and most of the major components of the IMRI magnet has been developed and tested and

at the final stage of assembly at the rated condition. This will expedite the development process of the new unit of MRI magnet system.
Or the bidder can start the development process after the successful testing of the IMRI magnet. Bidder can participate in the final stage of assembly process and testing of the IMRI magnet.

h. In the Phase-II, once magnet is developed, tested successfully and manufactured by the Indian manufacturer, the procured Magnet system will be replaced by indigenously developed system by system integrator. The progress of the work shall be reviewed periodically.

A schematic of the process in given in Figure 2 below.


Selection of Industry partners & integrators
Process:
1st Pre-Bid meeting
2nd Pre Bid meeting
Technical & Financial Scrutiny of RFP
Sub-System Manufacturers (SM)
SM1 for RF Amplifier
SM2 for RF Coils
SM3 for Spectrometer
SM4 for Controls System
SM5 for IMRI Software
SM6 for 1.5 T Superconducting Magnet
Job Role:
Development of commercially deployable MRI sub-systems as per IEC standards for SM1 to SM4
Development of commercially deployable MRI sub-system for SM5
Participate in manufacturing process of 1st indigenous 1.5T Superconducting Magnet for SM6
Timeframe: 12 months from the date of signing the agreement
Phase 1
IMRI-I
Final product of phase I - (Availability of indigenous sub-systems to local and international MRI market)
Sub-System Manufacturer (SM)
System Integrator (SI)
Job Role:
Development of 1st commercially deployable MRI sub-systems as per IEC standards
Timeframe: 12 months from the date of signing the agreement
Job Role:
Create in-house capability for integrating different sub-systems
Integrate sub-system developed by industry partners and develop 1st commercially deployable 1.5T MRI machine as per IEC standards with procured magnet
Timeframe: 18 months from the date of signing the agreement
Combined Job Role:
Get Approval for integrated MRI machine from Ethics committee.
Get integrated MRI machine approved as per BIS standards.
Install at government hospital
Getting the integrated MRI machine validated from user (Doctors)
Implement the shortcomings and feedback from users in the integrated IMRI machines
Is successful
No
Termination of Bid
Yes
Final Product with procured Magnet
Phase 2
Sub-System Manufacturer (SM)
System Integrator (SI)
Job Role:
Assist in the reintegration process and modify the sub-systems wherever required in the re-integration process
Job Role:
For the MRI machine developed in Phase 1, replace the procured magnet with indigenous magnet.
Reintegrate sub-system developed by industry partners with indigenous 1.5T MRI machine
Timeframe: 12 months
Combined Job Role:
Get Approval for the completely indigenized MRI machine from Ethics committee
Get indigenized MRI machine approved as per BIS standards.
Getting the indigenized MRI machine validated from user (Doctors)
Implement the shortcomings and feedback from users in the indigenized IMRI machines
Creation of detailed documentation on fabrication, packaging and integration as per industry standards
Service and maintain the indigenized 1.5 TMRI system at User site
Final Product with Indigenous Magnet
IMRI-II
Final Product of phase II - (Establishment of complete MRI Eco system)

Other Terms & Conditions:

c) All the SM as well as SI consortium will have to sign/execute a Non-Disclosure Agreement Clause with SAMEER/Partner Institutes (IUAC, CDAC-T/K) based on the interest in subsystems/MRI.

d) The SI consortium will sign a MoU amongst themselves and submit the executed copy of the same to SAMEER as a part of Bid document.

2.3.3. Eligibility *Criteria for Industry*

S. No.	Criteria	Documentary proof to be submitted
1	An applicant (referred to as "bidder") shall be a Limited Liability Partnership registered under the LLP Act or a Company incorporated and registered in India under the Companies Act, 1956 or Partnership firm under the Indian Partnership Act, 1932. Certification by chartered Accountant for minimum of Fifty one percent shareholding by Indian entities is to be furnished. The LLP/Company/partnership firm should be operational in India for at least last five (5) financial years as of 31st March, 2021 as evidenced by the Certificate of Incorporation issued by the Registrar of Companies, India.	Documents in the format as mentioned in Annexure B6
2	The bidder should have an annual turnover of **INR 25.0 crores** or more in case of System Integrator and INR 5.0 crores or more in case of subsystem manufacturer during each of the last three (3) financial years ending 31st March 2021 as evidenced by the audited accounts of the company.	Documents in the format as mentioned in Annexure B8
3	The bidder should have a positive net worth for the last three (3) financial years ending 31st March 2021 as evidenced by the audited accounts of the company. Net worth is defined as sum of shareholders capital and Reserves & Surplus	Documents in the format as mentioned in Annexure B8

4	The Subsystem manufacturers (Bidder) should have minimum five (5) years of manufacturing experience in building similar systems. The System Integrator along with his consortium partner should have executed work related to manufacturing, supply and maintenance of medical devices during the last five (5) financial years.	Documents in the format as mentioned in Annexure B9
5	The bidder should possess ISO 9000/9001 /13485 or equivalent certified.	Copy of valid certificates
6	Firms/ Companies may enhance their qualifications/ competence by forming a Consortium with other firms/companies. It is clarified that in case of Consortium, the Lead Bidder should be System Integrator and shall be a firm established in India or a Company incorporated in India	Copy of Power of Attorney with clear roles & responsibilities and defining joint and several liabilities and Consortium Agreement
7	The bidder shall not have been blacklisted by or entangled in legal disputes with Central Government or any State Government Organization / Department PSU in India at the time of submission of the Bid.	Documents in the format as mentioned in Annexure B7
8	The Bidder should have adequate manpower, infrastructure to carry out the work which they are proposed to undertake.	Manpower strength i. Technical; ii. Non-technical at various levels to be furnished.
9	The System integrator/Subsystem Manufacturer should have adequate inspection and Quality control facilities.	The list of equipment available to be furnished.
10	The System Integrator should have service engineers /adequate manpower at all times to attend service calls for the subsystem or MRI.	The details of this are to be furnished
11	The System Integrator should have well-established sales, aftersales, service, maintenance and marketing network.	The details of this are to be furnished

2.3.4. Financial Terms and Conditions:

i. During Phase-1, SM and SI consortium are expected to develop engineering model of hardware subsystems and MRI machine. The expenses towards components, fabrication, assembly and quality approval will be taken care by them.
ii. System Integrators are required to have requisite infrastructure where MRI would be integrated and tested. MRI, once manufactured, needs to be approved by ethics committee as per the BIS standards before installation at hospital.
iii. The installation and maintenance for the field trial of MRI developed under this program will be the responsibility of SM and SI. SAMEER and its collaborating partners will provide complete technical support to make initiative successful.
iv. The travel related expenses towards Scientists & Engineers from SAMEER/CDAC/IUAC during the development phase will be borne by the Industry.
v. Once the MRI is installed at hospital and the validated by doctors, SAMEER along with its collaborating partners and SM and SI will sign licensing agreement for manufacturing 1.5 T MRI machine and manufacturing of various subsystems and uses of software with mutually agreed terms and conditions.

2.3.5. Support of Government

i. Indian Technology – **(a) Support R&D, (b) Innovation & entrepreneurship, (c) setup CoEs etc.**

(a)Support R&D

Under the **Medical Electronics and Health Informatics Programme**, Ministry of Electronics & Information Technology (MeitY) is encouraging to use innovation and new technologies to develop new systems as well as to bring down the costs of healthcare technology, and make it more accessible.

The broad thrust areas includes Medical and imaging equipment including MRI, Electronic health records and online courseware in health informatics, Decision support systems, Infrastructure for training and the maintenance of medical electronics equipment, Establishing a Centre of Excellence for R&D in medical electronics, assistive technologies and independent living aids etc.

One of the complex and crucial technology for improving healthcare that is development of MRI has been undertaken by MeitY to develop 1.5 tesla MRI system. It has been proposed to Govt of India to reimburse the expenses towards, components/Subsystems being utilized for the development of MRI once the

same is demonstrated successfully. The proposal is under active consideration and if the same is approved, the successful bidder will be informed.

(b) Innovation & entrepreneurship

Ministry of Electronics and Information Technology has also implemented specific schemes to boost innovation and start- ups by providing financial assistance to Institutions of Higher Learning to strengthen their Technology Incubation Centres, to MSMEs and Tech startups for international patent filing etc. MeitY is also **setting up Incubators,** Entrepreneur Parks focused on specific technology sectors including **Medical Electronics, Fabless chip design etc.**

To promote tech entrepreneurship, **Technology Incubation & Development of Entrepreneurs (TIDE 2.0)** scheme has been launched to provide technical and financial support to incubators engaged in handholding ICT start-ups using emerging technologies to address societal challenges in pre-identified areas of national relevance.

The Scheme will be implemented through empowering 51 incubators and handholding close to 2000 tech start-ups over a period of 5 years.

(c) Incubation Centres and CoEs

In addition, MeitY is setting-up Centres of Excellence in specific domains including Medical Technology. So far, around 25 CoEs in various domains including medical have been setup.

Objective is to promote innovation and entrepreneurship with the aim to identify, nurture and translate technological ideas and innovation in the broad area of ESDM sector with a focus in Medical Electronics i.e. Micro Electro Mechanical Systems (MEMS: Lab on Chip), Low Cost Medical Diagnostic System, Low Cost Ultrasound, Electronic Device Reliability and Medical/Industrial X-ray Tubes, Medical Telemedicine related Electronic products. PCB designing & manufacturing lab, testing & calibration lab, mechanical packaging & product prototype lab and RF sputtering unit (with clean room facility) has already been installed in the IC and functional

This incubation centre is being set up in area of 3000 sq meters constructed space with state of the art facilities designated for ESDM incubation.

Centre of Excellence (CoE) on Medi-Electronics & Health Informatics at Lucknow

To stimulate the establishment and growth of technology-based start-ups in the

field of medical electronics and health informatics by providing the necessary infrastructure, mentoring, marketing, funding and eco-system required for their success and growth.

The Medi-Electronics & Health Informatics CoE is being setup at SGPGI, Lucknow with Department of IT and Electronics, UP Govt. as funding partner, **AiMED as industry partner, AMTZ** as industry and seed funding partner and **Kalam Institute of Health Technology as academic partner.** The project aims to support 50 start-ups over a period of 5 years.

ii. Heavy reliance on import and lack of pro-manufacturing infrastructure – **Promote manufacturing "Expand & Export"**

Efforts are being made to take the technology developed under not only in IMRI but in other projects also to market. Towards this, I would also like to highlight that **Promoting electronics manufacturing** in India has been a key element of Digital India. Three new schemes namely **PLI, SPECS and EMC 2.0 under National Policy on Electronics 2019** have been launched to further boost electronic manufacturing in the country, offset the disabilities faced by industries, develop a robust electronics manufacturing ecosystem, utilize the opportunities arising from disruption in global supply chains due to pandemic, and establish India as a global leader in electronics manufacturing. The total budget outlay is of INR 50,000 Crore, the expected benefit of these schemes will be an incremental manufacturing of INR 15 Lakh Crore (including exports worth 10 Lakh Crore over next 5 years). These schemes will not only increase the local value addition, but is also expected to provide employment to more than 10 Lakh.

iii. Preferential Procurement Policy

Once the MRI developed indigenously and successfully demonstrated for its performance, MeitY will provide support to SM and SI for preferential procurement by Govt Hospitals.

Chapter 3 – Specifications and Technical details

3.1. Technologies involved

A brief description of the technologies involved in making Magnetic Resonance Imaging (MRI) sub systems is given below. SAMEER, CDAC and IUAC has developed and established the technological expertise listed below that is required for the design and manufacturing of MRI subsystems.

i. RF Technology: The RF components under control of the operators console are the radio frequency source and pulse programmer. The source produces a sine wave of the desired frequency. The Pulse programmer shapes the RF pulses into sinc pulses. High powers RF Power Amplifier are vital parts of MRI systems. The RF power required for the MRI system varies based on the magnetic field of the system. For 1.5T MRI requires approx. 72 dBm. Development of RF Amplifier system for MRI has to full fill a stringent requirement like power stability, linearity, droop etc.
Another important RF component in an MRI Scanner is RF Coils. A RF coil consists of one or more loops of conductive wire, looped around the core of the coil. Coils are part of the hardware of MRI machines and are used to create a magnetic field or to detect a changing magnetic field by voltage induced in the wire. RF coils design is specific to the body parts for the scanning. Coils are broadly classified as Volume and surface coils. Some of the coils are body bird cage, head birdcage, phased array coil etc.
Computational analysis of RF Coils and Amplifiers with EM Tools are required for prototyping, developing and optimization of system.

ii. Imaging Technology: Magnetic resonance imaging (MRI) is a medical imaging technique used in radiology to form pictures of the anatomy and the physiological processes of the body. MRI scanners use strong magnetic fields, magnetic field gradients, and radio waves to generate images of the organs in the body.

iii. FPGA Technology: The MRI spectrometer comprises a digital transmitter section and a receiver section. The objective of the spectrometer is to excite the particular slice in the human anatomy with required spatial resolution and create an image for diagnosis. The SAMEER designed Spectrometer is a low cost, state of art spectrometer based on a 28 nanometer FPGA chip, consisting of two ARM processors & programmable logic layers. It is flexible for future upgrade since the programmable logic layer has four lakhs plus flip-flops & 900 pin configurable outputs.

iv. Mechanical Engineering Technology: MRI equipment is sensitive to temperature, humidity, and air pressure; therefore, mechanical systems must meet the technical requirements of the equipment while ensuring a safe and protected

environment for the patients and healthcare staff within the facility. Effective MEP design ensures that medical professionals can focus on their first priority – delivering high-quality patient care.

v. Control/Software Engineering: The NI based control system is used for presetting, monitoring, and controlling operation of the entire MRI system. Each sub-modules have its own local control system thus making it standalone. The log status file provides display of various status and monitoring parameters and the status of the various interlocks and subsystems.

vi. Superconducting Magnet Technology: A superconducting magnet is an electromagnet made from coils of superconducting wire. They must be cooled to the cryogenic temperatures during operation. In its superconducting state the wire has no electrical resistance and therefore can conduct much larger electric currents than ordinary wire, creating intense magnetic fields. Superconducting magnets can produce greater magnetic fields than all but the strongest non-superconducting electromagnets and can be cheaper to operate because no energy is dissipated as heat in the windings.

Actively- shielded superconducting magnet not only provides a highly homogeneous magnetic field at the imaging volume but restricts the 5G fringe field within a permissible spatial limit. The technology of the superconducting switch and the superconducting joint makes it possible to achieve a temporal stability of 0.1ppm/hr or better. A self-activated secondary superconducting circuit also makes it possible to shield the imaging volume from the external magnetic interference thereby preserving the field homogeneity in the imaging volume. A passive quench protection system (QPS) protects the magnet during a quench in persistent mode of operation during a scan. The magnet ramping unit (MRU) in sync with QPS efficiently takes care of any eventuality during training of the magnet. Although an innovative design has been incorporated in the IMRI magnet to minimize the quench. The whole-body magnet is housed in a cryocooler based 4K zero-boil-off helium cryostat having warm bore of 900mm thereby making the magnet ever-cooled. In case of emergency, the magnet can be run down to zero field within 2-3 minutes. Passive shimming provides to rectify the inhomogeneities generated in the imaging volume due to the imperfection in manufacturing of the magnet.

vii. Gradient Coil/Gradient Amplifier: Gradients are loops of wire or thin conductive sheets on a cylindrical shell lying just inside the bore of an MR scanner. When current is passed through these coils a secondary magnetic field is created. This *gradient field* slightly distorts the main magnetic field in a predictable pattern, causing the resonance frequency of protons to vary in as a function of position. The primary function of gradients, therefore, is to allow spatial encoding of the MR signal. Gradients also are critical for a wide range of "physiologic" techniques, such as MR angiography, diffusion, and perfusion imaging.

viii. Physics: A basic understanding of MRI physics is required for the interpretation of MRI scans and also to understand the MRI manufacturing and integration process. MRI produces detailed images of many body parts. A wide range of different MRI images produced helps to answer specific clinical questions. A systematic approach is required for image interpretation. There are important safety issues regarding the use of MRI. The MRI scanner and sub-systems need to be tested and the specifications have to be demonstrated to the regulatory authorities before it is cleared for installation at the hospitals. Proper Radiation shielding is required to keep the radiation leakages from the machine within stipulated limits. To understand all this proper knowledge and understanding of MRI Physics play a vital role.

3.2. Technical Specifications / Features

3.2.1. Hardware Modules Specifications

1. RF Amplifier

15kW/4kW RF Amplifier Specifications

A. Performance Specifications	
Parameter	**Values**
Frequency of Operation	63.87 MHz
Bandwidth	600 kHz
Shape of RF Pulses and pattern [1]	Rectangular, Sinc, Gaussian
Gain Variations (Flatness)	±0.2 dB over the bandwidth
Output Power (Peak power)	15 kW for Body coil 4 kW for Head/Knee coil
Duty Cycle	10% (Max.)
Typical Gain	72 dB/ 66 dB
Class of Operation	AB
Efficiency	>50%
Nominal Input Impedance	50 Ohm
Input VSWR	1.5:1 (Max.)
Output VSWR(Load)	3:1 (Max)

Gain Linearity (Dynamic range)	<0.5 dB Variations over 20 dB range <1.0 dB Variation over 50 dB range
Phase Linearity	<5 degree over 20 dB range <10 degree over 50 dB range
Short term stability (5 mins) Gain stability Phase stability	<0.2 dB <5 degree
Input Signal pulse width	4μs to 10ms
Harmonics	< 20dBc at rated power
Output Noise, Blanked	<-130 dBm/Hz
Output Noise, Un-blanked	<-65 dBm/Hz
Spurious noise	<-40dBc
Droop	< 8% over a 10 ms rectangular pulse

Note:

1. RF power varies from pulse to pulse in the pulse train. So this should be considered while developing the system

2. Spectrometer (FPGA Based)

2.1. RF Exciter (FPGA)

Parameter	Values
Type of RF Pulses	Rect, Sinc, Gaussian
Frequency	63.87 MHz ± 1 MHz
RF Pulse Width	Minimum width 4 us, Max 3 ms
Output power	5 dBm (400 millivolts)
Phase noise (dBc/Hz)	Better than -110 @64MHz at 10 kHz offset
Stability:	Better than ±10 ppm
Electrical Parameter	5V , 12 V
Connectors	SMA for signal connectivity
Connectivity Impedance	50 Ω

2.2 Gradient Signal (FPGA)

Parameter	Values
Gradient Gx,Gy,Gz	20 bit high resolution Analog output
Type of Gradient Pulses	Arbitrary shape
Frequency	100 KHz
Pulse Width	Variable
Output Type	Analog (waveform RS 422) / Digital
Number of waveforms	Three (Independent of each other)
Occurrences	Any Instance (programmable)
Electrical Parameter	5V , 12 V, 15 V
Connectors	SMA for signal connectivity
Connectivity Impedance	50 Ω

2.3 Direct Sampling Receiver (FPGA)

Parameter	Values
Signal Frequency	63.87 MHz
Number of channel	01/02/04/08 / 16 (Selectable)
Bandwidth	Programmable 200 KHz (around center fc)
Frequency Encodes	256 or 512
Phase Encodes	256 or 512
Digitiser (ADC)	14/16 bit
Dynamic range	80 dB
Minimum detectable signal	better than -110 dBm
Noise floor	-115 dBm
Front end System noise	Lesser than 2 dB
Input power Clipping Level	-30 dBm
DDC specifications	Resolution = Better than 1 Hz ; Freely tunable within window
Digital data O/P type	I, Q of all 16 receiver channels
Data Output	K space Data upload to the PC via TCP

	Protocol
Environmental parameters	Temperature: 10°~ 40°C Storage: 10°~ 40°C Humidity: Up to 95% non – condensing
Electrical Parameter	5V , 12 V
Connectors	SMA for signal connectivity
Connectivity Impedance	50 Ω

3. RF Coils

3.1. Surface Coil - 3 inch coil

Parameter	**Values**
System	1.5 T
Frequency	63.87MHz
Bandwidth	>800KHz
Tune Detune difference	>30
Q Ratio	2-10
Impedance	50ohm
Coverage	3-6 cm
Number of channels	1
Decoupling	Passive, Active, Geometrical and Preamp decoupling
Main application	Elbows, Wrist, Ankle, Inner ear, Pediatrics

3.2. Surface Coil - 5 inch coil

Parameter	**Values**
System	1.5 T
Frequency	63.87MHz
Tune detune difference	>30dB
Impedance	50 Ohm
Bandwidth	>800KHz
Q Ratio	2-10
Decoupling	Passive, Active, Geometrical and Preamp decoupling

Coverage	5-12 cm
Number of channels	1
Main application	Elbows, Wrist, Ankle, Inner ear, Pediatrics

3.3. Surface coil - CTL coil

All 6 channels are identical and should have following specifications

Parameter	Values
System	1.5 T
Frequency	63.87MHz
Bandwidth	>800KHz
Q ratio	2-10
Tune-detune difference	>30 dB
Decoupling	Passive, Active, Geometrical and Preamp decoupling
Number of channels	6
Main application	Complete spine, thoracic, neck and lumbar Region

3.4. Front end For Surface Coils

Parameter	Values
Frequency	63.87 MHz
Noise Figure	<1.3
LNA input Impedance	<3 ohm
Gain	>56 dB
Dynamic range	75dB
Receiver sensitivity	-90dB
Isolation Loss	>120-150 dB

3.5. Volume Coil

Parameter	Values
System	1.5 T
Frequency	63.87Mhz
Head Birdcage	
Parameter	Value

Coverage	32 cm
Number of Rungs	16
Mode of Operations	Quadrature
Polarization	Circular
3dB bandwidth	>600KHz
Q Ratio	4-10
Impedance	Port 1 -50hm Port 2 50 ohm
Isolation between ports	>12db
Application	Head

Knee Birdcage	
Parameter	**Values**
System	1.5 T
Coverage	32 cm
Number of Rungs	16
Mode of Operations	Quadrature
Polarization	Circular
3dB bandwidth	>600KHz
Q Ratio	4-10
Impedance	Port 1 -50hm Port 2 -50 ohm
Isolation between ports	>12db
Application	Knee

Transmit only /Transmit receive Body Birdcage	
Parameter	**Values**
System	1.5 T
Coverage	64 cm
Number of Rungs	16
Polarization	Circular
3dB bandwidth	>600KHz
Q Ratio	4-10

Impedance	Port 1 -50hm Port 2 -50 ohm
Isolation between ports	>12db
Mode of Operations	Quadrature
Dynamic detune circuit (8 numbers)	At least >20dB
Application	Whole body transmit only/transmit receive

3.6. Hybrid TR RF Switch(Body)

Parameter	**Values**
Frequency	63.87MHz
Number of ports	4
Port Impedance	50 ohm
Insertion Loss (Transmit)	Coil 1 <0.8 dB Coil 2-<0.4
Insertion loss(receive)	Coil 1<0.4 Coil 2 <0.4
Isolation Loss	50-55 dB
Phase difference (Coil1-Coil 2 ports)	90 degree
Receiver protection interface	Included (antiparallel diode)
Amplitude Imbalance	<0.4dB
Phase Imbalance	<5 degree

3.7. Hybrid TR RF Switch (Head)

Parameter	**Values**
Frequency	63.87MHz
Number of ports	4
Port Impedance (all 4)	50 ohm
Insertion Loss (Transmit)	Coil 1 <0.5 dB Coil 2-<0.4
Insertion loss(receive)	Coil 1<0.4 Coil 2 <0.4
Isolation Loss	50-55 dB

Phase difference (Coil1-Coil 2 ports)	90 degree
Receiver protection interface	Included (antiparallel diode)
Amplitude Imbalance	<0.4dB
Phase Imbalance	<5 degree

3.8. Front end Head and Body Birdcage Coils

Parameter	Values
Frequency	63.87 MHz
Noise Figure	<1.3
LNA input Impedance	<50 ohm
Gain	>56 dB
Dynamic range	75dB
Receiver sensitivity	-90dB
Isolation Loss	>120-150 dB

4. Control system specification

4.1. Amplifier controls:

Parameter	Values
Sampling rate(Power)	500kSa/sec
Sampling rate(Current)	250kSa/sec
Temperature threshold	70^0 C
Total input acquisition parameters in Amplifier	16(Temp), 16(Current), Forward & Reverse power.
Power Sensitivity	20 mVpp @10MHz
Response time for Power Detection	400 nsec
Maximum power detection limit	18 dbm
Current Sensitivity	25 mA
Response time for Current Detection	1 usec
Communication bus	TCP bus

4.2. Coil Control:

Parameter	Values
Control Voltage generation range	-10 V to +10 V
Total channels available	12
Pulse width	Variable
Current source capacity/channel	40 mA
Coil ID interface	EEPROM
Communication bus	TCP bus

4.3. Couch Control:

Parameter	Values
Couch Dimension	2460*550*40
Total Weight	150 kg
Stroke	1500 mm
Maximum time to pass stroke	150 s
Max forward speed /symmetrical profile	10 mm/s
Vertical Axis Movement	45 cm to 100 cm from ground plane

5. Gradient specification

System sub-module	Specification
3 axes rating	1035V/1000A
Output voltage	Programmable
Software Interface	RS-422
Clock frequency (Internal/External)	100 kHz
Current Setpoint Input	Differential
Communication Frame Format	Telegram frame
Programmable block	System Control

6. Whole-Body1.5T Superconducting MRI magnet system

6.1. 1.5T Superconducting MRI magnet

Parameter	**Value**
Application Type	Whole-Body
Magnet Type	Superconducting
Field Strength	1.5 T
Conductor	NbTi
Field Of View	45cm
Operating temperature	4.2K
Spatial peak to peak Homogeneity (RMS)	8 ppm peak to peak at 45 cm FOV (RMS ~0.22 ppm)
Shielding Type	Actively Shielded magnet
Room temperature Bore	~ 90 cm
5 G Fringe field	3.5 m (axial) × 2.5 m (radial)
Operating current	< 500 A
Winding Type	Solenoidal Winding
External Interference shielding (EIS)	Active EIS coil with shielding efficiency > 95%
Magnetic Field stability	≤ 0.1 ppm/hr
Operation Mode of the magnet	Persistent
Persistent Current Switch(PCS)	Two number PCS one each for main coil and EIS coil
Patient Bore	≥ 65mm
Quench Protection System	Self -activating Passive Quench Protection System
Magnet bobbin	Multi-coil metallic bobbin Structure
Emergency Run Down	Equipped with state-of -art ERDU unit. Full ramp- down of the magnet within 2 min

Shimming	Passive shimming

6.2. Superconducting Switches (PCS) and controller

Parameter	**Value**
Number of Superconducting switches(PCS)	One (PCS 1) for main magnet and one for (PCS 2) external interference shielding coil
Current Capacity of PCS 1	< 1kA
Current capacity of PCS 2	< 100A
Conductor	Multi-strand NbTi wire in a resistive matrix
Winding type	Non-Inductive Solenoidal type
Operating temperature	4.2K
Operation of PCS 1	Switching operation is Controlled by Magnet Ramping Unit , Interlocked with the magnet charging and discharging operation
Operation of PCS 2	Operation controlled by EIS switch controller
Inductance of PCS1 and PCS 2	≤ 10 μH

6.3. Magnet Quench Protection System (QPS)

Parameter	**Value**
Type of Quench protection system	Self-activating passive quench protection system (in persistent mode of operation)
Standard /code	IEC6061-2-33
Major components of the QPS	Cold diodes and dump resistors etc,
Max voltage at the magnet lead terminal	≤ 30V
Decay time to current zero	< 20 s

6.4 Emergency Run Down Unit (ERDU)

Parameter	**Value**

Type of ERDU unit	Battery operated ERDU unit
Standard/Guideline	USFDA
Time to reach zero current during emergency stop	< 3min
Major components	Resistors, chargeable batteries, electronics controller to power the heaters

6.5. 4K Zero Boil off MRI cryostat

Parameter	**Value**
Cryogen	Liquid Helium
Cooling technique	4K cryocooler based Zero-Boil-Off (ZBO) Technology eliminate the helium losses by re-condensing the valuable helium, resulting in a "zero-loss" system. The thermal shield is maintained at <50K
Cryocooler	Double Stage 4K GM cryocooler (Sumitomo) with water/air cooled compressor / 6.7-7.2kW for Water-cooled and 3.6-5.4kW for Air -cooled Compressor
Operating bath Pressure	< 2 psi / the bath pressure is regulated through a PID based electronic controller
Length of the Bore	~ 1.7m
Diameter	~2.0m
Gradient coil (GC) mounting	Whole-body gradient coil can be mounted inside the bore.
Warm bore diameter w/o gradient coil	~90cm
Warm bore diameter after mounting the GC	~ 65 cm
Safety mechanism	A multistage cryogenic safety has been provided having safety relief valve and rupture disc

3.2.2. Software Modules Specifications / Features

1. IMRI Software Specifications

Parameter	Value/Target
Minimum slice thickness 2-D/3-D	5mm
Minimum Reconstruction FOV	1 cm
Maximum Reconstruction FOV	50 cm
Pulse sequence interface	Pulseq
RAW data interface	ISMRMRD
Plug and Play	Yes
Dynamic Pipeline configuration	Yes
DICOM compatibility	DICOM 3.0
Image Viewer	Basic Viewer, DICOM Viewer, 3D Viewer
Parallel/Fast Imaging	Parallel Imaging , Partial K-Space
Scan orientations	Transverse, coronal, sagittal, oblique
2D/3D image reconstruction	Yes
Pulse sequences	Standard pulse sequences

2. Image Visualization Modules

- **Diffusion Imaging**
  - Generation of Apparent Diffusion Coefficient (ADC) maps
  - Generation of Fractional Anisotropy(FA) and color FA maps

- **Perfusion Imaging**
  - Generation of DCE-MRI from dynamic sequence.
  - Generation of DSC-MRI maps from dynamic sequences.

- **Denoising and Segmentation**
  - Generation of Denoised images from input Diffusion Weighted Images
  - Segmentation of Gray matter, White Matter and CSF from input

T1/T2/Flair/Proton Density images

3.2.3. Descriptive Specifications

The Descriptive specifications for Indian Medical Resonance Imaging (IMRI) system and its respective subsystems are given below,

3.2.3.1. RF Amplifier system

The heart of the transmitter/RF power amplifier is built on 1.25KW amplifier module. It has been designed and developed using LDMOS device operating in class AB push-pull configuration. 16 such units have been designed, developed successfully.

Four number of 3.5-4kW solid state power amplifier at 63.87MHz has been designed and developed. Each 3.5-4kW module consists of four 1.25 kW power amplifiers, two driver amplifier, one pre-driver, three 2-way power divider and one 4-way high power combiner. All the components/modules in the 3.5-4kW system has been designed and developed indigenously at SAMEER. High power has been obtained by divide-amplify-combine technique. Four 3.5-4kW modules were combined to achieve 15 kW peak power.

Another 2kW amplifier module with all monitoring and control circuits has been developed as it is required separately for head imaging. Various monitoring parameter includes temperature, current, forward and reflected power when connected to loads. This module is developed and integrated to the existing scanner to take the image of a head phantom through a birdcage coil.

a. Amplifier

The solid state device based main amplifier is developed and that device part number is MRF1K50H. Gain of the developed Main amplifier is 24dB. The bandwidth of the complete system is achieved up to 1 MHz

b. Combiner

There are two types of combiners developed: Wilkinson based 4-way power combiner with co-axial cables having insertion loss of 0.6dB and Ferrite based combiner having insertion loss of less than 0.2dB.

c. Driver Amplifier

The driver amplifier is also developed based on solid state device technology with a part number MRFE6V525L. The achieved gain is 23dB

d. Pre-driver Amplifier

The driver amplifier is also developed based on solid state device technology with a part number MRFE6V525L. The achieved gain is 23dB

e. Splitters

There are two types of splitters used in subsystems like 2 way and 4 way splitter. The developed 2 way and 4 way splitter has been developed with 0.2 dB and 1 dB of

insertion loss respectively.

f. Dual Directional Coupler

There are 4 dual directional couplers developed with air suspended technique. The coupling power of 50dB is achieved.

3.2.3.2. Spectrometer:

I. Transmitter

The entire file of PSD is loaded into the Transmitter from IMRI software. PSD files contain values of RF, Gx, Gy, Gz, ADC and Delay. Radio Frequency excitation frequency and the Arbitrary gradient data is encoded using shape data. The data rate at which the data is stored in shape is 1MHz. Trap is encoded at 100kHz rate whereas Arbitrary gradient is at 1MHz. RF pulse width range is minimum 4us and maximum 3ms. Timing signal generation is generated using the block id. The RF generation is achieved using DAC34h84 (16bit). The playout on DAC plays a critical role in a transmission system. Its speed and performance determine the efficiency with which the digital to analog conversion can be performed. The data is modulated by multiplying it with the carrier frequency(63.87 Mhz). The carrier signal is programmable and is generated by the DDS (16bits, sine only). DAC34H84 needs to be configured.

II. Clocking Module

The design requires 5 different clocks which are generated inherently using the clocking wizard present in the design-

1. Clk_out1 : 400MHz clock for RF DAC external input on user_clk_n pin.
2. Clk_out2 : 200MHz clock for RF DAC internal setup, this clock goes to IP's(DDS, CIC, Multiplier, Select_IO, Rising edge detect IP which generate read enable signal for phase read FIFO)
3. Clk_out3 : 200MHz with 90 degree phase shift as data_clk of RF DAC (single_to_diff IP)
4. Clk_out4 : 25MHz clock for DAC5791 IP's
5. Clk_out5 : 20 MHz clock for the ADc FIFO read and rest of the PS part(single channel design). (Note: for 8 channel design this clock will be 160MHz)

III. Receiver

Receiver design is implemented on two ADC's i.e. AD9269(16bit) and ADS5294(14bit). AD9269 is a two channel ADC and 5294 is an 8 Channel ADC.
DDS is set to be configurable in respect to frequency and phase. DDS frequency 63.87MHz is given.
An input clock of 20MHz is externally given to the ADC. Same clock is passed over to the design through the FMC connection and the entire design runs on a common clock of 20 MHz.

The data coming from the ADC (single channel) is 16bits wide and is multiplied with the carrier generated to generate quadrature signals. The I and Q data is given to a FIR filter which has a programmable frequency. The filter coefficient file for fir compiler is generated in MATLAB using the FDA tool.

3.2.3.3. IMRI Software

The MR Imaging software offers a complete workflow solution that enables MR technologists/radiologists to easily plan, acquire and visualize images, in an easy to use software environment. The scalable and customizable software platform facilitates MR research community to extend the software features by plugging in modules. The software comes standard with a package of basic pulse sequences and parallel image reconstruction options optimized for 1.5T scanner.

Features

- Generic Software Platform with open interfaces
- International Standards Compliance(Pulseq, ISMRMRD, DICOM)
- Scalable/customizable modules
- Pulse Sequence Library
- Dynamic Protocol Configuration
- Dynamic Pulse sequence Configuration
- Standard pulse sequences and calibration sequences
- Graphical Slice planning
- Patient Work list
- Parallel Imaging Reconstruction
- PACS Browser
- DICOM Viewer
- Filming
- Calibration and Quality Analysis
- Scanner Integration support
- Advanced Visualization Modules
- Pluggable Reconstruction pipeline modules.

3.2.3.4. IMRI Pulse Sequence Framework

The pulse sequences framework for IMRI software provides a customizable and scalable architecture for adding new pulse sequences dynamically without affecting normal software

The features of the frameworks are;

- Open-standard based software environment helps in implementing and applying MR pulse sequences to clinical scanners from different vendors.
- Validation and registration options for newly developed pulse sequences without affecting the major software workflow.
- Validated the framework with GE and Siemens scanners

- The framework is preloaded with standard pulse sequences and calibration sequences

3.2.3.5. IMRI Reconstruction Framework

The image reconstruction framework offers modular MR image reconstruction which can facilitate code reuse, prototyping, cross platform development and parallelism.
The features of the frameworks are;

- The framework adopts open source ISMRMRD standard for the representation or raw data.
- A customizable and scalable architecture for adding new reconstruction algorithms dynamically without affecting normal software
- High performance parallel acquisition and reconstruction engine with built in standard and parallel imaging algorithms.
- DICOM format is used to represent the reconstructed image.

3.2.3.6. Image Visualization Modules

3.2.3.6.1. Diffusion Imaging (Features)

- Capable of working on multi- vendor Diffusion Weighted Imaging (DWI) and Diffusion Tensor Image (DTI) datasets.
- Visualization of both greyscale and colorscale images possible.
- Values from ADC and FA maps possible based on ROI selection.
- Features in present day scanners provided.

3.2.3.6.2. Perfusion Imaging

- Capable of working on multi- vendor Perfusion dynamic sequences.
- Capable of displaying of kinetic curves for CE-MRI and signal dips for DSC-MRI.
- Capable of selection of ROI for calculation of perfusion parameters.

3.2.3.6.3. Denoising and Segmentation

- Both the Denoising and Segmentation modules are capable of working on multi-vendor image data sets

3.3. Status of Development

3.3.1.. Hardware Modules:

1. **The Amplifier sub-assembly:**

The RF amplifier provides the required energy to coil for producing B1 EM fields. The developed amplifier uses a modular approach for ease in maintenance activity. As discussed in specification SAMMER has developed a complete 15kW amplifier and it is rack mounted. The development of pre-driver, driver, main amplifier, combiner at different stages and VVA has been completed. The individual testing and integrated testing completed. The 1kW, 2kW and 15kW systems are developed. The 1kW and 2kW systems are completely ready with all required interlocks and obtain images after successful integration with other systems for head scanning. The independent 15kW rack mounted system is ready without interlocks. The final integration of the 15kW system with body birdcage coil and other systems for full body imaging is remaining.

2. Spectrometer sub-assembly

The spectrometer sub-assembly (both transmitter and receiver) is completed and integrated with the Refurbished GE Magnet

3. Coils sub-assembly

I. Volume Coils

Volume coils are homogenous in nature which will be used for transmitting and receiving the RF signal in MRI. Birdcage coil is one such type of coil used for full body scanning as well as head and knee imaging in transmit and receive mode. Head bird cage and knee birdcage are developed and integrated with the MRI system. Development of body birdcage is under process.
Following are the subparts of volume coils developed in house.

a) Hybrid Coupler

As the birdcage coil is driven in quadrature mode for better homogeneity of the magnetic field, hybrid coupler is a must for quadrature Operation. A lambda/8 design using lumped components is designed.
Specifications of the coupler-

Coupling- 3.15dB
Phase Difference-90.17 degree
Isolation-28dB

b) Cable Trap

For the Common Mode Reduction two traps each at the feeding ports of the coil are used.
These traps are nothing but a parallel tank circuit which provides high impedance to the common mode currents flowing outer of the shield.

c) Detuning Circuit

For using the coil in transmit mode, the coil needs to detune the coil. The detuning is done by placing a single diode in series in the RF Path. The detuning was achieved with an isolation of 16dB during receive time and Insertion of 0.5dB during transmit time.

d) High power TR switch for body bird cage as well as head birdcage is under development

II. Surface coil

Surface coils have a high signal to noise ratio as they are very close to body parts. They are available in different shapes and dimensions as per the body parts. 3inch, 5inch, as a single channel and CTL coil as a 6 channel phased array coil for the parallel imaging are developed.

a) 3inch coil

3 inch indicates the diameter of the coil and also depth of penetration. This is a single channel coil tuned at 63.87MHz and matched at 50 0hm. Measured SNR is around 40 for 3inch coil. It's mostly used for Elbows, Wrist, Ankle, Inner ear, Pediatrics.

b) 5 inch coil

5 inch indicates the diameter of the coil around 13cm and also depth of penetration around 5-12cm. This is a single channel coil tuned at 63.87MHz and matched at 50 0hm. Measured SNR is around 90 for 5inch coil. It's mostly used for Elbows, Wrist, Ankle, Inner ear, Pediatrics. Development of 3inch and 5inch coil is done.

c) CTL coil

CTL stands for cervical, thoracic, lumbar. This is a 6 channel coil which is used for imaging of the complete spine and neck part of the human body. Field of view of the CTL coil is around 50cm in length. Development of CTL coil is under progress.

III. Front end for surface coils and birdcage coils

A miniaturized version of receiver front end is designed at size of 8*10 cm. It includes switches, LNAs and filters. Layout is designed in such a way that either of the filters can be used i.e., SAW filter or BPF.

Two different PCB's are designed for both Surface coil and Birdcage coil. The PCB's are designed following the EMI/EMC guidelines. Front end for bird cage coil is matched with 50 ohm for the birdcage integration.

4. Controls sub-assembly

a. RF Amplifier Controls

Radio Frequency source is responsible for generating the RF pulse carrier signal of 63.87 MHz and the pulse sequence. The controlling diagram for RFA consists of four chains of 4KW RFA modules which in total gives 16KW power required for MRI and an NI Controller. Radio frequency Power Amplifier (RFPA) is a vital sub-system of an MRI scanner. It amplifies the RF Pulse from the source. Dual Directional Coupler is used to monitor forward and reflected power simultaneously. Forward power is used for controlling operation of power level. The amount of power coupled depends on the coupling value of a specific coupler. Gate voltages of the power amplifier and driver amplifier are 2.6V and 2.8V respectively and 50V is drain voltage.

Sensor & Monitoring Assembly:

The overall assembly has 16 main amplifiers. Each Main Amplifier consists of a current sensor and temperature sensor. The required input power is adjusted by the voltage variable attenuator (VVA). Parameters to be monitored and controlled for RFPA are drain voltage and gate voltage, drain current, plate temperature, forward power, reflected power. VSWR is a way to measure imperfections. The minimum VSWR is 1. Reflected power, forward power and VSWR are monitored by checking the VSWR. Forward power and Reverse power is given to the power detector which converts it to a DC voltage which measures electrical power delivered to a load. The plate temperature of the main amplifier is monitored with the help of a temperature sensor. The drain current is given to the current sensor which helps to monitor and control the current level. A specific NI controller is defined for a specific parameter controlling.

b. RF coils controls:

The RF coils can be categorized into two main groups: volume coils and surface coils. Coil assembly requires few control voltage signals for detuning circuit which is provided by the Coil Control hardware. Similarly, the selection of type of coil for scanning purposes is done with the help of Coil ID assigned to every individual coil. The selected coil, number of channels selected and connection status of the coil is sent to the master controller via TCP frame transfer.

5. Patient Table:

An MRI scanner is used mainly in medical diagnosis to render pictures of the inside of a Patient. For imaging purposes, the patient support system provides a platform for the patient to lie on and have a safe scan in the magnetic environment. The patient support system (PSS) is a complete assembly consisting of a patient table, I/Os for RF coils and the controlling devices. The patient table consists of a table with a removable tabletop and a user interface. The table can be moved along the vertical and horizontal axis. Multiple RF coils are attached to the table making the table an embedded system to carry the patient, RF coil circuitry, and a driving mechanism.

The patient table has the following functions: positioning the patient for the measurement, positioning the coils used for the measurement, positioning the patient in the magnet isocenter. The complete Patient support system consists of Table, table top overlay, coil placement arrangement, controlling devices, motors, drivers, sensors, display. MRI overlays are made of fiberglass with a foam core, have indexing options and are compatible with a three-pin Lok-Bar. The connectors for RF coils are attached to it. User control is having control buttons for table movement as in /out, up/ down as desired. These controls can be accessed by authorized people only.

The light visor is located on top at the entrance to the Magnet bore.

Light-visor is implemented for marking the scan plane, and also for automated positioning of this scan plane to the Centre of the bore of the MRI scanner. The laser light visor facilitates correct patient positioning. User displays show the timing of treatment, position of tabletop as well as overlay. The system is controlled via a user-interface. For Horizontal Movement, operations such as IN, OUT, SET ZERO, MOVE TO ISOCENTER & BACK TO ZERO are performed.
The system consists of HMI, the controller module, drive, motor, potentiometer secondary feedback.

6. Whole-Body 1.5T Superconducting magnet system

6.1 MRI magnet *Bobbin*

Bobbin is one of the most crucial components of the MRI magnet having precisely machined winding pockets for the superconducting coil. The bobbin needs to house the superconducting coils at the predefined position to achieve the homogeneity as per the EM design of the magnet withstanding the large operational forces in the magnet. The bobbin has been designed through an extensive FEA simulation (structural, thermal and electrical). The multi-coil bobbin structure has been fabricated with precise mechanical machining. The metallic bobbin is made up of light weight material having higher machinal strength. The bobbin provides the structural integrity of the superconducting coils of the MRI magnet. It also provides necessary support for the other components (quench protection system, superconducting switches, cryogenic instrumentation etc of the magnet.

6.2 Actively *shield 1.5T superconducting magnet*

The 1.5T superconducting magnet is heart of the scanner. It not only generates a highly homogenous field (< 10ppm peak-to peak) at the imaging volume (45-50cm), it also restricts the expansion of the fringe field. A multicoil actively shielded 1.5T superconducting magnet has been designed through an

extensive magnetostatic simulation using FEA software. The peak to peak and RMS homogeneity are respectively 8 ppm and 0.8 ppm in 45 cm DSV. The 5G field is restricted within 3.5 (m) axially and 2.5m (radially). The magnet has been designed to make it a less prone to quench. A special type of Niobium Titanium superconducting wire has been used to minimize the quench. Various operational stresses have been studied through the FEA simulation and accordingly the mechanism has been incorporated to control the stresses within a certain limit.

The imaging volume of the MRI magnet needs to be protected from any external low frequency magnets disturbance. A set of self-activated superconducting coil has been designed and developed to shield the imaging volume from any external disturbances preserving the desired field homogeneity. 95-98% of external effect will be nullified by the shielding mechanism.

6.3 Winding of the magnet

The superconducting wires needs to be precisely wound on the metallic bobbin. The winding of the superconducting coils play a crucial role in determining the field homogeneity and overall performances of the magnet. The winding parameters have been generated through the trail winding of the actual conductor onto the actual bobbin to achieve the magnetic parameters as per EM design. An extensive studies have done to provide the electrical insulation between the superconducting coils and the magnet bobbin. The winding of the bobbin is done using any large size solenoidal winding machine having precise control of pitch and tension. The winding is presently under progress as per the winding parameters.

6.4 Superconducting switch

Superconducting Switch or Persistent Current Switch (PCS) is one of the main components of the MRI magnet for the persistent operation of the magnet during scan. The PCS also plays an significant role in ramping up/down of the magnet. The electrical and thermal behaviour of the PCS determine the switching performance of the PCS in sync with MRI magnet. The PCS for the main magnet has been developed after a prototyping and testing at actual operating condition. The switching behaviour has been tested at the operating current (< 500A) 4.2K. The normal resistance the inductance of the main PCS has been optimized for the better performance and accordingly it has been developed and tested. The switching behaviour of the PCS is controlled by the magnet ramping unit (MRU) during any ramp up/down exercise.

6.5 Superconducting Joint technology

The multicoil MRI magnet needs numerous numbers of inter-coil or coil-PCS joints. The electrical resistance of such joints plays a crucial role in determining the temporal field stability of the magnet. The joints would be implemented in-situ after completion of the winding. The inter-coil and coil-pcs joining technique have been developed after a rigorous testing, characterization, prototyping of various such joints etc. The joint process has been validated after a making numerous samples using the same predefined process and testing them in the actual operating condition (~ 500 A) at 4.2K.

6.6 Emergency Run Down Unit

Emergency run down unit provide necessary safety in case any emergency situation arises during operation. ERDU unit would ramp down magnetic field within 2-3 minutes. It is a battery-operated controller which provides a certain of energy to the magnet to initiate quench in the magnet. An ERDU unit has designed having few innovative features to meet safety guideline of the USFDA. The ERDU system is a the advanced stage of completion.

6.7 4K Zero boil off cryostat with 90omm warm bore

The cryostat houses the whole body superconducting MRI magnet and provide the patient bore for imaging. The cryostat maintains the operating temperature of 4.2 K for the operation of the NbTi magnet. The magnet is precisely positioned inside the cryostat in a predefined coaxial position. The cryostat eventually provides the structural integrity of the magnet system along with thermal environment. A 4K zero-boil-off MRI magnet has been designed and developed after an extensive simulation (thermal, structural, EM) and numerous analytical calculation. The magnet is dipped inside the annular helium vessel. During normal operation, the state of the art zero boil off technique has been incorporated and test with actual cryogenic load at 4.2k. A double stage GM cryocooler based technique has been used to make it a zero-helium loss thereby making the system ever- cooled and minimizing the refilling of liquid helium. The thermal shield is maintained at 40K by 1st stage of the cryocooler. A self-centering support system has been designed and developed to maintain the magnet at its position during the operation. The During a quench, 1600L of liquid needs to be replaced. Although some innovative technique has been incorporated to minimize the quench of the magnet. Additional leftover liquid would keep the coils at 4.2K to the extent possible till the next refilling.

6.8 Magnet-cryostat assembly jigs and Fixture

Rail guided, fork-lift and spider based jigs and fixture is necessary for precise positioning of the magnet into the 4K cryostat with precise alignment following

a predefined assembly and intermediate testing steps. A heavy duty assembly station having versatile features of rail-guided mechanism, fork-lift based support stand and internal/outer spider ring has been designed and developed. IUAC in consultation with SAMEER would explore the possibility of the temporary issuing of magnet-cryostat assembly jigs and fixture to the bidder of magnet manufacturer for developing the new unit of MRI magnet system.

3.3.2. Software Modules:

1. IMRI Software

The developed software has been successfully tested in the lab environment. The pulse sequences generated by the software is validated for demonstration capability of the designed pulse sequence to create the intended image , Error free implementation of network communication and playing out the pulse sequence in actual hardware. The GRE sequence generated by the IMRI pulse sequence module was successfully played out in the IMRI scanner and image was reconstructed using the IMRI recon engine.

For validating the sequences in vendor specific MRI machines, a hardware interface module was developed. TOPPE based hardware interface module was developed for integrating the timing constraints of GE hardware with developed pulse sequences. The developed GRE pulse sequence was tested in GE scanner at Bangalore and Siemens scanner at university of Columbia, New York.

The standard, partial Fourier and parallel image reconstruction algorithms developed are validated with raw data acquired from GE and Siemens scanner. The validation has been done as per the guidelines prescribed by NEMA methods. The raw data is converted in to the internationally accepted ISMRMRD format.

2. Image Visualization Modules

- **Diffusion Imaging (Features)**
  - ADC maps have undergone double blinded validation on multi- vendor Diffusion Weighted Imaging (DWI) datasets.
  - ADC maps have undergone double blinded validation on multi- vendor Diffusion Tensor Image (DTI) datasets.
  - ADC maps accepted during validation stage.
  - FA maps accepted during validation stage.
  - Validation on 130 datasets for Diffusion Imaging modules.

- **Perfusion Imaging**
  - Perfusion imaging modules underwent validation at different hospitals on 109 datasets from different hospitals throughout India.
  - Perfusion maps got validated at different stages of validation at different

hospitals throughout India.

- Perfusion imaging module got validated on 109 datasets.

- **Denoising and Segmentation**
  - Both the modules have been validated by comparing with output from standard software
  - Both the modules are accepted during validation. Validation has undergone 147 images.

SUMMARY: READYNESS OF TECHNOLOGY

S.NO	SUB-COMPONENTS OF MAGNETIC RESONANCE IMAGING	READYNESS OF THE TECHNOLOGY BY SAMEER
Hardware components		
1.	**AMPLIFIER SUBASSEMBLY**	
A.	**15kW Amplifier Rack mount Assembly**	
a.	All Individual four module of 4kW system	Ready and tested.
b.	Complete 15kW rack mounted system	Ready and tested
c.	Controls/monitoring and interlocks required for complete 15kW system	Ready
B.	**2 kW Amplifier**	
a.	Complete 2kW rack mount assembly with control	Ready, Tested and integrated with the MR system for Head scanning.
2.	**SPECTROMETER SUBASSEMBLY**	
	FPGA	
I.	Transmitter	Ready
II	Receiver	Ready Single channel upload on IMRI Ready 8 and 16 channel design
3.	**COILS SUBASSEMBLY**	
1.	Head Coil	Ready
2.	Knee Coil	Ready
3.	Hybrid Coupler	Ready
4.	Cable Trap	Ready
5.	Detuning Circuit	Ready
	CTL Coil	Ready
	Surface Coil – 3” and 5”	Ready
	Front for Coil	Ready
4.	**CONTROL SUBASSEMBLY**	

1	RFA	Chassis: NI-9075 Modules: NI 9205 NI 9263 NI 9201	Ready and technology can be passed to the vendor
2	Coils	Chassis: NI-9075 Modules: NI 9403 NI 9263	Ready and technology can be passed to the vendor
3	Couch	Chassis: NI-9075 Modules: NI 9403 NI 9853	Ready and technology can be passed to the vendor
5.	**1.5T whole-body superconducting MRI magnet system**		
1.	Magnet bobbin		Ready
2.	Winding of the SC coils of magnet and Sc EIS coil		Under Progress
3.	Superconducting switch for main magnet		Ready
4.	Superconducting switch for EIS coil and Switch controller		Ready
5.	Superconducting Joint technology and joint making station		Ready
6.	Quench protection system (high power cold diodes, low power cold diodes, resistors, dump resistors etc.)		Each individual components have been tested at the rated condition and ready for installation
7.	Magnet ancillaries (wire running. Electrical components etc)		Ready for integration with the magnet.
8.	Cryocooler based Helium Recondenser for zero-boil-technique		Ready
9.	Bath Pressure controller		Ready
10.	4K Zero-boil-off MRI cryostat		Most of the have major components (vacuum vessel, helium vessel, thermal shield etc.) minor components (various types of suspension rods, cryogenic insulation etc.) have been fabricated and ready for assembly.

11.	Magnet-cryostat Assembly Jigs and Fixture	The magnet-cryostat assembly station has been fabricated and ready for magnet-cryostat integration.
12.	Emergency run down unit	Under final stage of fabrication
13.	Cryogenic instrumentation and magnet data acquisition system	Ready
Software Modules		
1.	IMRI Software	Ready, integrated with the MR hardware system and tested in the lab environment
2	IMRI Pulse Sequence Framework	Ready and tested in the lab environment
3.	IMRI Reconstruction Framework	Ready and tested in the lab environment
3.	**IMAGE VISUALIZATION Modules**	
1.	Diffusion Imaging	TRL 8 (System developed and validated)
2.	Perfusion Imaging	TRL 8 (System developed and validated)
3.	Denoising and Segmentation	TRL 8 (System developed and validated)

Balance work / activities to be carried out:

1. Integration of 15kW amplifier with body birdcage coil and other subsystems.
2. Spectrometer (NI): Implementation of 8 Channel code and testing in a loop.
3. For IMRI software, Integration and testing of advanced sequences and modules with hardware subsystem, fine tuning and optimizations for image quality
4. Ethical Clearance and animal trails of integrated IMRI systems with GE Magnet
5. Ethical Clearance and animal trails of integrated IMRI systems with IMRI Magnet.
6. Magnet-cryostat assembly would be carried out using the jigs and fixture which will be followed by the testing of the magnet and shimming of the magnet to achieve the field homogeneity etc.

Chapter 4 - Pre-bid Queries

i. SAMEER / Industry Engagement Committee shall hold a pre-bid briefing meeting with the prospective bidders at SAMEER, Mumbai. The bidders will have to send their queries to SAMEER by email to tapas@sameer.gov.in

ii. All enquiries / clarifications from the bidders, related to this EoI, must be directed in writing exclusively to the contact person notified in this EoI document. Please refer to Annexure: B1 “Request for Clarifications” for pre-bid queries format.

iii. The preferred mode of delivering written questions to the aforementioned contact person would be through email. Telephone calls will not be accepted. In no event SAMEER will be responsible for ensuring that bidders' inquiries have been received by SAMEER.

The queries by the bidders will be provided in the format mentioned in Annexure B1

iv. After distribution of the EoI, the contact person notified by SAMEER will begin accepting written questions from the bidders. SAMEER will, at its discretion, make efforts (but not be obligated) to provide a full, complete, accurate, and timely response to all questions. However, SAMEER makes no representation or warranty as to the completeness or accuracy of any response, nor does SAMEER undertake to answer all the questions.

v. Sameer will not be responsible for any party/entity missing out on the pre-bid briefing meeting by any proposed bidders nor any delayed responses will be entertained.

vi. If the bidders would like to interact with IUAC team or would like to visit IUAC-Delhi prior to the bidding, they would send the request to the SAMEER. A mutually convenient date would be decided for the visit or on-site interaction.

Chapter 5 - Bid submission

5.1. Bid Submission Instructions

i. The bidders should submit their offers in two (2) parts Pre-Qualification Bid, Technical Bid as per format given in this document.

ii. The bidder shall submit following envelopes:

Envelope Number	Marked As	Content of Envelope
One	Response to Pre-Qualification criterion from <<Bidder Name>>	One Original Hard Copy, One Duplicate Hard Copy & One Soft Copy of the documents as per Annexure B.12
Two	Technical bid/proposal from << Bidder Name>>	One Original Hard Copy, One Duplicate Hard Copy & One Soft Copy of the documents as per Annexure B.13

iii. The bidders should submit soft copy of technical bid in a sealed envelope. Technical bid should be in a single file in PDF format.

iv. The soft copy media (CD/DVD/USB) must be duly signed using a permanent Pen/Marker and should bear the name of the bidder.

v. The bidder shall seal the response to the invitation of EoI, including response to pre-qualification bid and Technical bids in an outer envelope marked "Response to the invitation of EoI for engagement for INDIAN MANUFACTURING OF 1.5 T MAGNETIC RESONANCE IMAGING". The envelope shall indicate the name and address of the bidder.

vi. The outer envelope shall indicate the name and address of the bidder to enable the proposal to be returned unopened in case it is declared "late". Both inner and outer envelopes shall be addressed to SAMEER at the address specified in section 1.2.

vii. The original proposal shall be prepared in indelible ink. It shall contain no inter- lineation or overwriting, except as necessary to correct errors made by the bidder itself.

viii. Any such corrections must be initialed by the person (or persons) who sign(s) the proposals.

ix. All pages of the proposal must be sequentially numbered and shall be initialed by the Authorized Representative of the bidder.

x. A bidder is eligible to submit only one (1) Bid against this EoI.

xi. To assist in the examination, evaluation and comparison of bids, SAMEER at their discretion can ask the bidder for the clarification of its bid. The request for clarification and the response shall be in writing. However, post submission of bid, no clarification at the initiative of the bidder shall be entertained.

xii. Bidders if they choose, may prior to submitting their bid, visit SAMEER, with prior appointment. However, any such bidders agree that SAMEER will not be responsible for any outcomes that may arise from such meetings.

xiii. Bidders may be called for making a presentation before the committee.

xiv. Authority may visit bidder's facilities for the assessment.

xv. At any time before the submission of EoI, the Authority may carry out amendment(s) to this EoI document and/or the schedule. The amendment will be made available on SAMEER websites (www.sameer.gov.in) as well as CDAC (www.cdac.in), IUAC (www.iuac.res.in) and MeitY (www.meity.gov.in) website and will be binding on the bidder. The Authority may at its discretion extend the bid schedule for the submission of proposals.

xvi. The Authority reserves the right to accept or reject any application without assigning any reason thereof or assuming any liability.

xvii. Bids that are incomplete in any respect or those that are not consistent with the requirements as specified in this document or those that do not adhere to formats, wherever specified may be considered non-responsive and may be liable for rejection and no further correspondences will be entertained with such bidders.

xviii. Canvassing in any form would disqualify the applicant.

xix. For any clarifications on the Expression of Interest, the following may be contacted through email/Letter

Shri. Tapas K. Bhuiya
Scientist-E,
Technology Innovation Division,
SAMEER, Mumbai 400076
E-mail: tapas@sameer.gov.in

5.2. Integrity Pact

The bidder is required to enter into an Integrity Pact with SAMEER. For this, the

bidder shall submit the original signed, stamped and notarized Integrity Pact as part of Pre-qualification bid failing which, the Proposal submitted by the concerned bidder will be liable to be forthwith and summarily rejected. The format for the Integrity Pact is provided in Annexure B.11. All bidders are bound to comply with the integrity pact clauses. Bids submitted without signing the integrity pact will be rejected (entirely at SAMEER's sole determination) without assigning any reason absolutely whatsoever.

5.3. Technical Proposal guidelines

i. The bidder is expected to understand the complete scope of the technology required for manufacturing the MRI sub-module as per know how transfer by SAMEER on "**as is where is basis**" described in this EoI under para 3.1, 3.2 & 3.3. Bidder is required to give the acceptance to receive the technology on **"as is where is basis"** as per technical specifications and status of development described under 3.2 & 3.3. Also as an integrator the bidder is expected to understand the entire integration process.

ii. SAMEER retains the right of the final say in the interpretation of the scope of the Project in terms of Technology required for Manufacturing and deployment of MRI sub-modules, as listed in this EoI.

iii. The bidder is expected to submit their bid in the format specified. Failure to use the specified formats may result in disqualification/rejection of the proposal.

iv. The Technical Proposals must be direct, concise, and complete. Any information which is not directly relevant to this EoI should not be included in the proposal by the bidder.

v. The bidder is requested to provide documentary evidence of experience, methodology or any other information provided in the Technical Bid. The bidders are not expected to attach any promotional material or brochures with the proposal.

vi. The bidder shall number all the pages of the Technical Bid including the annexure and other attachments. All pages should be signed by the authorized signatory.

vii. The Technical proposal shall include the following major sections:

i) Section I – Understanding of Scope of Technology required for Manufacturing of sub-modules of Indian Magnetic resonance Imaging
The bidder is expected to understand the complete scope of this technology required for manufacturing of sub-components of Magnetic Resonance Imaging Machine as per knowledge transfer by SAMEER and its collaborating partners.

ii) Section II – Proposed Approach and Methodology
Overall tentative approach and methodology for manufacturing of subsystems of Indian Magnetic Resonance Imaging as well as integration

- Methodology for manufacturing electrical / electronic subsystems /RF subsystems, manufacturing mechanical sub-systems and integration and testing with both procured and Indian magnet.

iii) Section III – Broad Work Plan

- Proposed stages of product development with timeline.
- Proposed plan for manufacturing first unit including QA/QC and obtaining type approval from appropriate authority
- Proposed plan for manufacturing subsequent units

viii. Additional information directly relevant to the manufacturing of the MRI machine provided in the EoI may be submitted to accompany the proposal. In submitting additional information, please mark it as supplemental to the required response.

5.4. Venue and Deadline for submission

i. Proposals must be received at the address specified in Chapter 1 of this EoI.

ii. Any proposal received by the SAMEER after the above deadline shall be rejected and returned opened or unopened to the bidder

iii. SAMEER shall not be responsible for any postal delay or non-receipt/ non-delivery of the documents. No further correspondence on the subject will be entertained.

iv. SAMEER reserves the right to

a. Relax, add, change, modify or waive/delete any of the conditions stipulated in this EoI document as deemed necessary in the best interest of the Nation and the objective of the scheme without assigning any reasons thereof and

b. Include any other item in the scope of work at any time after consultation in the pre-bid meeting or otherwise.

v. SAMEER reserves the right to modify and amend any of the above- stipulated condition(s)/criterion(s) depending upon project priorities.

vi. In case, the day of bid submission is declared holiday by Govt. of India, the next working day will be treated as day for submission of bids. There will be no change in the timings.

5.5. Bid Opening

The Bids will be opened by the committee formed by the competent authority (CFBCA). There will be two (2) bid-opening events:

a) Pre-Qualification bid

b) Technical bid

The venue, date and time for opening the Pre-qualification bid are as mentioned in section 1.2. The date and time for opening of Technical bid would be communicated to the qualified bidders.

The Technical Bids of only those bidders will be opened who clear the Pre-qualification stage as selected.

IMPORTANT NOTE:

a. Participation in Bid Opening will be STRICTLY via ONLINE VIRTUAL PLATFORM.
b. Vendors interested must fill the ONLINE FORM available at http://publictender.sameer.gov.in/ , two (2) working days before the bid opening date.
c. On the day of Bid opening, a virtual meeting link will be provided through mail to the vendors who have registered for participating in the EoI bidding. Only the vendors who have submitted the offer can participate in the online bid opening.
d. There will be a presumption that those Vendors who did not fill in the form are not interested in joining the EoI bid Opening Process.

5.6. *Right to Accept Any Proposal and To Reject Any or All Proposal(s)*

SAMEER reserves the right to accept or reject any proposal, and to annul the biding process and reject all proposals at any time prior to award of contract, without thereby incurring any liability to the affected bidder or bidders or any obligation to inform the affected bidder or bidders of the grounds for SAMEER's action. In the remote event that no bids are accepted or successful, SAMEER reserves the right to float another EoI or totally discard this EoI without any liability to the intending Bidders in this EoI. This however, does not limit the bidders ability to re-bid for another EoI.

5.7. *Notification of Award*

i. Prior to the expiration of the validity period, SAMEER will notify the successful bidder in writing or by fax or email, that its proposal has been accepted. In case the evaluation process has not been completed within the stipulated period, SAMEER reserves the right to extend the validity period of the bid or the evaluation process itself.

Chapter 6 Bid Evaluation

6.1. Committee formed by the competent authority (CFBCA)

i. The committee formed by the competent authority (CFBCA) constituted by SAMEER shall evaluate the Bids.

ii. The decision of the CFBCA in the evaluation of the Technical (including Pre-Qualification) bids shall be final. Technical Bid evaluation is to ensure that the proposed solution by the bidder meets the functional/technical requirements as outlined in the EoI Document. No correspondence will be entertained outside the process of discussion with the Committee.

iii. CFBCA will evaluate and compare the bids determined to be substantially responsive. It is CFBCA intent to select the proposals that are responsive to the project needs and each proposal will be evaluated using the information furnished in technical bid as per section 5.3.

iv. To qualify the Technical Bid Evaluation, the bidder must conform to all the requirements stated in the EoI document.

6.2. Pre-qualification Evaluation

i. The bidders must have furnished the necessary documents to establish their eligibility (indicating the page number in the bid) for each of the items given as per Annexure A: ELIGIBILITY CRITERIA. Relevant portions in the documents should be highlighted. If a bid is not accompanied by all the necessary documents/requisite details as required, it will be summarily rejected.

ii. A Bid that does not fulfill all the stipulated eligibility conditions/criteria will not be considered.

6.3. Technical Bid Evaluation

i. Committee formed by the competent authority (CFBCA) constituted by the SAMEER will carry out a detailed evaluation of responses to the EoI and all supporting documents/ documentary evidence. Technical Bids received will be evaluated to determine whether they are substantially responsive to the requirements set forth in the Expression of Interest. In order to reach such a determination, CFBCA will examine the information supplied by the bidders, and shall evaluate the same. In the event of inability to submit requisite supporting documents / documentary evidence, bid shall be rejected.

ii. **Proposal Presentations:** The Committee shall invite bidders who meet pre-qualification criteria to make a Presentation. The purpose of such presentations

would be to allow the bidders to present their proposed approach to the CFBCA and the key point in their respective proposals.

iii. The technical evaluation of Bids will be carried out to ensure technical and functional compliance with requirements mentioned in the EoI.

iv. The decision of the CFBCA in the evaluation of responses to the Expression Of Interest shall be final. No correspondence will be entertained in this regard.

v. CFBCA will evaluate the bidder's proposal based upon its clarity and the directness of its response to the requirements of the project as outlined in this EoI.

vi. SAMEER reserves the right to ask for more information in terms of customer name, experience or deliverables and the bidder is required to provide details about the information enquired.

vii. CFBCA reserves the right (without any liability) to reject any or all proposals on the basis of any deviations.

Chapter 7 - Appointment of Successful bidder

7.1. Award Criteria

SAMEER will award the Contract to the successful bidder on NON exclusive basis based on the evaluation criteria described herein.
Whichever bidder meets the evaluation criteria the contract will be awarded to that SM/SI consortium. There is no limit on the number of SM/SI consortium to whom the contract can be awarded.

The selected bidder will be asked to submit the final proposal against the (Request for Proposal) RFP sent by SAMEER and they will be required to submit the same within 15 days from date of communication sent to them.

7.2. Signing of Contract/Agreement

After SAMEER notifies the successful bidder that its proposal has been accepted, the bidder must sign the contract/agreement within thirty (30) days of notification with the respective institute namely, SAMEER and its collaborating partners.

7.3. *Failure to Agree with the Terms and Conditions of the EoI*

a. Failure of the successful bidder to agree with the Legal Agreement and Terms & Conditions of the EoI shall constitute sufficient grounds for the annulment of the award, in which event SAMEER may award the contract to the next qualifying bidder or call for new proposals from the interested bidders.

Chapter 8 – Deliverables and Timelines

i. The successful bidder shall render progress-cum-achievement reports to SAMEER on a quarterly basis (or as required by it) on the progress made on all aspects of the project.

ii. The timelines are divided into following activities:

Sr. No	Description	Timeline (T)
1	Signing of agreement	Within 30 days from award of contract
2	Training and handholding for development and manufacturing of sub-system	12 months
3	Testing and integration	18 months

Chapter 9 - Progress Review and Monitoring

9.1. Committee formed by the competent authority

Committee formed by the competent authority (CFBCA) Constituted by SAMEER will meet on a regular basis to review and monitor the manufacturing progress.

In case of delay, the successful bidder will be called for meeting with CFBCA to explain the reasons for the delay to in the schedule and to make recommendations regarding termination of exclusivity clause of the contract. CFBCA's decision will be final and binding on the bidder. In such an event of termination of exclusivity, CFBCA or SAMEER may select/appoint alternative manufacture/ vendor for carrying out the manufacturing process.

9.2. Technical Review Committee for monitoring of execution of the project

A Technical Review Committee (TC) will be set up during the start of the project. The TC will, at the minimum, include a designated point of contact from bidder. It will also include key persons from various stakeholders like SAMEER, field experts and other officials/representatives by invitation. The operational aspects of the TC need to be handled by SAMEER including maintaining monthly statuses, minutes of the meetings, project plans, etc.

Technical committee will meet formally covering, at a minimum, the following agenda items:

i. Project Progress
ii. Technical challenges and support required from stakeholders
iii. Issues and concerns
iv. Discussion on submitted deliverables
v. Discussion/Clarifications on progress-cum-achievement reports
vi. Any other issues that either party wishes to add to the agenda

Chapter 10 - General Terms and Conditions

10.1. Terms and Conditions

i. While every effort has been made to provide comprehensive and accurate background information on requirements and specifications, bidders must form their own conclusions about the solution needed to meet the requirements. Bidders and recipients of this EoI may wish to consult their own legal advisers in relation to this EoI. All information supplied by bidders may be treated as contractually binding on the bidders, on successful award of the assignment by Authority on the basis of this EoI

ii. All the consortium members (bidders) shall have to enter in a multi-party agreement with SAMEER.

iii. Any notification of preferred bidder status by SAMEER shall not give rise to any enforceable rights by the bidder. SAMEER may cancel or reschedule/ refloat the whole EoI process at any time prior to a formal written contract being executed by or on behalf of the SAMEER.

iv. This EoI supersedes and replaces any previous public documentation & communications related to the components mentioned in the EoI and bidders should place no reliance on such communications.

v. Bidders are advised to study all instructions, forms, terms, requirements and other information in the EoI documents carefully. Submission of the bid shall deemed to have been done after careful study and examination of the EoI document with full understanding of its implications.

vi. The response to this EoI should be full and complete in all respects. Failure to furnish all information required by the EoI documents or submission of a proposal not substantially responsive to the EoI documents in every respect will be at the bidder's risk and may result in rejection of its Proposal.

vii. The bidder is responsible for all costs incurred in connection with participation in this process, including, but not limited to, costs incurred in conduct of informative and other diligence activities, participation in meetings/discussions/presentations, preparation of proposal, providing any additional information required by SAMEER to facilitate the evaluation process, and in negotiating a definitive Contractor and all such activities related to the bid process. SAMEER will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

viii. All materials submitted by the bidder become the property of SAMEER and may

be returned completely at its sole discretion.

xi. At any time prior to the last date for receipt of bids, SAMEER may for any reason whether at its own initiative or in response to a clarification requested by a prospective bidder, modify/change/alter the EoI document by an amendment.

xii. The amendment will be published on the SAMEER website as well as CDAC (www.cdac.in), IUAC (www.iuac.res.in) and MeitY (www.meity.gov.in) website.

xiii. In order to afford prospective bidders reasonable time in which to take the amendment into account in preparing their bids, SAMEER may, at its discretion, extend the last date for the receipt of Bids.

xiv. The bidders are allowed to resubmit their bid, if required, after such amendments.

xv. If SAMEER deems it appropriate to revise any part of this EoI or to issue additional data to clarify an interpretation of provisions of this EoI, it may issue supplements to this EoI. Any such corrigendum shall be deemed to be incorporated by this reference into this EoI.

xvi. SAMEER may, in exceptional circumstances and at its discretion, extend the deadline for submission of proposals by issuing a corrigendum published in the SAMEER website in which case all rights and obligations of the project and the bidders previously subject to the original deadline will thereafter be subject to the deadline as extended.

xvii. SAMEER may terminate the EoI process at any time and without assigning any reason(s). SAMEER makes no commitments, express or implied, that this process will result in a business transaction with anyone. The bidder must specifically indicate if there is any conflict of interest arising as a result of bidder or any consortium partner.

xviii. The intending Bidders acknowledge and agree that IPR must also be filed and reside in India so that India has access and complete control to these rights in times of emergency to protect our national interest.

xix. The Grantee (bidder) shall not on its own name or in the name of any third party, file any patent Application for the grant of patent of the said KNOW-HOW provided by SAMEER to be licensed and hereby agree(s) it/they shall also not oppose at any patent application made by SAMEER.

xx. The details of the add-on knowhow brought in by the Grantee (bidder) by Modifications / Improvements will not be passed on to other agencies by SAMEER without the Grantee (bidder)'s consent.

xxi. Any minor modifications / improvements to the existing designs which the

Grantee (bidder) may consider essential while in the process of commercial production of the article covered under this agreement may be introduced only with prior permission of SAMEER in writing. Any such modification and improvement shall constitute an add-on knowhow to the original knowhow provided here under shall as such belong to SAMEER.

xxii. Any new accessories / attachments / features which the Grantee (bidder) may consider essential during the process of commercialization of the article covered under these terms may be developed and retrofitted by the Grantee (bidder) if these items result in an upgrading of the specification without degrading the performance. All such items will be introduced with prior intimation of the same to SAMEER in writing. If introducing such items make it necessary to get approval from the regulatory authority, Grantee (bidder) will be solely responsible to obtain all such approvals. SAMEER reserves the right to conduct such test, research and evaluation on the Product that are manufactured after introducing such items, as SAMEER may consider necessary to satisfy itself as to the performance of the Product till these terms or the terms of any agreements is/are in force. Grantee (bidder) shall indemnify SAMEER from any deterioration of the system performance arising out of the modification carried by Grantee (bidder).

xviii. The successful bidder shall comply with all applicable regulations, guidelines, notifications, ordinances and laws (including without limitation labor laws, insurance laws, etc.) while providing the services.

xix. All clauses of the EoI shall mutatis mutandis apply to all consortium members to the extent of their scope of work.

xx. Subcontracting of this contract as a whole is not allowed.

xxi. In case of any dispute on any matter related to the project/ this EoI during the course of its implementation, the decision of the Secretary, MeitY shall be final and binding.

10.2. Instructions for Consortium

Bidder can form consortium with the partners to leverage the expertise of the partners – Design/Fabrication/Sales or any other relevant expertise required to manufacture and supply sub-modules of Magnetic Resonance Imaging Machine.

1. All members in the consortium should be registered as a legal entity in India and should have signed the Integrity Pact.

2. At least one (1) member of the consortium should meet the turnover, project experience mentioned in Annexure A.

3. The lead bidder shall be liable for the entire scope of work and risks involved

thereof (the liability shall be for the entire value of the contract).

4. The non-lead bidders shall be liable for the scope of work for which they are responsible along with the lead bidder (Liability shall be limited to the value of the scope of work; while the lead bidder still carries the liability for the entire scope of work.)

5. Any change in the consortium member at a later date would not be allowed without prior permission of SAMEER for cases where the consortium has benefited from the non-lead bidders credentials/ experience.

6. Member of one (1) consortium cannot be part of any other consortium for the bidding.

10.3. Conflict of Interest

1. The bidder must specifically indicate if there is any conflict of interest.
    1.1 If there is a conflict of interest, the bidder must mention such conflict of interest in their bid for evaluation by SAMEER and if requested by SAMEER, give such undertaking as may be required by SAMEER to mitigate any adverse impact of such conflict on the project.

2. The bidder must specifically indicate if there is any conflict of interest arising if any staff/official who may be involved in the preparation, negotiation, management or enforcement of the contract has any private interest relevant to the proposal. If there is a conflict of interest, the bidder must submit/give undertaking, indemnifying SAMEER and confirming that the existence of any such staff/official will not affect or adversely impact the project.

10.4. Inspection, Quality Control and Audit

The selected bidder shall, whenever required, furnish (and provide assistance towards) all relevant information, records, and data to auditors and/or inspecting officials of SAMEER and or any authority designated by SAMEER. SAMEER reserves the right to call for any relevant material information/report which would help it in arriving at a decision.

10.5. Manage Risks

1. The successful bidder shall identify and bear all the risks associated with Development, Implementation, and Support & Maintenance for supply of Indian MRI and indemnify SAMEER from any and all such risks.

2. SAMEER shall not compensate for any losses if any incurred by the successful bidder during the entire contract period and even thereafter.

10.6. Disqualification

The proposal is liable to be disqualified in the following cases or in case bidder fails to meet the bidding requirements as indicated in this EoI:

i. Proposal not submitted in accordance with the procedure and formats prescribed in this document or treated as non-conforming proposal.

ii. During validity of the proposal, or its extended period, if any, the bidder varies its quoted prices.

iii. Bidder's proposal is conditional and has deviations from the terms and conditions of EoI.

iv. Proposal is received in incomplete form.

v. Proposal is received after due date and time.

vi. Proposal is not accompanied by all the requisite documents

vii. Information submitted in bid proposal is found to be misrepresented, incorrect or false, accidentally, unwittingly or otherwise, at any time during the processing of the contract or during the tenure of the contract including the extension period if any.

viii. Bidder tries to influence the proposal evaluation process by unlawful/corrupt/fraudulent means at any point of time during the bid process.

10.7. Limitation of Liability

i. Neither Party shall be liable to the other Party for any indirect or consequential loss or damage (including loss of revenue and profits) arising out of or relating to the bidding process, EoI or Contract.

ii. In the case of Gross Negligence or Willful Misconduct on the part of the successful bidder or on the part of any person acting on behalf of the successful bidder executing the work or in carrying out the Services, the successful bidder, with respect to damage caused by the successful bidder including to property and/or assets of SAMEER or its stakeholders shall regardless of anything contained herein, be liable for any direct loss or damage.

iii. This limitation of liability slated in this Clause, shall not affect the successful bidder's liability, if any, for damage by successful bidder to a Third Party's real property, tangible personal property or bodily injury or death caused by the successful bidder or any person acting on behalf of the successful bidder in executing the work or in carrying out the Services and shall also not affect indemnity provisions under clause 10.8 below.

10.8. Indemnify

The selected bidder must/will indemnify SAMEER and its stakeholders against all third party claims of intellectual property rights infringement including infringement of patent, trademark/copyright or industrial design rights arising from the use of the services, designs, codes, chips etc. and related services or any part thereof. SAMEER and its stakeholders stand indemnified from any claims that the hired manpower / bidder vendor's manpower may opt to have towards the discharge of their duties in the fulfillment of the contract or the provision of services therein. SAMEER and its stakeholders also stand indemnified from any compensation arising out of accidental loss of life or injury sustained by the hired manpower / bidder's manpower while discharging their duty towards fulfillment of the contract as well as any faulty engineering, design, intended performance or deliverables or the product(s).

10.9. Termination for Default

SAMEER may, without prejudice to any other remedy for breach of contract, by written notice of default sent to the bidder, terminate the contract in whole or part: if the bidder fails to deliver any or all of the systems within the period(s) specified in the Contract, or within any extension thereof granted by the SAMEER pursuant to conditions of contract or if the bidder fails to perform any other obligation(s) under the Contract. In the event SAMEER terminates the Contract in whole or in part.

SAMEER may terminate the contract granted to the bidder if the bidder fails to develop, deliver, deploy and validate from doctors, the Indian MRI within the given timeline.

SAMEER may also terminate the contract in the event of any proven fraud or willful negligence on part of the bidder during the tenure of the contract or in the event of any disrepute is bought to the project on the part of any act/omission by the bidder or its officials during any stage of the project as this project is in national interests.

10.10. Termination for Insolvency

SAMEER may at any time terminate the contract by giving four (4) weeks written notice to the selected bidder, without any compensation to the selected bidder, if the selected bidder becomes bankrupt or otherwise insolvent or a bankruptcy or insolvency or winding up etc. proceeding is initiated against the successful bidder.

10.11. Force Majeure

If at any time, during the continuance of the contract, the performance in whole or in part by either party of any obligation under the contract is prevented or delayed by reasons of any war, hostility, acts of public enemy, civil commotion, sabotage, fires, floods, explosions, epidemics, pandemics, quarantine restrictions, strikes,

lockouts, acts of God (hereinafter referred to as "events") neither party shall, by reason of such event, be entitled to terminate the contract, nor shall either party have any claim for damages against the other in respect of such non-performance or delay, provided the performance and/or delivery is resumed as soon as practicable after such event has come to an end or ceased to exist. The decision of SAMEER as to whether the performance or delivery has so resumed or not, shall be final and conclusive, provided further, that if the performance in whole or in part or any obligation under the contract is prevented or delayed by reason of any such event for a period exceeding thirty (30) days, the SAMEER may at its option, terminate the contract without any obligation to compensate or performance on its part.

10.12. Governing Law and Disputes

The contract shall be interpreted in accordance with the laws of the Government of India. All disputes or differences whatsoever arising between the parties out of or in connection with this contract or in discharge of any obligation arising out of the Contract (whether during the progress of work or after completion of such work and whether before or after the termination of this contract, abandonment or breach of this contract), shall be settled amicably. If the matter still remains unresolved, then the same may be referred to for arbitration under the Arbitration and Conciliation Act, 1996. If the parties are not able to solve them amicably, either party (SAMEER or bidder), give written notice to other party clearly setting out there in specific dispute(s) and/or difference(s) and shall be referred to a sole arbitrator mutually agreed upon, and the award made in pursuance thereof shall be binding on the parties. In the absence of consensus about the single arbitrator, the dispute may be referred to joint arbitrator; one to be nominated by each party and the said arbitrators shall nominate a presiding arbitrator, before commencing the arbitration proceedings. The arbitration shall be settled in accordance with the applicable Indian Laws. Any appeal will be subject to the exclusive jurisdiction of courts at Mumbai. The bidder shall continue work under the Contract during the pendency of the arbitration proceedings unless otherwise directed by the SAMEER or unless the matter is such that the work cannot possibly be continued until the decision of the arbitrator is obtained. Arbitration proceeding shall be held at Mumbai, India, and the language of the arbitration proceedings and that of all documents and communications between the parties shall be in English.

JURISDICTION

The Parties to this Agreement hereby declare that the Courts in **Mumbai** alone will exclusively deal with disputes, if any, arising out of this Agreement.

10.13. Fraud and Corrupt Practices

a) The bidders and their respective officers, employees, agents and advisers shall observe the highest standard of ethics during the Selection Process. Notwithstanding anything to the contrary contained in this EoI, SAMEER shall

reject a bid without being liable in any manner whatsoever to the bidder, if it determines that the bidder has, directly or indirectly or through an agent, engaged in corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice (collectively the "Prohibited Practices") in the Selection Process.

b) Without prejudice to the rights of the SAMEER under Clause above and the rights and remedies which SAMEER may have under these terms or the Agreement, if a bidder, as the case may be, is found by the Authority to have directly or indirectly or through an agent, engaged or indulged in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice during the Selection Process, or after the execution of the Agreement, such bidder shall not be eligible to participate in any bid or EoI issued by SAMEER during a period of two (2) years from the date such bidder, as the case may be, is found by SAMEER to have directly or through an agent, engaged or indulged in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice, as the case may be.

c) For the purposes of this Section, the following terms shall have the meaning hereinafter respectively assigned to them:

d) "corrupt practice" means (i) the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence the action of any person connected with the Selection Process (for avoidance of doubt, offering of employment to or employing or engaging in any manner whatsoever, directly or indirectly, any official of SAMEER who is or has been associated in any manner, directly or indirectly with the Selection Process or has dealt with matters concerning the Agreement or arising there from, before or after the execution thereof, at any time prior to the expiry of one year from the date such official resigns or retires from or otherwise ceases to be in the service of SAMEER, shall be deemed to constitute influencing the actions of a person connected with the Selection Process); or (ii) save as provided herein, engaging in any manner whatsoever, whether during the Selection Process or after the execution of the Agreement, as the case may be, any person in respect of any matter relating to the Project, these terms or the Agreement, who at any time has been or is a legal, financial or technical consultant/ adviser of SAMEER in relation to any matter concerning the Project;

e) "fraudulent practice" means a misrepresentation or omission of facts or disclosure of incomplete facts, in order to influence the Selection Process;

f) "coercive practice" means impairing or harming or threatening to impair or harm, directly or indirectly, any persons or property to influence any person's participation or action in the Selection Process;

g) "undesirable practice" means (i) establishing contact with any person connected with or employed or engaged by SAMEER with the objective of canvassing, lobbying or in any manner influencing or attempting to influence the Selection Process; or (ii) having a Conflict of Interest; and

h) “Restrictive practice” means forming a cartel or arriving at any understanding or arrangement among bidders with the objective of restricting or manipulating a full and fair competition in the Selection Process.

Chapter 11 - Annexures

Annexure A - Eligibility Criteria

The format is mentioned in section 2.3.3.

The bidder is required to download the EoI document from the website. The complete document is required to be signed on each page along with the company seal and submitted along with the prequalification bid.

Annexure B – Bid Formats

B1 Request for Clarifications

Bidders requiring specific points of clarification may communicate with SAMEER during the specified period using the following format:

bidder's Request for Clarification			
Name of the Organization			
Representative Name			
Position / Designation			
Email Address			
Contact Details		Mob:	Landline:
Clarifications Requested			
S. No.	EoI Page No – Section – Sub-section	Content of the EoI	Points of Clarification
1			
2			
3			

Yours faithfully,
Designated Contact Person
Company name

B2 Authorization Letter

Duly authorized to sign the EoI Response for and on behalf of:
(Name and Address of Company) (Seal/Stamp of bidder)
Witness Signature:
Witness Name:
Witness Address:

CERTIFICATE AS TO AUTHORISED SIGNATORIES

I, <representative *name*>, the Company Secretary of <*name of the organization*>, certify that
<*Representative name*>who signed the above Bid is authorized to do so and bind the company by authority of its board/ governing body.
Date:
Name:
Designation:
Signature: (Company Seal)

Note*: Authorized signatory should be an employee of the bidder organization and should have been authorized vide a board resolution, authorizing him/her to sign/execute the proposal as a binding document and also to execute all relevant agreements forming part of EoI. Copy of board resolution should be provided/annexed along with this Authorisation Letter.*

B3 Litigation Impact Statement

<Company letter head>

<Date>
<Address>

Ref: EoI for ENGAGING INDUSTRIES FOR MANUFACTURING OF INDIAN MAGNETIC RESONANCE IMAGING (MRI) MACHINE

Dear Sir,

We have read and understood the contents of the Expression of Interest and pursuant to this hereby confirm that we continue to satisfy the eligibility criteria laid out at the time of short-listing us to participate in the bidding process to EoI for ENGAGING INDUSTRIES FOR MANUFACTURING OF INDIAN MAGNETIC RESONANCE IMAGING (MRI) MACHINE.

There are no pending litigations/proceedings (or notices/orders issued or any process initiated against us) in any court of law, regulatory authority or quasi-judicial authority, which are likely to have a materially adverse impact on our ability to deliver under this project, or to pay our debts as they fall due or on our ability to enter into any of the transactions contained in or contemplated in respect of the manufacturing of sub-modules of magnetic resonance imaging (MRI) Machine or for building complete magnetic resonance imaging (MRI) Machine.

<Signature> <Designation>

Duly authorized to sign the EoI Response for and on behalf of:

Sincerely,

Company
Seal Name
Designation
Signature
Date
<Name and Address of Company> Seal/Stamp of the Company

B4 Bid Cover Letter

<Company letter head> <Date>
<Address>

Dear Sir,

Ref: EoI for ENGAGING INDUSTRIES FOR MANUFACTURING OF INDIAN MAGNETIC RESONANCE IMAGING (MRI) MACHINE

Having examined the EoI, the receipt of which is hereby duly acknowledged, we, the undersigned, offer to provide the professional services as required and outlined in the EoI for ENGAGING INDUSTRY FOR MANUFACTURING OF MAGNETIC RESONANCE IMAGING (MRI) MACHINE

We attach hereto the response as required by the EoI, which constitutes our proposal.

We confirm that the information contained in this response or any part thereof, including its exhibits, and other documents and instruments delivered or to be delivered to SAMEER is/are true, accurate, verifiable and complete. This response includes all information necessary to ensure that the statements therein do not in whole or in part mislead SAMEER in its short-listing process. Further, we declare that there are no conflict of interest situations that are or may affect this EoI and the subsequent actions that flow from it.

We fully understand and agree to comply that on verification, if any of the information provided here is found to be misleading the short listing process, we are liable to be dismissed from the selection process or termination of the agreement during the project, if selected to do so.

We agree for unconditional acceptance of all the terms and conditions set out in the EoI document and also agree to abide by this bid response from the date fixed for bid opening.

We agree that SAMEER is not bound to accept any bid response that they may receive. We also agree that SAMEER reserves the right in absolute sense to reject all or any of the products/ services specified in the bid response.

It is hereby confirmed that I/We are entitled to act on behalf of our company/ corporation/ firm/ organization and empowered to sign this document as well as such other documents, which may be required in this connection.

The following persons will be the authorized representatives of the company for all the future correspondence till the completion of the bidding process, between SAMEER and our organization.

Details	**Primary Contact**	**Secondary**
Name		
Designation		
Address		
Landline No.		
Mobile No.		
Fax No.		
Email Address		

We understand that it will be the responsibility of our organization to keep SAMEER informed of any changes in this list of authorized persons and we fully understand that SAMEER shall not be responsible for non-receipt or non-delivery of any communication and/or any missing communication in the event reasonable prior notice of any change in the authorized person(s) of the company is not provided to SAMEER.

Dated this ..... Day of **2021**
Sincerely, Company Seal

Name Designation Signature Date

<Name and Address of Company> Seal/Stamp of the Company

B5 Conflict of Interest

<Company letter head>

<Date>

<Address>

Sir,

Sub: Undertaking on Conflict of Interest regarding Engaging Industry for Manufacturing of INDIAN MAGNETIC RESONANCE IMAGING (MRI) MACHINE

I/We do hereby undertake that there is absence of, actual or potential conflict of interest on the part of the bidder or any prospective subcontractor due to prior, current, or proposed contracts, engagements, or affiliations with SAMEER.

I/We also confirm that there are no potential elements (time-frame for service delivery, resource, financial or other) that would adversely impact our ability to complete the requirements as given in the EoI.

We undertake and agree to indemnify and hold SAMEER harmless against all claims, losses, damages, costs, expenses, litigations, proceedings, fees of legal advisors (on a reimbursement basis) and fees of other professionals incurred (in the case of legal fees and fees of professionals) by SAMEER and/or its representatives, if due to any such conflict any loss or damage is suffered by SAMEER.

<Signature>

<Designation>

Duly authorized to sign the EoI Response for and on behalf of:

Sincerely,

Company Seal

Name

Designation

Signature

Date

<Name and Address of Company> Seal/Stamp of the Company

B6 Details of bidder Organization

To be filled separately by consortium members

<Company Letter Head>

Details of the bidder Organization	
Name	
Nature of the legal status in India	
Nature of business in India	
Date of Incorporation	
Date of Commencement of Business	
ROC Reference No	
Address of the Headquarters	
Address of the Registered Office in India	
Address of offices in India	

Other Relevant Information

Name of contact person: Address: Telephone: Fax: E-mail:	
Permanent Account Number:	
GSTN	
The Bidder profile. Giving details of current activities and management/personnel structure including evidence of incorporation.	
The in-house technological expertise available form the following to be furnished:	
High power RF Amplifier	
High power RF System	
Precision & heavy mechanical engineering	
Control and Instrumentation	
Imaging Technology	
Super conducting magnet and Cryogenic technology	
Embedded system technology	

Mandatory Supporting Documents:

a. Certificate of Incorporation from Registrar Of Companies (ROC)

b. Relevant sections of Memorandum of Association of the company or filings to the stock exchanges to indicate the nature of business of the company

c. Certification on commencement of business

d. Copy of board resolution authorizing the bid signatory along with power of attorney

CERTIFICATE AS TO AUTHORISED SIGNATORIES

I, <representative *name*>, the Company Secretary of <*name of the organization*>, certify that <*Representative name*>who signed the above Bid is authorized to do so and bind the company by authority of its board/ governing body.

Date: Name: Designation: Signature:

(Company Seal)

B7 Undertaking of not being Black Listed

(To be submitted on the Letterhead of the bidder)

<Date>

<Address>

Dear Sir,

We confirm that our company is not blacklisted in any manner whatsoever by MeitY, any State Government, Central Government or any other Public sector undertaking or a Corporation or any other Autonomous organization of Central or State Government or the Registrar of Companies/ Firms as on Bid submission date.

Further we confirm that, our company is not convicted of an offence (a) under the Prevention of Corruption Act, 1988; or (b) the Indian Penal Code or any other law for the time being in force, for causing any loss of life or property or causing a threat to public health as part of execution of a public procurement contract, during last 3 years from date of submission of this bid.

It is hereby confirmed that I/We are entitled to act on behalf of our company/ corporation/ firm/ organization and empowered to sign this document as well as such other documents, which may be required in this connection.

Sincerely,

<Signature>

<Company Seal>

Name:

Designation:

Name and Address of Company:

B8 Financial Information of the bidder

To be filled separately by consortium members

<Date>

Financial Information		
2018-19	2019-20	2020-21
Turnover (in INR crores)		
Profit Before Tax (in INR crores)		
Net Worth (in INR crores)		
Other Relevant Information		
Mandatory Supporting Documents: a. Externally Audited financial statements for each of the three (3) financial years as mentioned above (Please include only the sections on P&L, revenue and the assets, not the entire balance sheet.) b. Certification by the company auditors supporting the revenue break-up		

<Signature>

<Company Seal>

Name:

Designation:

Name and Address of Auditor:

B9 Bidder's Experience

To be filled separately by consortium members

Bidder's experience in the last 5 financial years from the date of publishing of EoI
Product development
The previous experience of manufacturing products under the EoI/own internal development by the Bidder is preferred. Please furnish the details. SAMEER would (either through itself or through its authorized representatives) inspect the manufacturing facilities of the Bidder, and the decision of SAMEER visiting committee would be final and binding on all the parties.
Products manufactured as regular activity
List of products manufactured as regular activity in last five years. Give the list of products with general specifications and the customers.
List of clients
List of PSUs/ Govt. customers- with the contact details (Address, Telephone Number, and the name of contact person)
List of other important customers – with the contact details (Address, Telephone Number, and the name of contact person)

Supporting Documents

Bidders to submit (a) Work Order/Purchase Order/Contract + Completion Certificates from the client; OR (b) Work Order/Purchase Order/Contract + Certificate of Completion by the Statutory Auditor; (c) OR Work Order/Purchase Order/Contract + Phase Completion Certificate for Projects for which Development is complete

The above supporting document(s) should clearly specify the value of the purchase order. The above document(s) should be duly certified by authorized signatory. Please use separate forms for multiple citations.

<On behalf of bidder Name>
Authorized Signature [In full and initials]:
Name and Title of Signatory:
Name of Firm: Address:
Seal/Stamp of bidder:

B10 Technical Proposal Cover Letter

<Letterhead of the bidder>
<Date>
<Address>

Ref: EoI for ENGAGING INDUSTRY FOR MANUFACTURING OF INDIAN MAGNETIC RESONANCE IMAGING (MRI) MACHINE

Dear Sir,

Having examined the bid document, the receipt of which is hereby duly acknowledged, we, the undersigned, offer to bid for **ENGAGING INDUSTRIES FOR MANUFACTURING OF INDIAN MRI** as required and outlined in the EoI.

We attach hereto the bid Technical response as required by the bid document, which constitutes our proposal.

We undertake, if our proposal is accepted, to provide all the services put forward in this EoI or such features as may subsequently be mutually agreed between us and SAMEER or its appointed representatives.

We agree for unconditional acceptance of all the terms and conditions in the bid document and also agree to abide by this bid response till the expiry of the Bid Validity Period. Until a formal contract is prepared and executed, this bid response (along with any changes agreed by us), together with your written acceptance thereof in your notification of award, shall constitute a letter of intent between us and SAMEER.

We confirm that the information contained in this proposal or any part thereof, including its exhibits, schedules, and other documents and instruments delivered or to be delivered to SAMEER is true, accurate, and complete. This proposal includes all information necessary to ensure that the statements therein do not in whole or in part mislead SAMEER as to any material fact.

We agree that you are not bound to accept any bid response you may receive. We also agree that you reserve the right in absolute sense to reject all or any of the products/ service specified in the bid response without assigning any reason whatsoever.

It is hereby confirmed that I/We are entitled to act on behalf of our corporation/company/ firm/organization and empowered to sign this document as well as such other documents, which may be required in this connection.

Dated this ..... Day of ..... **2022.**

(Signature) (In the capacity of) Duly authorized to sign the Bid Response

for and on behalf of:

(Name and Address of Company) Seal/Stamp of bidder

CERTIFICATE AS TO AUTHORISED SIGNATORIES

I, certify that I am .....<designation>..... of the .....<Company Name>....., and that .....<Name of the Respondent>..... who signed the above response is authorized to bind the corporation by authority of its governing body.

Date

(Seal here)

Signature

B11 Integrity Pact

This Integrity Pact is entered into by and between SAMEER located at Mumbai, which expression shall, unless excluded by or repugnant to the context, deemed to include its successor/s in office or assign) of the First Part;

AND

_____, a Company incorporated under the Companies Act, 1956, having its registered office at_____(hereinafter referred to as "bidder" which expression shall, unless the context otherwise requires, include its permitted successors and assigns) of the Second Part.

Preamble

SAMEER intends to award, under laid down organizational procedures, contract for _through an open bid process and has issued EoI bearing number _____. SAMEER values full compliance with all relevant laws of the land, rules, regulations, economic use of resources and of fairness/ transparency in its relations with its bidder(s) and /or Vendor(s) / Contractor(s).

In order to achieve these goals, SAMEER wishes to enter into this Integrity Pact with the bidder(s) for this EoI process and execution of the Agreement and will appoint an <Independent External Monitor (IEM)>, who will monitor the EoI process and the execution of the Agreement for compliance with the principles mentioned above.

Section 1 – Commitments of SAMEER

a) SAMEER commits itself to take all measures necessary to prevent corruption and to observe the following principles:-

i) No employee of SAMEER, personally or through family members, will in connection with the EoI for, or the execution of the Agreement, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which the person is not legally entitled to.

ii) SAMEER will during this EoI process treat all bidder(s) with equity and reason. SAMEER will in particular, before and during this EoI process, provide to all bidders the same information and will not provide to any bidder(s) confidential/ additional information through which the bidder(s) could obtain an advantage in relation to this EoI process or the Agreement execution.

iii) SAMEER will exclude from the process all known prejudiced persons.

b) If SAMEER obtains information on the conduct of any of its officers /employees which is a criminal offence under the Indian Penal Code 1860 and/or Prevention of Corruption Act 1988, or if there be a substantive suspicion in this regard, MeitY will inform the Chief Vigilance Officer and in addition can initiate disciplinary actions.

Section 2 – Commitments of the bidder

a) The bidder commits to take all measures necessary to prevent corruption. It commits itself to observe the following principles during its participation in this EoI process and during the Agreement execution.

b) The bidder will not, directly or through any other persons or firm, offer promise or give to any of SAMEER employees involved in this EoI process or the execution of the Agreement or to any third person any material or other benefit which he/ she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during this EoI process or during the execution of the Agreement.

c) The bidder will not enter with other bidder(s) into any undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in this EoI process.

d) The bidder will not commit any offence under the Indian Penal Code 1860 and / or Prevention of Corruption Act 1988; further the bidder will not use improperly, for purposes of competition or personal gain, or pass on to others, any information or document provided by SAMEER as part of the business

relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.

e) The bidder will, when presenting its bid, disclose any and all payments it has made, is committed to or intends to make to agents, brokers or any other intermediaries in connection with this bidding process or the award of Agreement under this bidding process.

f) The bidder will not, directly or through any other person or firm, approach any Government officials, ministers, political person's public servants, or any external agencies in an effort to influence the bidding decision making process or to attain any undue favor to the bidder.

g) The bidder shall exclude, from this bid process or execution of the Agreement, all known prejudiced persons including those employees / Directors /management representatives of the bidder who have family relationships with the employees or officers of SAMEER.

h) The bidder shall disclose the circumstances, arrangements, undertakings or relationships that constitute, or may reasonably be considered to constitute, an actual or potential conflict of interest with its obligations specified in the EoI process or under any Agreement which may be negotiated or executed with SAMEER. Bidder and its employees, agents, advisors and any other person associated with the bidder must not place themselves in a position which may, or does, give rise to conflict of interest (or a potential conflict of interest) between the interests of SAMEER or any other interests during this bid process or through operation of the Agreement.

i) The bidder will not indulge in any corrupt, fraudulent, coercive undesirable or restrictive practice in the bid process or the execution of the Agreement.

j) The bidder will not instigate third persons to commit offences outlined above or be an accessory to such offences.

Section 3 – Disqualification from bid process and exclusion from future Contracts

If the bidder, during the bid process or before award or during execution of the Agreement has committed a transgression through a violation of Section 2 above, or in any other form, such as to put his reliability or credibility in question, SAMEER is entitled to (without any liability) disqualify the bidder from this bid process or decide not to award the work or terminate the awarded Agreement or blacklist the bidder.

Section 4 – Compensation for Damages

a) If SAMEER has disqualified the bidder from this bid process prior to the award according to Section 3, SAMEER is entitled for compensation of Damage.

Section 5 – Previous Transgression

a) The bidder declares that no previous transgressions occurred in the last three (3) years with any other Central Government / State Government or Central PSU entity in India or any entity in any other country conforming to the anti-corruption approach that could justify bidder's exclusion from this bid process.

b) If the bidder makes incorrect statement on this subject or hides any material information.

c) SAMEER is entitled to disqualify the bidder from this EoI process or action can be taken as per the procedure mentioned in "Guidelines on Banning of business dealings".

Section 6 – Equal treatment of all bidders

a) The bidder undertakes to demand from all subcontractors of the Vendor a commitment in conformity with this Integrity Pact, and to submit it to SAMEER before signing of the Agreement with SAMEER.

b) SAMEER will enter into individual Integrity Pacts with identical conditions as this one with all sub-contractors of the Vendor.

c) Only if the bidder has entered into this Integrity Pact with SAMEER, the bidder shall be eligible to

participate in this bid process or execution of the Agreement.

d) SAMEER will have the right to disqualify the bidder from this bid process if the bidder does not get this Integrity Pact from bidder's authorized signatory or violate any of its provisions.

Section 7 – Criminal charges against violation bidder/ Subcontractor(s)

If SAMEER obtains knowledge of conduct of the bidder or its Subcontractor, or of an employee or a representative or an associate of the bidder or Subcontractor which constitutes corruption, or if SAMEER has substantive suspicion in this regard, SAMEER will inform the same to the Chief Vigilance Officer.

Section 8 – <Independent External Monitor>

a) SAMEER appoints_____as <Independent External Monitor> for this Integrity Pact. The task of <Independent External Monitor> is to review independently and objectively, whether and to what extent the Parties comply with the obligations under this Integrity Pact.

b) <Independent External Monitor> is not subject to instructions by the representatives of the Parties and performs his functions neutrally and independently. <Independent External Monitor> shall report to _____.

c) Independent agency will also sign a non-disclosure agreement with SAMEER to protect the confidentiality.

d) The bidder accepts that <Independent External Monitor> has the right to access without restriction to all project documentation of SAMEER including that provided by the bidder. The bidder will also grant <Independent External Monitor>, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his project documentation. The same is applicable to Subcontractors of the Vendor. <Independent External Monitor> is under contractual obligation to treat the information and documents of the bidder/ Subcontractor(s) of Vendor with confidentiality.

e) SAMEER will provide to <Independent External Monitor> sufficient information about all meetings among the parties related to the bid process or the execution of the Agreement provided such meetings could have an impact on the contractual relations between SAMEER and the successful bidder. The Parties offer to <Independent External Monitor> the option to participate in such meetings.

f) As soon as <Independent External Monitor> notices, or believes to notice, a violation of this Integrity Pact, he will so inform SAMEER and request SAMEER to discontinue or take corrective action, or to take other relevant action. <Independent External Monitor> can in this regard submit non-binding recommendations. Beyond this, <Independent External Monitor> has no right to demand from the parties that they act in a specific manner, refrain from action or tolerate action.

g) <Independent External Monitor> will submit a written report to SAMEER within 8 to 10 weeks from the date of reference or intimation to him by SAMEER and, should the occasion arise, submit proposals for correcting problematic situations.

h) If <Independent External Monitor> has reported to SAMEER, a substantiated suspicion of an offence under relevant Indian Penal Code 1860 and Prevention of Corruption Act 1988, and SAMEER has not, within the reasonable time taken visible action to proceed against such

i) Offence or reported it to the Chief Vigilance Officer, <Independent External Monitor> may also transmit his information directly to the Central Vigilance Commissioner, Government of India.

j) The word 'Monitor' would include both singular and plural.

Section 9 – Pact Duration

a) This Integrity Pact begins when both Parties have legally signed it. It expires for the successful bidder 12 months after the last payment under the Agreement, and for all other bidders, six (6) months after the execution of the Agreement with the Vendor.

b) If any claim is made/ lodged during this time, the same shall be binding and continue to be valid despite the lapse of this pact as specified above, unless it is discharged/ determined by SAMEER.

Section 10 – Other provisions

a) This Integrity Pact is subject to Indian Law, place of performance and jurisdiction is the Office of SAMEER first above written, i.e. Mumbai.

b) Changes and supplements of this Integrity Pact as well as termination notices need to be made in writing. Parties acknowledge that side agreements have not been made.

c) Should one or several provisions of this Integrity Pact turn out to be invalid, the remainder of this Integrity Pact remains valid. In this case, the Parties will strive to come to an agreement to their original intentions.

For & On Behalf of SAMEER	For & On Behalf of the bidder
(Official Seal)	(Official Seal)
Signature:	Signature:
Name	Name
Place Date	
Witness	Place Date
(Name, Signature & Address)	Witness
	(Name, Signature & Address)

B12 Pre-Qualification Bid Format

S. No.	Section Heading	Details
1	Bid Cover Letter	Annexure B.4
2	Integrity Pact	Annexure B.11
3	Authorization Letter	Annexure B.2
4	Conflict of Interest	Annexure B.5
5	Litigation Impact Statement	Annexure B.3
6	Details Of Bidder Organization	Annexure B.6
7	Bidders Experience	Annexure B.9
8	Undertaking Of Not Being Black Listed	Annexure B.7
9	Financial Information Of The Bidder	Annexure B.8
10	Pre-Qualification Criteria	Annexure A
11	Signed copy of EoI	

B13 Technical Bid Format

S. No.	Section Heading	Details
1	Technical Proposal Cover Letter	Annexure B.10
2	Technical Proposal (with all relevant documents)	Section 5.3