

## 6.4.1: Institutional strategies for mobilisation of funds and the optimal utilisation of resources

---

## 6.4.1: Institutional strategies for mobilization of funds and the optimal utilization of resources

---

### Contents

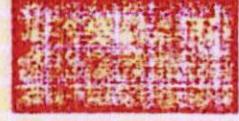
- [Link for Additional Information](#)

# Strategies for Mobilization of Funds and Optimal Utilization of Resources

---

## Contents

1. Establishment of Endowment Fund with Gujarat State Financial Services Ltd.
2. Establishment of Research Labs
  - Finishing School
  - Marwadi University Jyoti CNC Automation Ltd. (MUJCAL) Lab
  - Establishment of Smart Foundry
  - Supercomputer Facility awarded by Gujarat Council on Science and Technology (GUJCOST), Govt. of Gujarat
3. Marwadi University, Testing & Consultancy Revenue Data



## GUJARAT STATE FINANCIAL SERVICES LTD.

(A Government of Gujarat Undertaking)

Wing "B", 3rd Floor, Khanij Bhavan, 132 ft. Ring Road,  
Nr. University Ground, Vastrapur, Ahmedabad-380 052.

Phone No.: 079-27912528-29-30 Fax No.: 079-27912534 Email : resource@gsfs.in  
Website: www.gsfs.co.in CIN : U65910GJ1992SGC018602 GSTIN : 24AAACG5581B1Z0

### INTER-CORPORATE DEPOSIT RECEIPT

(Non - Transferable)

Fund Type: Own Fund

Date: 21-03-2022

ICD NO: 86093

Entity Code: 573

RECEIVED FROM

MARWADI EDUCATION FOUNDATION

RAJKOT-MORVI ROAD

AT&PO : GAURIDAD

RAJKOT

360003

સી-પેમેન્ટ મેળવવા માટે ચૂકવણીનાં આગળનાં કાર્યરત દિવસના  
(શનિવાર સિવાય) બપોરના ૨-૦૦ કલાક સુધીમાં જ અચૂક  
બાલ કરવાની રહેશે. શનિવારના રોજ સી-પેમેન્ટ થશે નહિં.

### INTER CORPORATE DEPOSIT AS PER DETAILS HEREUNDER

DEPOSIT RECEIPT NO.	AMOUNT OF DEPOSIT (Rs.)	DATE OF DEPOSIT	PERIOD OF DEPOSIT	RATE OF INTEREST (% P.A.)	DUE DATE
86093	6,08,72,191/-	16-03-2022	1096 DAYS	5.25*	16-03-2025

Issued Pursuant to Auto renewal of ICD No: 58716

\* Interest compounded quarterly and will change in case of leap year & change in TDS rate.

Gross Interest : 10273690

\* TDS Amount : 1027370

Net Interest : 9246320

Net Maturity Amt : 70118511

FOR GUJARAT STATE FINANCIAL SERVICES LTD.



*[Signature]*

AUTHORISED SIGNATORIES

(Instructions Overleaf)



મત્સ્યેષ્યે જયતે

Roopwant Singh, IAS  
Director IT & e-Governance  
Government of Gujarat

DIT/IT-ITeS Policy/2017/1287321.

03<sup>rd</sup> March, 2017

To,  
**Dr. R. Sridaran**  
Dean, FCA, MEFGI  
Marwadi Education Foundation  
Marwadi University.  
Rjakot - Morbi Highway, Nr. Gauridad Village.  
Rajkot - 360003.

Ref.: Your Application dated 13/10/2016 for seeking incentives under the IT/ITES Policy 2016-21

Dear Mr. R. Sridaran,

At the outset, I on behalf of Government of Gujarat convey my appreciation to the fact that you have chosen Gujarat State to set up/expand your operations.

We would gladly like to facilitate your progress in this State and in this context I am acknowledging (in the enclosed Annexure-2a) your application submitted for seeking incentives under the recently launched IT/ITES Policy of Government of Gujarat. You may proceed with the other formalities that need to be done to avail the benefits under the Policy. A dedicated resource has been allotted to you who will be your interface with regards to the application submitted. I am also available at email: [directorit@gujarat.gov.in](mailto:directorit@gujarat.gov.in), Phone No 079-232-59222, in case of any further assistance required.

I wish you all the best in your venture.

With regards,

Yours sincerely,

(Roopwant Singh)

CC: Secretary, Department of Science & Technology  
Block No. 7, 5th Floor,  
New Sachivalaya, Gandhinagar



**Letter of In-principle Approval for Assistance to IT/ITeS Unit under the Scheme of Assistance for IT/ITeS Industry**

**(Annexure 2a)**

Date 03/03/2017

To,

**Dr. R. Sridaran**

**Dean, FCA, MEFGI**

**Marwadi Education Foundation**

Marwadi University,

Rjakot - Morbi Highway, Nr. Gauridad Village,

Rajkot - 360003

**Ref: 1. Your Expression of Interest dated 13/10/2016**

**Sub: In-principle approval for Assistance under Scheme of Assistance for IT/ITeS Industry**

Sir,

1. We are pleased to acknowledge your application dated 13/10/2016 seeking assistance under the scheme for IT/ITeS Industry with registration No. **033/IT/0317**. In future correspondences please quote the registration number allotted to you.
2. On behalf of the Government of Gujarat, I convey the "in-principle" approval with reference to your application No. 033/IT/0317 dated **13/10/2016** for assistance under the Scheme of assistance for IT/ITeS Industry for your unit **at Marwadi University, Rjakot - Morbi Highway, Nr. Gauridad Village, Rajkot - 360003 with an estimated investment of Rs. 73 lakh.**

- 3 Subject to the adherence to conditions as laid out in para 4 of this letter and subject to approval by the Empowered Committee, the assistance that you can avail under the scheme will be as under:

Sr. No	Assistance Type	Indicative eligible amount of assistance	Remarks
1	Assistance for R&D Institute / Finishing School	60% of the project cost excluding land subject to ceiling of Rs. 50 lakhs for setting up Finishing Schools for IT/ITES Sector in Colleges and Educational Institutes across the State	The final amount to be disbursed will be subject to eligibility and approval of the empowered Committee

4. This in-principle approval is valid for a period of one (1) year from the <sup>1</sup>date of issuance of this letter subject to fulfillment of the following conditions -
- Procurement and having final possession of office space
  - Financial Closure of the Project - for computing financial closure the applicant will be allowed to incorporate eligible assistance from Govt. / GoG under respective schemes for assistance to IT/ITES unit along with own equity and debt that the applicant will take
  - Preparation and submission of Detailed Project Report (DPR)
  - Component/ activity wise implementation schedule specifying the timelines and corresponding milestones
  - Submission of application as per para 5.6 of the scheme within 1 year.
5. In case, the above conditions are not met by the end of the validity period of this in-principle approval, the validity will be extended for an additional period of maximum one (1) year subject to the fulfillment of the following mandatory conditions, with a satisfactory justification for the delay of the other conditions mentioned in para 4 above.
- Procurement and having final possession of the land / office space

- (b) Financial Closure of the Project
6. Application for extending validity of in-principle approval shall be made before expiry of one year from grant of in-principle approval. In case, the validity period is extended, a detailed timelines for fulfilling the following conditions should be intimated to the Competent Authority
- (a) Preparation and submission of DPR
- (b) Component/ activity wise implementation schedule specifying the timelines and corresponding milestones
- (c) Submission of formal application as per para 5.6 of the Scheme
7. In an instance where the criteria is not met within the validity period with or without extension, the in-principle approval shall lapse and the applicant would not have any claim for any incentive / benefit against the Government. However, you can submit a new Expression of Interest which would not be linked to the application referenced herein and will be treated as a new application.
8. You are informed that till the filing of formal application as in Annexure – 3, you can change the applicant. You are further informed that in relation to the indicative assistance indicated in para 3 of the letter, the numbers are indicative only. Actual eligible amount will depend on scrutiny of formal application and supporting documents by the Competent Authority and approval by the Empowered Committee.
9. I wish you best of luck with the Project. Should you have any difficulty or have queries **Mr. Amit Barot** will be your personal contact. He can be reached at: (O) 079-232-59232, (M) +91-9825024914, email: [amitb@gujarat.gov.in](mailto:amitb@gujarat.gov.in) and office address: **Office of Director (IT & eGovernance)**, C/o Gujarat Informatics Limited, Block No. 1, 8<sup>th</sup> Floor, Udyog Bhavan, Sector 11, Gandhinagar.

Yours Sincerely,

(Roopwant Singh)

Director (IT & eGovernance)  
Government of Gujarat

CC: **Secretary, Department of Science & Technology**  
Block No. 7, 5th Floor,  
New Sachivalaya, Gandhinagar



**Inauguration**  
**of**  
**Marwadi Univeristy Jyoti CNC Automation Limited (MUJCAL)**  
**Association**  
**for**  
**Foundry Technology**

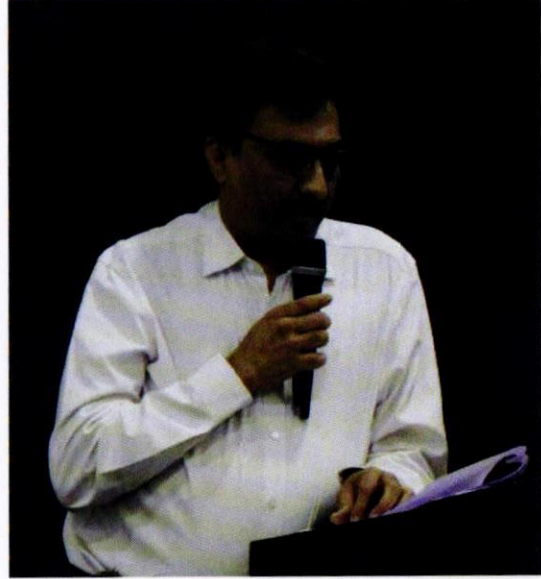
Marwadi University (MU) always focuses on overall development of students by implementing three tier teaching-learning philosophy. This philosophy primarily emphasizes on imparting skills to the students studying in various courses at University. In persistence of it, Marwadi University in collaboration with Jyoti CNC Automation Limited & Centre for Entrepreneurship Development Cell (CED)-Gandhinagar establish Marwadi University Jyoti CNC Automation Limited (MUJCAL) Association for Foundry Technology to impart technical skills essential in foundries of Rajkot cluster.

MUJCAL is funded with more than 1.3 crore, and have dedicated space over 3200 square feet. MUJCAL is equipped with more than 40 equipment including 3D Scanner, 3D Printer, Die Engraver, Sieve Analyser, Mould Permeability Tester, Vacuum Assisted Melting Furnace, Metallurgical Microscope, Universal Testing Machine (UTM), Ultrasonic Non-destructive Testing Machine, X-ray fluorescence (XRF), Spectrometer, Casting Simulation Software (AutoCAST) etc. used in pattern and mould making, melting, pouring, testing as well as inspection of castings.

An inauguration ceremony of MUJCAL was organized on 8<sup>th</sup> December 2018 at campus of Marwadi University. Eminent personalities including Mr Parakramsinh Jadeja (MD, Jyoti CNC), Dr Ramnath Prasad (Director, CED Gandhinagar), Mr Ketanbhai Marwadi (President, Marwadi University), Mr Jitubhai Chandarana (Vice President, Marwadi University) as well as more than 110 industrial delegates were present during an inaugural function. This inaugural function was opened by welcome speech delivered by Dr Y P Kosta (Provost, Marwadi University). He introduces metal casting process, and told about contribution of Rajkot in the metal casting. Basic details related to MUJCAL was discussed about Dr Amit Sata (Professor, Mechanical Engineering Department). He also discussed about various short term bridge courses offered by MUJCAL to young engineers and industrial professionals. Keynote address on importance of technical skills and industrial-institute relationship was delivered by Mr Parakramsinh Jadej. Mr Ketanbhai Marwadi thanked CED Gandhinagar for providing support for establishment of MUJCAL, and also assured that

community of young engineer will take maximum benefits of MUJCAL. Dr Ramnath Prasad (Chief guest) discussed importance about entrepreneurship and skills in building nation. He also briefed about various entrepreneurship schemes as well as skill enhancement opportunities offered by Government of Gujarat. The function concluded with vote of thanks delivered by Mr Naresh Jadeja (Registrar, Marwadi University). Dr R B Jadeja (Dean, Faculty of Engineering), Dr R L Jhala (Dean, Faculty of Technology), Dr S S Pandey (Dean, Faculty of PG Studies), Dr N V Rachchh (Head, Mechanical Department-FoE), Dr P A Patel ((Head, Mechanical Department-FoT), Dr R M Bhoraniya(Head, Mechanical Department-PG Studies), Mr Bhavesh Kanabar (Head, Agricultural Department), Mr Nikhil Chotai (Head, Automobile Department-FoE) and all the faculties of Mechanical as well as Automobile engineering department put great effort for making this event successful.









*myadega*  
Registrar  
Marwadi University





കേരളം കേരल KERALA

B 951743

**MEMORANDUM OF UNDERSTANDING (MOU)**

This MOU made and entered into on this 28<sup>th</sup> day of November, two thousand and sixteen

BETWEEN

National Institute for Interdisciplinary Science and Technology, Thiruvananthapuram, a constituent laboratory of Council of Scientific and Industrial Research, a society registered under the societies Registration Act (XXI of 1860) having its registered office at Anusandhan Bhavan, 2, Rafi Marg, New Delhi 110001, India (hereinafter called "CSIR-NIIST" which expression shall where the context so admits include its successors and permitted assignees),

AND

Indian Institute of Technology, Powai, Mumbai 400 076, India under ministry of HRD, Government of India, (hereinafter called "IIT-B" which expression shall where the context so admits include its successors and permitted assignees),

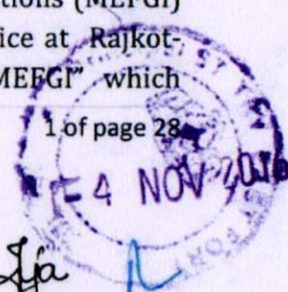
AND

Faculty of Engineering - Marwadi Education Foundation Group of Institutions (MEFGI) Campus, under Marwadi Education Foundation, having its registered office at, Rajkot-Morbi Road, Rajkot-360 003 (Gujarat), India., (hereinafter called "MEFGI" which

No: 8865 Value Rs. 500/-  
21.11.2016 Issued to  
The Director, CSIR-NIIST,  
Pappanamcode

കിളിപ്പാലം വെണ്ടർ  
വി. മുരുകൻ

*[Handwritten signatures and initials]*



expression shall where the context so admits include its successors and permitted assignees) of the one part;

AND

Charotar University of Science and Technology, situated at Changa, having address at CHARUSAT Campus, Changa, Taluka Petlad, District Anand-388 421 formed under Gujarat State Act No.8 of 2009, Government of Gujarat and has empowered to award degrees by UGC u/s.22 of UGC Act, 1956 (hereinafter called "CHARUSAT" which expression shall where the context so admits include its successors and permitted assignees) of the other part.

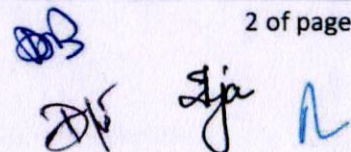
### **Preamble**

Whereas CSIR-NIIST along with three other Institutes (CSIR-Central Mechanical Engineering Research Institute (CSIR-CMERI), Durgapur; Visvesvaraya National Institute of Technology (VNIT Nagpur), Nagpur; Jadavpur University, Kolkata) submitted a project proposal entitled "SMART Foundry 2020" to Advanced Manufacturing Technologies of Technology Systems Development Programme (TSDP) of Department of Science & Technology (DST), Ministry of Science & Technology, for consideration for funding along with the investigators from 6 institutes (IITB, CHARUSAT, MEFGI, College of Engineering, Pune (COE); DKTE TEI, Ichalkaranji; SGGI Institute, Nanded;), and 5 industry partners (3D Foundry Tech, Mumbai; Aha 3D, Jaipur; TREELabs, Mumbai; Marco Polo, Kolkata and Atomberg, Mumbai) (hereinafter called '**TSDP PROJECT on SMART FOUNDRY 2020**'), short summary thereof is attached as Annexure I

And Whereas DST has sanctioned the project vide sanction order no.DST/TSG/AMT/2015/332 (General) dated August 17, 2016 for a total cost of Rs 9.50 crore, including DST contribution of Rs. 8.25 crore and industry contribution of Rs. 1.25 crore. (Annexure II) and has divided its contribution among four PI's of respective institutes, and has released the first instalment of the sanctioned budget, as per the details in their sanction letter. (Annexure II).

And Whereas the four PI's in the respective Institutes (CSIR-NIIST, CSIR-CMERI, VNIT, Nagpur & Jadavpur University) are entrusted to share the funds to their respective academic partners as per the details agreed by all the concerned investigators and charted out in Annexure III.

And Therefore CSIR-NIIST, IITB, MEFGI and CHARUSAT desires to enter into a Memorandum of Understanding (MOU) setting forth the terms and conditions for carrying out the TSDP PROJECT on SMART FOUNDRY 2020.

Handwritten signatures in blue ink, including a circular stamp and several initials.

The MOU details the responsibilities and obligations of each party and other terms and conditions pertaining to the MOU for undertaking the TSDP PROJECT on SMART FOUNDRY 2020.

### **C.1. Responsibilities of CSIR-NIIST**

C.1.1 CSIR-NIIST shall develop error-free code for CFD based multiphysics solver for casting process simulation including 3D Navier Stokes solver for mold filling and 3D heat transfer solver for solidification as part of Work Package (1) in Annexure 1 and benchmark it with commercial CFD code.

C.1.2 CSIR-NIIST shall develop software for process data management and visualization for SMART Foundry 2020 as part of Work Package (5) in Annexure 1, and the work involves consolidating all data generating sub-systems and setting up cloud server, data streaming to the cloud, with basic dashboard displays and software development for on-screen data visualization and Cloud data management.

### **C.2. Responsibilities of IITB**

C.2.1 CSIR-IITB shall develop levelset based free surface algorithm for tracking the free surface during mold filling and assist CSIR-NIIST in integration of multiphysics CFD code with the free surface tracking software code.

### **C.3. Responsibilities of MEFGI**

C.3.1 MEFGI shall develop cloud-based data analytics software and optimize process parameters by analysis of historical data and implement it in cloud based devices

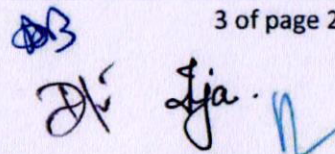
### **C.4. Responsibilities of CHARUSAT**

C.4.1 CHARUSAT shall develop algorithms for feeder design and improving the methods design module in the existing AutoCAST X1 code of 3D Foundry Tech Pvt. Ltd., Mumbai, as part of Work Package 1

C.4.2 CHARUSAT shall develop modular system for manufacturing of Metal Matrix Composites in collaboration with IITB and Jadavpur University, as part of Work Package 4.

### **C.5. Financial Obligations**

C.5.1. The total Project Cost distributed to CSIR-NIIST is ₹ 313.122 Lakh (Rupees Three crore Thirteen Lakh Twelve Thousand Two Hundred only). Details of the total budget





sanctioned to each party for carrying out TSDP PROJECT on SMART FOUNDRY 2020 is as tabulated below:

S N	Institute Item	CSIR- NIIST	IITB	CHARUSAT	MEFGI	Total Cost
1	Equipment	61.00	35.00	19.00	10.00	125.00
2	Manpower	49.248	33.696	22.464	22.464	127.872
3	Consumables	3.00	4.50	15.00	1.50	24.00
4	Contingencies/	1.50	0.0	0.0	0.0	1.5
5	Other costs	7.00	8.5	2.00	0.75	18.25
6	Travel	1.50	0.00	0.0	0.0	1.5
7	Institutional Overhead Charges	5.00	6.5	2.00	1.50	15.0
	<b>Total (₹in lakh)</b>	<b>128.248</b>	<b>88.196</b>	<b>60.464</b>	<b>36.214</b>	<b>313.122</b>

C.5.2 Money will be released to the participating institutes by CSIR-NIIST on signing of MoU

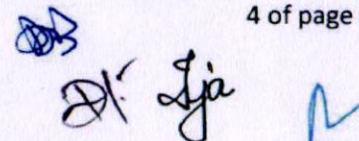
#### **C.6. Intellectual Property Rights**

C.6.1. Any intellectual property rights obtained by parties hereto pertaining to the TSDP PROJECT on SMART FOUNDRY 2020 prior to signing of the agreement shall remain the property of that party.

C.6.2. Any intellectual property rights arising from the TSDP PROJECT on SMART FOUNDRY 2020 will be jointly owned by all parties.

C.6.3. The procedural formalities for securing and maintaining the intellectual property rights shall be the responsibility of CSIR-NIIST and the expenditure incurred thereof shall be borne by all the parties in equal proportion. The question of whether or not intellectual property right should be secured and the territory where these shall be secured shall be decided unaniMoUsly by Heads of the institutes of all the parties.

C.6.4. The parties shall consult each other for any publication in respect of the PROJECT.



## **7. Utilisation of Intellectual Property Rights**

7.1. All parties shall have the right to license the intellectual property generated in the TSDP PROJECT on SMART FOUNDRY 2020 to third parties, subject to approval from all other parties. The terms and conditions for such licensing shall be settled mutually between all parties. The premia or royalty accrued from licensing of the intellectual property to other parties shall be shared equally among all parties.

## **8. General terms**

All parties are free to sign MOU / agreement with any other parties in India or overseas for similar projects at their own discretion by taking consent from other parties.

## **9. Confidentiality**

During the tenure of the MOU and thereafter, all the parties undertake on their behalf and on behalf of their subcontractors/ employees / representatives / associates to maintain strict confidentiality and prevent disclosure thereof, of all the information and data exchanged/generated pertaining to project work under this MOU for any purposes other than in accordance with this MOU.

## **10. Force Majeure**

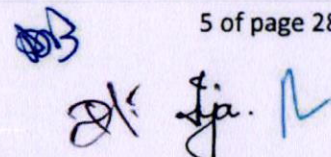
Neither party shall be held responsible for non-fulfillment of their respective obligations under this MOU due to the exigency of one or more of the force majeure events such as but not limited to acts of God, war, flood earthquakes, strike, lockouts epidemics, riots, civil commotion, etc., provided on the occurrence and cessation of any such events, the party affected thereby shall give a notice in writing to the other party within one month of such occurrence or cessation. If the force-majeure condition continues beyond six months, the parties shall then mutually decide about the future course of action.

## **11. Effective date, duration, termination of the MOU**

11.1. The MOU shall be effective from the date of signing and shall remain in force for the period of three years.

11.2. The MoU shall terminate on the expiry of the period, as in clause 12.1 unless extended by the parties.

11.3. During the tenure of the MoU, parties hereto can terminate the MOU either for breach of any of the terms and conditions of this MOU or otherwise by giving 3 months notice in writing to the defaulting party. Failure of any party to terminate the



MOU on account of breach or default by the other shall not constitute a waiver of that party's right to terminate this MoU.

11.4. In the event of termination of the MoU vide 12.3 the rights and obligations of the parties, thereto shall be settled by mutual discussion.

## **12. Notices**

All notices and other communications required to be served on each party under the terms of this MOU shall be considered to be duly served if the same shall have been delivered to, left with or posted by registered mail to that party at its last known address of business.

## **13. Amendments to the MoU**

No amendment or modification of this MoU shall be valid, unless the same is made in writing by all the parties or their authorized representatives and specifically stating the same to be an amendment of this MoU. The modifications/changes shall be effective from the date on which they are made/executed, unless otherwise agreed to.

## **14. Assignment of MoU**

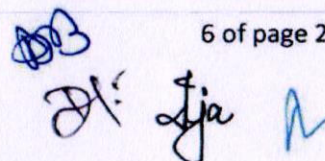
The rights and/or liabilities arising to any party to this MoU shall not be assigned except with the written consent of the other party and subject to such terms and conditions as may be mutually agreed upon.

## **15. Arbitration**

Any dispute arising out of this Agreement, the same shall be dealt with under the provisions of Indian Arbitration and Conciliation Act, 1996. The venue of arbitration shall be at New Delhi.

In witness whereof, the parties hereto have signed this MoU on the day, month and year mentioned herein before.

Signing Page Follows:

Handwritten signatures in blue ink, including a circled '03', 'D.K.', 'Jia', and a stylized 'N'.

For and on behalf of  
CSIR-NIIST

Signature

Name: Dr. Jose James

Designation: Chief Scientist & Head,

RPBD Division डॉ. ए. सुन्दरेशन

Seal

Dr. A. SUNDARESAN



प्रधान, अनुसंधान योजना एवं व्यवसाय विकास प्रभाग  
Head, Research Planning & Business Development Division  
सी एस आर आर - एन आई आई (एसटी), भारत सरकार  
CSIR-National Institute for Interdisciplinary  
Plane and Technology, CSIR-NIIST, Govt. of India

Witnesses: (Name & Address)

- 1) S. Savithri  
Principal Scientist  
CSIR-NIIST, Trivandrum  
इंडस्ट्रियल एस्टेट पी ओ, तिरुवनन्तपुरम-695 019  
Industrial Estate P.O., Thiruvananthapuram-695 019
- 2) Chandrasekhar C.K.  
Principal Scientist  
CSIR-NIIST, Trivandrum

For and on behalf of

MEFGI

Signature

Name: Prof. (Dr.) R. B. Jadeja

Designation:

Seal Dean - Faculty of Engineering  
Marwadi Education Foundation's  
Group of Institutions, Rajkot

Witnesses: (Name & Address)

- 1) Amit V. Sata  
Mechanical engg. dept, Faculty  
of engg. NEFGI, At Gamwad.  
Rajkot - 360003
- 2) CDR R.L. JHALA  
DEAN - Faculty of Technology  
MEFGI, At : Gamwad,  
RAJKOT - 360003.

For and on behalf of  
IITB

Signature

Name: Prof. P. V. BAJAJI

Designation: PROFESSOR & DEAN (R&D)

Seal

संकायाध्यक्ष, शोध एवं विकास  
Dean, Research and Development  
कृते निदेशक, आय आय टी मुंबई  
For Director, IIT Bombay

Witnesses (Name & Address)

- 1) S. Karagadde  
Dept. of Mechanical Engg.  
IIT Bombay
- 2) Padma Satish  
Office of the Dean (R&D)  
IIT Bombay

For and on behalf of

CHARUSAT

Signature

Name: Devang Joshi

Designation: Registrar

Seal



Witnesses (Name & Address)

- 1) Manu Sutar  
Mechanical Engg. Department -  
CHARUSAT campus, Changa  
Anand - 388421
- 2) Vijay Chaudhary  
Mechanical Engg. Dept.  
CHARUSAT, Changa, Anand.

Date

Date

## Annexure I

# SMART Foundry 2020

(SMART=Sustainable Metalcasting using Advanced Research and Technology)

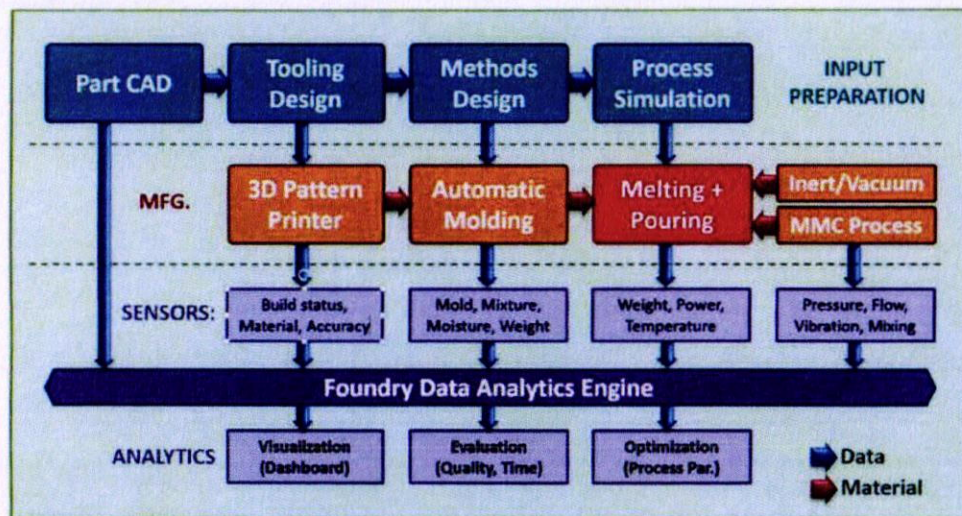
File No: File No.: DST/TSG/AMT/2015/332

**Smart manufacturing or Industry 4.0** leverages information & communications technologies to democratize production and make it more sustainable. India, with its large base of SMEs, human resources and IT infrastructure can adopt this paradigm to meet challenges of employability, employment and entrepreneurship. Relevant technologies like 3D CAD, process simulation, 3D printing, rapid tooling, and process data analytics can be readily applied to metal casting – the mother industry that feeds all other sectors.

**SMART** (Sustainable Metalcasting using Advanced Research and Technology) Foundry 2020 is a collaborative initiative by a national network of researchers and entrepreneurs. The system will enable rapid manufacture of small size intricate metal parts with better quality (than conventional sand casting) and lower cost (compared to machining or 3D metal printing). Applications include rapid prototypes for testing, replacement parts for valuable equipment, and high-value components for art, medical and defence.

### Objective of TSDP PROJECT

The proposed SMART Foundry will be a miniaturized, easy-to-use, low-cost, semi-automatic foundry, which can be set up and used by entrepreneurs to rapidly create small intricate metal parts in a range of materials including Al, and MMCs, for applications that are not covered by conventional casting process or 3D metal printing. As mentioned earlier, the system comprises five modules: (1) Casting design and simulation, (2) Automatic mold fabrication, (3) Efficient melting and direct pouring, (4) Metal matrix processing, and (5) Data sensing, analytics and optimization and is schematically depicted in Figure 1. The detailed work packages and deliverables as agreed by all the partners are given below:



**Fig. 1: Architecture of the proposed SMART Foundry**

The whole team will demonstrate Version 1 and Version 2 of SMART FOUNDRY at 18 and 36 months. The first version will be displayed at VNIT, Nagpur at the end of 18 months and version 2 of the SMART FOUNDRY will be displayed at two other locations towards the end of the project.

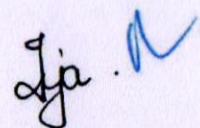
### The Research Team

Sl.	Name, Designation, Affiliation	Phone and E-Mail	Responsibility
1	Dr. S. Savithri, Sr. Principal Scientist NIIST, Thiruvananthapuram	+91 9446183238 <a href="mailto:sivakumarsavi@gmail.com">sivakumarsavi@gmail.com</a> <a href="mailto:ssavithri@niist.res.in">ssavithri@niist.res.in</a>	Overall project coordinator & PI of WP-1
2	Dr. Nagahanumaiah, Sr. Principal Scientist, CMERI, Durgapur	+91 9434181360 <a href="mailto:naga@cmeri.res.in">naga@cmeri.res.in</a>	Co- project coordinator & PI of WP-2 and lead role in demonstration of SMART FOUNDRY Version 1 & 2
3	Dr. A.M. Kuthe, Professor, Mechanical Engg. VNIT Nagpur	+91 9423685194 <a href="mailto:amkme2002@yahoo.com">amkme2002@yahoo.com</a>	PI of WP-3
4	Dr. GoutamSutradhar, Professor Jadavpur University, Kolkata	+91 9830342891 <a href="mailto:cast_1963@rediffmail.com">cast_1963@rediffmail.com</a>	PI of WP-4
5	Dr. Atul Sharma, Professor, Mechanical Engg., IIT Bombay, Mumbai	+91 9819806255 <a href="mailto:atulsharma.iitb@gmail.com">atulsharma.iitb@gmail.com</a>	Team member of WP1
6	Dr. MayurSutaria,	+91 9426371641	Team member of

	Associate Professor, Mechanical Engg., CHARUSAT, Anand	<a href="mailto:mayursutaria@gmail.com">mayursutaria@gmail.com</a>	WP1 & WP4
7	Dr. Arati V. Mulay, Associate Professor, Production Dept., College of Engg., Pune	+91 9763214820 <a href="mailto:avm.prod@coep.ac.in">avm.prod@coep.ac.in</a>	Team member of WP-2
8	Dr. VasudevShinde, Professor, Mech. Engg., DKTE TEI, Ichalkaranji	+91 9422590926 <a href="mailto:vasu.metal@gmail.com">vasu.metal@gmail.com</a>	Team member of WP2 WP3
9	Dr. J.V.L. Venkatesh, Professor, Production Engg., SGGS Inst., Nanded	+91 9657720072 <a href="mailto:jvlvenkatesh@sggs.ac.in">jvlvenkatesh@sggs.ac.in</a>	Team member of WP3 & WP5
10	Dr. ShyamKaragadde, Asst. Professor, Mechanical Engg., IIT Bombay, Mumbai	+91 7506937398 <a href="mailto:s.karagadde@iitb.ac.in">s.karagadde@iitb.ac.in</a>	Team member of WP1, WP4
11	Dr. Elizabeth Jacob, Chief Scientist NIIST, Thiruvananthapuram	+91 9495124564 <a href="mailto:liz.csir@gmail.com">liz.csir@gmail.com</a>	PI of WP5
12	(Dr.) Amit Sata, Associate Professor, Faculty of Engineering - Marwadi Education Foundation Group of Institutions (MEFGI) Campus, Rajkot	+91 9825217702 <a href="mailto:ameetsata2000@gmail.com">ameetsata2000@gmail.com</a>	Team member of WP5
<b>Industry partners:</b>			

13	3D Foundry Tech Pvt Ltd., Mulund, Mumbai – <b>Shri. BabaPrasad Lanka</b>	+91 9892100072 <a href="mailto:babaprasad.lanka@hotmail.com">babaprasad.lanka@hotmail.com</a>	Industrial Partner & Team member WP1
14	Aha 3D Innovations, 166, Janakpuri II ImlyPhatak Jaipur 302015 Rajasthan INDIA	+91 9929904445 <a href="mailto:aakash@aha3d.in">aakash@aha3d.in</a>	Industrial Partner & Team member WP2
15	TREELabs Foundation, Bandra-Kurla, Mumbai, <b>Shri. Dipankar</b>	+91 912225723001 <a href="mailto:dips.treelabs@gmail.com">dips.treelabs@gmail.com</a>	Industrial Partner & Team member WP3
16	Marcopolo Products Pvt. Ltd., Kolkata, <b>Shri. Aditya Kumar</b>	+91 9830089023 <a href="mailto:aditya.kumar@marcopolo.co.in">aditya.kumar@marcopolo.co.in</a>	Industrial Partner & Team member WP4
17	Atomberg Technologies Pvt. Ltd., Ghatkopar, Mumbai, <b>Shri. ManojMeena,</b>	+91 9619139662 <a href="mailto:manoj.atomberg@gmail.com">manoj.atomberg@gmail.com</a>	Industrial Partner & Team member WP5







## Details of different work packages

**Table 1.a :WP-1**

Title of WP-1	Casting Design and Simulation
Investigations	Advanced software technology units which includes (a) Intelligent design of tooling and methods (b) Multi-physics CFD-based casting process simulation for mold filling & solidification for prediction of defects
WP-1 Leader	Dr. S. Savithri (CSIR-NIIST)
Research team	<b>NIIST Trivandrum (Dr. S. Savithri)</b> - IITB, Mumbai (Prof.Atul Sharma, &Prof.Shyamprasad K ) - CUST, Anand (Dr.MayurSutaria)  - <i>3D Foundry Tech, Mumbai</i> (Mr. B. Lanka) – <b>Industrial Partner</b>
Expected Outcome	2 technical software products (a) for design - tooling design module, methods design module (b) CFD based multiphysics solver code for casting process simulation
Duration	From: October 2016 To: September 2019

EXAMPLE

~~3~~ ~~JK~~ Jia.

**Table 1.b: Tasks under WP-1**

Sl	Task	Lead Agency	Support Agencies	Duration (Months)
1.1	Tooling Design Program	3DFT	IITB, CUST	<p>12 months from start of project for version 0 of the software code – error free running software code</p> <p>12-18 months for beta testing &amp; benchmarking - version -1</p> <p>18-24 months for final version &amp; packaging – version 2</p> <p>24-36 months for demonstrating &amp; commercialization</p>
1.2	Methods Design Program	CUST	3DFT, NIIST, IITB	<p>12 months from start of project for version 0 of the software code – error free running software code</p> <p>12-18 months for beta testing &amp; benchmarking - version -1</p> <p>18-24 months for final version &amp; packaging – version 2</p> <p>24-36 months for demonstrating &amp; commercialization of the software code</p>
1.3	Process Simulation (CFD) Program	NIIST	3DFT, IITB	<p>18 months from start of project for version 0 of the software code – error free running software code</p> <p>18-24 months for beta testing &amp; benchmarking - version -1</p> <p>24- 30 months for final version &amp; packaging – version 2</p> <p>30-36 months for demonstrating &amp; commercialization</p>

**Table 2.a :WP-2**

<b>Title of WP-2</b>	<b>Automatic Mold Fabrication</b>	
Investigations	Development of Automatic Mold Fabrication unit which will be driven by 3D printing technology for creating a plastic pattern, around which recycled silica sand mixed with chemicals will be packed automatically to create the mold.  Selection of sensors and integration to Version2 of SMART Foundry	
WP-2 Leader	Dr.Nagahanumaiah (CSIR-CMERI)	
Research team	<b>CMERI, Durgapur (Dr.Nagahanumaiah)</b> - COEP, Pune (Dr.Arati V. Mulay) - DKTE, Ichalkaranji (Dr.VasudevShinde) - <i>SoftTact Technology, Mumbai</i> (Mr.Rasik Patel) - Aha 3D Innovations Pvt. Ltd., Jaipur (Mr.Aakash)	
Expected Outcome	<b>Demonstrable Prototypes (Hardware Units)</b> - 3D Printing machine for plastic patterns making ( <b>COEP + SoftTact+Aha 3D</b> ) - Automatic mold fabrication machine for silica sand molds( <b>CSIR-CMERI</b> ) - Automatic shaker and sand reclaiming unit ( <b>DKTE</b> ) - Integrated SMART Foundry – Version I ( <b>All teams</b> ) - Semi-automatic SMART Foundry – Version 2 ( <b>CMERI + rest</b> )	
Duration	From: October 2016	To: September 2019

**Table 2.b: Tasks under WP-2**

Sl	Task	Lead Agency	Support Agencies	Duration (Months)
2.1	The design and development of automatic molding machine	CMERI	DKTE	<b>M1 – M15:</b> Design, development and demonstration of sand molds manufacturing using patterns produced by 3D Printing unit developed at 2.2 task  <b>M 19 – M25:</b> Testing and design modification and final prototype.
2.2	Development of 3D plastic pattern printing unit	COEP	CMERI	<b>M1 – M15:</b> Design, development and demonstration of plastic patterns to use in automatic molding machine developed at 2.1

Sl Task	Lead Agency	Support Agencies	Duration (Months)
			task. <b>M 19 – M25:</b> Testing and design modification and final prototype.
2.3 Sand reclaimer system	DKTE	CMERI	<b>M1 – M15:</b> Design, development and demonstration of sand reclaimer after shaking out of sand molds produced at 2.1 task. <b>M 19 – M25:</b> Testing and design modification and final prototype.
2.4 Integration and demonstration of version 2 of SMART FOUNDRY	CMERI	Rest of the team	<b>M16 – M18:</b> Demonstration SMART Foundry – V(1) <b>M19 – M22:</b> Testing and performance evaluation of subunits of SMART Foundry – V(1) <b>M19 – M25:</b> Sensor data acquisition and processing algorithms and controller system development <b>M26 – M32:</b> System Integration and demonstration of Semi-automatic SMART Foundry –V2.
2.5 Quality testing of castings manufactured	DKTE	Rest of the team	<b>M 32 – M36:</b> Testing of quality of casting produced in Semi-automatic SMART Foundry System <b>M32 – M36:</b> Outreach program for demonstration and training of practicing engineers and youths at different regions of the country.

03  
Df Jia N

**Table 3.a : WP-3**

<b>Title of WP-3</b>	<b>Efficient Melting and Direct Casting Unit</b>	
Investigations	Development of a system for melting and direct pouring of the molten metal into the mold in such a way that the casting process is carried out with high energy efficiency, safety and quality of the cast part	
WP-3 Leader	Dr. A.M. Kuthe	
Research team	- VNIT Nagpur (Dr. A.M. Kuthe) - DKTE, Ichalkaranji (Dr.VasudevShinde) - SGGS, Nanded (Prof. J.V.L. Venkatesh) - <i>TREELabs Foundation, Mumbai</i> (Dr.Dipankar)	
Expected Outcome	Sensor embedded advanced melting & pouring unit with a provision for attachment units like Vacuum / Inert Gas Unit & Metal Matrix Composite Unit	
Duration	From: October 2016	To: September 2019

**Table 3.b: Tasks under WP-3**

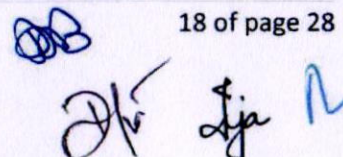
Sl	Task	Lead Agency	Support Agencies	Duration (Months)
3.1	Development of melting & pouring unit	VNIT	DKTE, SGGS	1-12 months
3.2	Development of vacuum/inert gas unit	VNIT	DKTE, SGGS	1-24 months
3.3	Development of sand reclaimer unit	DKTE	VNIT, SGGS	1-24 months

**Table 4.a :WP-4**

<b>Title of WP-4</b>	<b>Metal Matrix Composite Processing</b>	
Investigations	To develop a compact and modular sub-system for manufacturing Metal Matrix Composite (MMC) parts for industrial applications. It includes facilities to impart mechanical stirring, ultrasonic vibrations, and particle heating and feeding	
WP-4 Leader	-Dr.GoutamSutradhar, Jadavpur University	
Research team	<b>- Jadavpur University (Dr.GoutamSutradhar)</b> -CUST, Anand (Dr.MayurSutaria) - IITB, Mumbai (Prof.Shyamprasad K.) - Marco Polo, Kolkata (Mr. Aditya Kumar)	
Expected Outcome	Mechanical stirring system & Ultrasonic stirring system -  For synthesis of metal matrix composites and micro/nano composites with optimization of process parameters to eliminate segregation	
Duration	From:      October 2016	To:      September 2019

**Table 4.b: Tasks under WP-4**

Sl	Task	Lead Agency	Support Agencies	Duration (Months)
4.1	MMC Preparation & Casting Unit	Jadavpur University	CUST, IITB	12 months from start of project for Design and fabrication of system: version- 0  12-18 months for beta testing & improvements: version -1  18-30 months for integrating it with ultrasonic stirring system: version 2  30-36 months for demonstration
4.2	Design and Development of	CUST	Jadavpur University,	06 months from start of project for Design and finalization of specifications



SI	Task	Lead Agency	Support Agencies	Duration (Months)
	Ultrasonic Stirrer		IITB	06-12 months for development and fabrication of system: version- 0 12-18 months for beta testing & improvements: version -1 18-30 months to integrating it with vacuum and inert gas unit developed in WP-3: version 2 30-36 months for demonstration
4.3	Optimization of process parameters for MMC	IITB	CUST, Jadavpur University	Modelling and analysis for optimization of process parameters

**Table 5.a :WP-5**

Title of WP-5	Data Sensing and Analytics
Investigations	Development of product and process data schema and layout, work flow model of the SMART FOUNDRY  Collection & streaming of data to the cloud which will be enabled by various sensors which are placed in automatic molding unit, melting & pouring unit etc. (for temperature, pressure, moisture, weight, vibration, etc.) which will be picked by analytics software for real-time monitoring of the entire operation (visual dashboard) through smart phones, as well as for process optimization
WP-5 Leader	Dr. Elizabeth Jacob (CSIR-NIIST)
Research team	<b>NIIST Trivandrum (Dr. Elizabeth Jacob)</b> - MEFGI, Rajkot (Dr. Amit Sata) - SGGs, Nanded (Prof. J.V.L. Venkatesh) - Atomberg, Mumbai (Mr. Manoj Meena)
Expected Outcome	Data analytics software & cloud services



<b>Title of WP-5</b>	<b>Data Sensing and Analytics</b>	
Duration	From: October 2016	To: September 2019

**Table 5.b: Tasks under WP-5**

SI Task	Lead Agency	Support Agencies	Duration (Months)
5.1 Layout and workflow modelling of SMART FOUNDRY	SGGS	NIIST, MEFGI & the whole research team	<p>12 months from start of project for modeling the layout and workflow based on initial version of the SMART Foundry system.</p> <p>13-24 months for upgrading the system's layout and workflow models by incorporating details based on developments of various subsystems of the system.</p> <p>25-36 months for demonstration of the full system with all subsystems included in the layout and workflow design.</p>
5.2 Cloud Application Development	NIIST	SGGS, MEFGI	<p>1-6 Sensor data acquisition by consolidating all data generating sub-systems and setting up cloud server.</p> <p>7-18 months for data streaming to the cloud, with basic dashboard displays.</p> <p>19-24 months for software development for on-screen data visualization and Cloud data management.</p> <p>25-36 months for demonstration of Product and Process Data Management for SMART Foundry</p>
5.3 Development of data analytics engine	MEFGI	NIIST, SGGS	<p>1-12 months - Development of dashboard view for representing data collected from various modules</p> <p>13-24 months - Development of cloud-based data analytics software and optimization of process parameters by analysis of historical data and its implementation in cloud based devices - defect data analysis</p> <p>25-36 months - testing of process monitoring system on cloud based devices and demonstration of Product and Process Data Management for SMART Foundry</p>

*OB*  
*Dr. Jia N*

# Annexure

## II

No. DST/TSG/AMT/2015/332(General)  
Government of India  
Ministry of Science & Technology  
Department of Science & Technology

Technology Bhavan  
New Mehrauli Road  
New Delhi- 110 016  
Dated: 17.08.2016

### ORDER

Subject: **Financial assistance for the project entitled "SMART Foundry 2020 (SMART=Sustainable Metalcasting using Advanced Research and Technology)." submitted by Dr. S. Savithri, Sr. Principal Scientist, National Institute for Interdisciplinary Science & Technology (NIIST), Pappanamcode Industrial Estate, Thiruvananthapuram- 695 019, Kerala, Dr. Nagahanumalah, Sr. Principal Scientist & Head, Micro Systems Technology Laboratory, CSIR-Central Mechanical Engineering Research Institute (CMERI), M.G. Avenue, Durgapur- 713 209, West Bengal, Dr. A.M. Kuthe, Professor and Head, Mechanical Engineering Department, Visvesvaraya National Institute of Technology (VNIT), Nagpur- 440 010, Maharashtra and Dr. Goutam Sutradhar, Professor, Mechanical Engineering Department, Jadavpur University, Kolkata-700 032, West Bengal.**

Sanction of the President is conveyed for the sanction of ₹. 9,50,15,160/- (Rupees Nine Crore Fifty Lakh Fifteen Thousand One Hundred Sixty only) i.e ₹. 8,25,15,160/- (Rupees Eight Crore Twenty Five Lakh Fifteen Thousand One Hundred Sixty only) as the contribution of DST and ₹. 1,25,00,000/- (Rupees One Crore Twenty Five Lakh only) as the contribution of five Industrial Collaborators viz. M/s Aha 3D Innovations Private Ltd, M/s 3D Foundry Tech Pvt. Ltd, M/s Marco Polo Products Pvt. Ltd, M/s Treelabs Foundations and M/s Atomberg Technologies Pvt. Ltd with contribution of ₹. 25,00,000/- (Rupees Twenty Five Lakh only) each.

2. Out of the DST's contribution of ₹. 8,25,15,160/- (Rupees Eight Crore Twenty Five Lakh Fifteen Thousand One Hundred Sixty only) the break up of ₹. 3,13,12,200/- (Rupees Three Crore Thirteen Lakh Twelve Thousand Two Hundred only) will be the share for National Institute for Interdisciplinary Science & Technology (NIIST)-Thiruvananthapuram, ₹. 2,97,94,400/- (Rupees Two Crore Ninety Seven Lakh Ninety Four Thousand Four Hundred only) will be the share for CSIR-Central Mechanical Engineering Research Institute (CMERI)- Durgapur, ₹. 1,34,51,600/- (Rupees One Crore Thirty Four Lakh Fifty One Thousand Six Hundred only) will be the share for Visvesvaraya National Institute of Technology (VNIT)-Nagpur and ₹. 79,56,960/- (Rupees Seventy Nine Lakh Fifty Six Thousand Nine Hundred Sixty only) will be the share for Jadavpur University-Kolkata.

3. Out of the share of ₹. 3,13,12,200/- (Rupees Three Crore Thirteen Lakh Twelve Thousand Two Hundred only) in respect of NIIST-Thiruvananthapuram, the break-up of ₹. 1,25,00,000/- (Rupees One Crore Twenty Five Lakh only) would be for the Capital head and ₹. 1,88,12,200/- (Rupees One Crore Eighty Eight Lakh Twelve Thousand Two Hundred only) will be under the Grant in Aid General head.

4. Out of the share of ₹. 2,97,94,400/- (Rupees Two Crore Ninety Seven Lakh Ninety Four Thousand Four Hundred only) in respect of CSIR-CMERI-Durgapur, the break-up of ₹. 1,14,00,000/- (Rupees One Crore Fourteen Lakh only) would be towards the creation of Capital Assets and ₹. 1,83,94,400/- (Rupees One Crore Eighty Three Lakh Ninety Four Thousand Four Hundred only) would be towards the recurring budget head Grant-in-Aid General.

5. Out of the share of ₹. 1,34,51,600/- (Rupees One Crore Thirty Four Lakh Fifty One Thousand Six Hundred only) in respect of VNIT-Nagpur, the break-up of ₹. 46,00,000/- (Rupees Forty Six Lakh only) would be towards the creation of Capital Assets and ₹. 88,51,600/- (Rupees Eighty Eight Lakh Fifty One Thousand Six Hundred only) would be towards the recurring budget head Grant-in-Aid General.

6. Out of the share of ₹. 79,56,960/- (Rupees Seventy Nine Lakh Fifty Six Thousand Nine Hundred Sixty only) in respect of Jadavpur University-Kolkata, the break-up of ₹. 30,00,000/- (Rupees Thirty Lakh only) would be towards the creation of Capital Assets and ₹. 49,56,960/- (Rupees Forty Nine Lakh Fifty Six Thousand Nine Hundred Sixty only) would be towards the recurring budget head Grant-in-Aid General.

P.T.O.

*Handwritten signatures and initials*

Cont'd.3/-

HEAD		1 <sup>st</sup> year	2 <sup>nd</sup> year	3 <sup>rd</sup> year	Total	
1.	<b>EQUIPMENTS : High end CPU Cluster Computer, Other casting simulation software for bench marking, Alloy property databases, 25 KVA UPS with 2 hour backup, High end server for cloud based data management &amp; analytics, Server with monitor, 5KVA UPS &amp; Plotter, Software for layout and work flow modelling, Software like Mintab for DOE &amp; Solid works, High end workstations, High end desktops, Table top induction melting furnace capable of melting 2kg Aluminium, Ultrasonic stirring system, 16 Channel thermocouple unit, Data acquisition system, Casting cleaning and fettling unit, Resistance heating furnace and pouring equipment, Micro hardness tester, Inverted microscope with image analysis software, Ultrasonic flaw detection, Permeability tester (digital) &amp; inverted metalurgical microscope, Controller along with Pneumatic actuators, sensors etc, CAD Software, Hydraulic cylinder of 1 ton capacity along with power pack and accessories, Digital Oscilloscope, Precision motion stages &amp; other automation units, Workstations, Particle reinforcement heating and XRF feeding system, Vacuum attachment unit with accessories, 3D printing machine accessories, Laser Machine for Micro Machining, Minor equipment like android devices, software, laptops, digital webcam, LED TV etc, and minor equipments and accessories costing ₹ 1.00 lakh</b>	₹ 79,50,000/- NIIST CMERI VNIT JUK Total	₹ 54,00,000/- CMERI VNIT JUK Total	₹ 30,00,000/- CMERI VNIT JUK Total	₹ 30,00,000/- NIIST CMERI VNIT JUK Total	₹ 1,25,00,000/- ₹ 1,14,00,000/- ₹ 46,00,000/- ₹ 30,00,000/- ₹ 3,15,00,000/-

Non-recurring (Capital Items)

5. The item of expenditure for which the total allocation of ₹. 9,50,15,160/- has been approved for a period of 36 months are given below.

**Recurring Items (General) (NIIST-Thiruvananthapuram component)**

Sl.No	Item	1 <sup>st</sup> Year	2 <sup>nd</sup> Year	3 <sup>rd</sup> year	Total
1	MANPOWER				
	Research Associate-01 Nos @ ₹. 36,000/- + 20% HRA	518400	518400	518400	1555200
	JRF - 10 Nos @ Rs. 25,000/- + 20% HRA for the first two years and @ Rs. 28,000/- + 20% HRA for the 3 <sup>rd</sup> year as SRF.	3600000	3600000	4032000	11232000
2	Consumables	800000	800000	800000	2400000
3	Contingency	50000	50000	50000	150000
4	Travel	50000	50000	50000	150000
5	Other cost	600000	750000	475000	1825000
6	Overhead	1000000	250000	250000	1500000
	Grand Total	6618400	6018400	6175400	18812200

**Recurring Items (General) (CSIR-CMERI-Durgapur component)**

Sl.No	Item	1 <sup>st</sup> Year	2 <sup>nd</sup> Year	3 <sup>rd</sup> year	Total
1	MANPOWER				
	Research Associate-01 Nos @ ₹. 36,000/- + 20% HRA	518400	518400	518400	1555200
	JRF - 6 Nos @ Rs. 25,000/- + 20% HRA for the first two years and @ Rs. 28,000/- + 20% HRA for the 3 <sup>rd</sup> year as SRF.	2160000	2160000	2419200	6739200
2	Consumables	500000	1000000	1000000	2500000
3	Contingency	50000	50000	50000	150000
4	Travel	50000	50000	50000	150000
5	Other cost	1400000	2200000	2200000	5800000
6	Overhead	1000000	250000	250000	1500000
	Grand Total	5678400	6228400	6487600	18394400

**Recurring Items (General) (VNIT-Nagpur component)**

Sl.No	Item	1 <sup>st</sup> Year	2 <sup>nd</sup> Year	3 <sup>rd</sup> year	Total
1	MANPOWER				
	Research Associate-01 No @ ₹. 36,000/- + 20% HRA	518400	518400	518400	1555200
	JRF - 2 Nos @ ₹. 25,000/- + 20% HRA for the first two years and ₹. 28,000/- + 20% HRA for the 3 <sup>rd</sup> year as SRF.	720000	720000	806400	2246400
2	Consumables	650000	450000	250000	1350000
3	Contingency	50000	50000	50000	150000
4	Travel	50000	50000	50000	150000
5	Other cost	700000	700000	500000	1900000
6	Overhead	1000000	250000	250000	1500000
	Grand Total	3688400	2738400	2424800	8851600

**Recurring Items (General) (Jadavpur University -Kolkata component)**

Sl.No	Item	1 <sup>st</sup> Year	2 <sup>nd</sup> Year	3 <sup>rd</sup> year	Total
1	MANPOWER				
	JRF - 2 Nos @ Rs. 25,000/- + 30% HRA for the first two years and @ Rs. 28,000/- + 30% HRA for the 3 <sup>rd</sup> year as SRF.	780000	780000	873600	2433600
2	Consumables	400000	400000	200000	1000000
3	Contingency	50000	50000	50000	150000
4	Travel	50000	50000	50000	150000
5	Other cost	200000	200000	100000	500000
6	Overhead	298000	248000	177360	723360
	Grand Total	1778000	1728000	1450960	4956960

3. The overhead expenses are meant for the host Institute towards the cost for providing infrastructural facilities and benefits to the staff employed in the project etc.

*[Handwritten signature]*  
*[Handwritten initials]*

*[Handwritten signatures and initials]*

Cont'd.5/-

AMC, If any.

12. The financial support provided by DST should be duly acknowledged at all the forums and publications and proceedings whenever this work is presented. The Principal Investigator is requested to place a sticker on the equipment purchased through the grants provided for the project by DST having the name of DST Scheme, Title of the Project, Sanction Number and Date, Date of equipment purchased/commissioned, Cost of the equipment and information on

11. All purchases of equipments etc. would be as per GFR and the disposal of the same would be done with prior approval of DST.

10. The institute will furnish to the DST, utilization certificate and audited statement of accounts pertaining to the grant immediately after the end of each financial year.

9. It is also certified that this is the first sanction for the project and as such the clause related to the submission of the Utilization Certificate to PAO is not applicable.

8. The sanction has been issued under the powers delegated to the Ministers and with the concurrence of the Integrated Finance Division of Department of Science & Technology vide concurrence No. C/2658/IFD/2016-17 dated 17.08.2016 and with the approval of Head (TDT) vide his diary No. P-5241 dated 29.07.2016.

Demand No.77 Department of Science & Technology	
3425	OTHER SCIENTIFIC RESEARCH (MAJOR HEAD)
60	OTHERS (SUB - MAJOR HEAD)
60200	ASSISTANCE TO OTHER SCIENTIFIC BODIES (MINOR HEAD)
26	TECHNOLOGY DEVELOPMENT PROGRAMME
2601	TECHNOLOGY DEVELOPMENT & TRANSFER
260131	GRANTS-IN-AID GENERAL (PLAN) 2016-2017

7. The amount involved is debitable to:

Sl.No	Organization	Recurring	Bank Name	A/C Number	IFSC Code	Branch
1.	NIST- Trivandrum	6618400	State bank of Travancore	67047723825	SBTR0000030	Pappanamcode
2.	CMERI- Durgapur	5678400	State Bank of India	30280331299	SBIN0000074	Durgapur
3	VNIT- Nagpur	3688400	Canara Bank	3124201000001	CNRB0003124	VNIT
4	Jadavpur University	1778000	State Bank of India	11079699404	SBIN0000093	Jadavpur University
Total		17763200				

6. The amount of ₹. 1,77,63,200/- (Rupees One Crore Seventy Seven Lakh Sixty Three Thousand Two Hundred only) will be transferred to the beneficiaries as per the details given under :-

5. The sanction of the grant is subjected to the conditions mentioned in annexure-1.

4. Sanction of the President is accorded for the payment of ₹. 1,75,50,000/- (Rupees One Crore Seventy Five Lakh Fifty Thousand only) i.e. ₹. 79,50,000/- (Rupees Seventy Nine Lakh Fifty Thousand only) to Director, NIST-Thiruvananthapuram, ₹. 54,00,000/- (Rupees Fifty Four Lakh only) to Director, CSIR-CMERI-Durgapur, ₹. 27,00,000/- (Rupees Twenty Seven Lakh only) to Director, VNIT-Nagpur and ₹. 15,00,000/- to Registrar, Jadavpur University-Kolkata under the Creation of Capital Assets Head and ₹. 1,77,63,200/- (Rupees One Crore Seventy Seven Lakh Sixty Three Thousand Two Hundred only) i.e. ₹. 66,18,400/- (Rupees Sixty Six Lakh Eighteen Thousand Four Hundred only) to Director, NIST-Thiruvananthapuram, ₹. 56,78,400/- (Rupees Fifty Six Lakh Seventy Eight Thousand Four Hundred only) to Director, CSIR-CMERI-Durgapur, ₹. 36,88,400/- (Rupees Thirty Six Lakh Eighty Eight Thousand Four Hundred only) to Director, VNIT-Nagpur and ₹. 17,78,000/- (Rupees Seventeen Lakh Seventy Eight Thousand only) to Registrar, Jadavpur University-Kolkata under the Grant-in-Aid General head (Recurring) being the first installment of the grant for the year 2016-17 for implementation of the said research project.

No. DST/TSG/AMT/2015/332(Capital)  
Government of India  
Ministry of Science & Technology  
Department of Science & Technology

Technology Bhavan  
New Mehrauli Road  
New Delhi- 110 016  
Dated: 17.08.2016

**ORDER**

Subject: Financial assistance for the project entitled "SMART Foundry 2020 (SMART=Sustainable Metalcasting using Advanced Research and Technology)." submitted by Dr. S. Savithri, Sr. Principal Scientist, National Institute for Interdisciplinary Science & Technology (NIIST), Pappanamcode Industrial Estate, Thiruvananthapuram- 695 019, Kerala, Dr. Nagahanumaiyah, Sr. Principal Scientist & Head, Micro Systems Technology Laboratory, CSIR-Central Mechanical Engineering Research Institute (CMERI), M.G. Avenue, Durgapur- 713 209, West Bengal, Dr. A.M. Kuthe, Professor and Head, Mechanical Engineering Department, Visvesvaraya National Institute of Technology (VNIT), Nagpur- 440 010, Maharashtra and Dr. Goutam Sutradhar, Professor, Mechanical Engineering Department, Jadavpur University, Kolkata-700 032, West Bengal..

With reference to the Sanction Order No. DST/TSG/AMT/2015/332(General) dated 17.08.2016, sanction of the President is accorded for the approval of ₹. 3,15,00,000/- (Rupees Three Crore Fifteen Lakh only) i.e. ₹. 1,25,00,000/- (Rupees One Crore Twenty Five Lakh only) as the share for NIIST-Thiruvananthapuram, ₹. 1,14,00,000/- (Rupees One Crore Fourteen Lakh only) as the share of CSIR-CMERI, ₹. 46,00,000/- (Rupees Forty Six Lakh only) as the share of VNIT-Nagpur and ₹. 30,00,000/- (Rupees Thirty Lakh only) as the share of Jadavpur University-Kolkata towards the purchase of equipment's under the creation of Capital Assets.

2. Sanction of the President is also accorded for the release of ₹. 1,75,50,000/- (Rupees One Crore Seventy Five Lakh Fifty Thousand only) i.e. ₹. 79,50,000/- (Rupees Seventy Nine Lakh Fifty Thousand only) to Director, NIIST-Thiruvananthapuram, ₹. 54,00,000/- (Rupees Fifty Four Lakh only) to Director, CSIR-CMERI-Durgapur, ₹. 27,00,000/- (Rupees Twenty Seven Lakh only) to Director, VNIT- Nagpur and ₹. 15,00,000/- to Registrar, Jadavpur University-Kolkata as per the details given under :-

**Non-recurring (Capital Items)**

	HEAD	1 <sup>st</sup> year NIIST	1 <sup>st</sup> year CMERI	1 <sup>st</sup> year VNIT	1 <sup>st</sup> Year JUK	Total
1.	EQUIPMENTS : High end CPU Cluster Computer, Other casting simulation software for bench marking, Alloy property databases, 25 KVA UPS with 2 hour backup, High end server for cloud based data management & analytics, Server with monitor, 5KVA UPS & Plotter, Software for layout and work flow modelling, Software like Minitab for DOE & Solid works, High end workstations, High end desktops, Table top induction melting furnace capable of melting 2kg Aluminium, Ultrasonic stirring system, 16 Channel thermocouple unit, Data acquisition system, Casting cleaning and fettling unit, Resistance heating furnace and pouring equipment, Micro hardness tester, Inverted	₹. 79,50,000/-	₹. 54,00,000/-	₹. 27,00,000/-	₹. 15,00,000/-	₹. 1,75,50,000/-
		2 <sup>nd</sup> year	2 <sup>nd</sup> year	2 <sup>nd</sup> year	2 <sup>nd</sup> year	Total
		NIIST	CMERI	VNIT	JUK	
		₹. 45,50,000/-	₹. 30,00,000/-	₹. 12,00,000/-	₹. 10,00,000/-	₹. 97,50,000/-
	3 <sup>rd</sup> year	3 <sup>rd</sup> year	3 <sup>rd</sup> year	3 <sup>rd</sup> year	Total	
	NIIST	CMERI	VNIT	JUK		
	0	₹. 30,00,000/-	₹. 7,00,000/-	₹. 5,00,000/-		₹. 42,00,000/-

*Aluanto*

*AS*

*D/v* *ja.*

microscope with image analysis software, Ultrasonic flaw detection, Permeability tester (digital) & inverted metallurgical microscope, Controller along with Pneumatic actuators, sensors etc., CAD Software, Hydraulic cylinder of 1 ton capacity along with power pack and accessories, Digital Oscilloscope, Precision motion stages & other automation units, Workstations, Particle reinforcement heating and feeding system, XRF analyser/spectrometer, Vacuum attachment unit with accessories, 3D printing machine accessories, Laser Machine for Micro Machining, Minor equipment like android devices, software, laptops, digital webcam, LED TV etc., and Minor equipment's and accessories costing ₹. 1.00 lakh						
<b>TOTAL</b>	₹. 1,25,00,000/-	₹. 1,14,00,000/-	₹. 46,00,000/-	₹. 30,00,000/-	₹. 3,15,00,000/-	

2. The amount of ₹. 1,75,50,000/- (Rupees One Crore Seventy Five Lakh Fifty Thousand only) will be transferred to the beneficiaries as per the details given under :-

Sl. No.	Organization	Non-recurring	Bank Name	A/C Number	IFSC Code	Branch
1.	NIST-Trivandrum	7950000	State bank of Travancore	67047723825	SBTR0000090	Pappanamcode
2.	CMERI-Durgapur	5400000	State Bank of India	30280331299	SBIN0000074	Durgapur
3	VNIT-Nagpur	2700000	Canara Bank	3124201000001	CNR80003124	VNIT
4	Jadavpur University	1500000	State Bank of India	11079699404	SBIN0000093	Jadavpur University
	Total	17550000				

3. The amount involved is debitale to:

Demand No77	Department of Science & Technology
3425	OTHER SCIENTIFIC RESEARCH (MAJOR HEAD)
60	OTHERS (SUB - MAJOR HEAD)
60.200	ASSISTANCE TO OTHER SCIENTIFIC BODIES (MINOR HEAD)
26.01	TECHNOLOGY DEVELOPMENT & TRANSFER
26.01.35	GRANTS FOR CREATION OF CAPITAL ASSETS (PLAN) 2016-2017 (TSG)

4. The sanction has been issued under the powers delegated to the Ministries and with the concurrence of the Integrated Finance Division of Department of Science & Technology vide concurrence No. C/2659/IFD/2016-17 dated 17.08.2016 and with the approval of Head (TDT) vide his diary No. P-5241 dated 29.07.2016

5. It is also certified that this is the **first sanction** for the project and as such the clause related to the submission of the Utilization Certificate to PAO is not applicable.

6. The institute will furnish to the DST, utilization certificate and audited statement of accounts pertaining to the grant immediately after the end of each financial year. All purchases of equipments etc. would be as per GFR and the disposal of the same would be done with prior approval of DST.

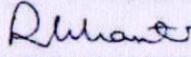
*SB*  
*Dr Jai*

13. The Institute/Agency will maintain separate audited accounts for the project and would keep the whole of the grant in a Bank Account earning interest, the interest earned should be reported to the DST. The interest thus earned will be treated as a credit to the Institute/Agency to be adjusted towards further installment of the grant".

14. As PER Rule 211 GFRs, the account of the project shall be open to inspection by the sanctioning authority/audit whenever the institution is called upon to do so

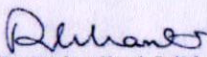
15. As per GFR-39, the sanction has been entered in the grants register maintained by the Technology Development & Transfer (TDT) Division and the serial number assigned in the register for the sanction is 14.

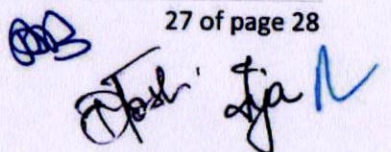
16. It is certified that all the Utilization Certificate in regard of all schemes/programmes/projects, present and previous pertaining to the institute have been received and no UC is pending against the organization as per the details in the PFMS also.

  
(Dr. Krishna Kanth Pulicherla) 11/8/16  
Scientist C

The Pay & Accounts Officer  
Department of Science & Technology  
New Delhi -110 016.

1. Cash Section (3 copies) for preparing the bill and remitting the amount to the above grantee.
2. Accounts Section, DST, New Delhi.
3. IFD, DST, New Delhi.
4. Director of audit (CW&M-II) AGCR Building, IP Estate, New Delhi.
5. Director, National Institute for Interdisciplinary Science & Technology (NIIST), Pappanamcode Industrial Estate, Thiruvananthapuram- 695 019, Kerala.
6. Director, CSIR-Central Mechanical Engineering Research Institute (CMERI), M.G. Avenue, Durgapur- 713 209, West Bengal.
7. Director, Visvesvaraya National Institute of Technology (VNIT), Nagpur- 440 010, Maharashtra.
8. Registrar, Jadavpur University, Kolkata-700 032, West Bengal.
9. Dr. S. Savithri, Sr. Principal Scientist, National Institute for Interdisciplinary Science & Technology (NIIST), Pappanamcode Industrial Estate, Thiruvananthapuram- 695 019, Kerala.
10. Dr. Nagahanumaiah, Sr. Principal Scientist & Head, Micro Systems Technology Laboratory, CSIR-Central Mechanical Engineering Research Institute (CMERI), M.G. Avenue, Durgapur- 713 209, West Bengal.
11. Dr. A.M. Kuthe, Professor and Head, Mechanical Engineering Department, Visvesvaraya National Institute of Technology (VNIT), Nagpur- 440 010, Maharashtra.
12. Dr. Goutam Sutradhar, Professor, Mechanical Engineering Department, Jadavpur University, Kolkata-700 032, West Bengal.
13. Mr. Aakash, Director, M/s Aha 3D Innovations Private Ltd., 166, Janakpur II, Jaipur-302 015, Rajasthan.
14. Mr. Baba Prasad Lanka, Managing Director, M/s 3D Foundry Tech, 507-C, Ecstasy Business Parkm Citi of Joy, J S D Road, Mulund (W), Mumbai-400 080, Maharashtra.
15. Mr. Aditya Kumar, Director, M/s Marco Polo Products P Ltd., Plot No. 75, Udayan Industrial Estate, 3 Pagladanga Road, Kolkata- 700 015, West Bengal.
16. Mr. Dipankar, Founder & Chief Scientist, M/s TREELabs Foundation, 627, 6th Floor, Master Mind IV, Royal Palms Estate, Aarey Milk Colony, Goregaon ( E), Mumbai-400 065, Maharashtra.
17. Mr. Manoj Meena, Director, Ms/ Atomberg Technologies Pvt Ltd, EL-111, Electronic zone, TTC MIDC Industrial Area, Navi Mumbai- 400 710, Maharashtra.
18. Sanction folder (Mr. C. Madhusudhanan, JTA, DST).
19. FICCI Cell, DST.


  
(Dr. Krishna Kanth Pulicherla) 11/8/16  
Scientist-C








**Annexure III - SMART FOUNDRY 2020 ( Sanction letter DST/TSG/AMT/2015/332 dated 17-08-2016)  
Responsibility and Budget Mapping Among Networking Partner Institutes**


Sl.	Networking Institute	PI	Co-PI	Deliverables	Budget in Rs. Lakh							
					Manpower	Consumables	Contingency	Other Cost	Travel	Equipment	Overhead	Total
1	CSIR-NIIST, Trivandrum	Dr. S. Savithri	Dr. Elizabeth J	CFD Based Multi-Physics Solver for Casting Process	27	1.5	0.75	3	0.75	36	2.5	71.3
		Dr. Elizabeth J	Dr.S.Savithri	Cloud Based Data Product and Process Data Storage, Analysis and Visualization	22	1.5	0.75	4	0.75	25	2.5	57
2	CSIR-CMERI, Durgapur	Dr.Nagahanumaiah	Dr.Sudip Kr. Samanta, Dr. A.K. Loahar	(1) Design and development of Automatic molding machine (2) Selection of sensors, integration to V-2 System	38	16	1.5	42	1.5	56	7	162
3	VNIT, Nagpur	Prof. A. M. Kuthe	Dr. K.M. Asthankar Dr. V.D. Ghuge	Design and development of Vacuum Melting and Pouring Unit	27	3	1.5	13	1.5	30	8.5	84.3
4	Jadavpur Univ. Kolkata	Prof. G. Sutradhar	Dr.ArunavaChanda	MMC Preparation and Casting Unit	24	10	1.5	5	1.5	30	7.23	79.6
5	IIT Bombay	Prof.Atul Sharma	Prof.Shyamprasad K.	Level Set Based Modelling and Simulation of Casting	11	3	0	3	0	20	3.5	40.7
		Prof.Shyamprasad K.	Prof.Atul Sharma	Process Optimization and Modeling of MMC	22	1.5	0	5.5	0	15	3	47.5
6	COEP, Pune	Dr.AratiMulay	Mr. Sandeep Ansane, Dr.BhagwanSonawane	Design and Development of 3D Plastic Pattern Printing Machine	22	3		5.5	0	18	3.5	52.5
7	DKTE, Kolhapur	Prof.VasudevShinde	Prof.P.N.Gore	(1) Development of Sand reclaimers (2) Melting & Pouring Unit and Quality Testing	22	6	0	11	0	40	4.5	84
8	SGGS, Nanded	Prof. J.V. Venkatesh	Dr. B.M. Dabade	(1) Product & Process Data Schema, (2) Layout and Workflow Modelling	11	10.5	0	6	0	16	6.5	50.2
9	CUST, Anand	Prof.Mayur K. Sutaria	Mr. Vijay Chaudhary	(1) Methods Design (2) Design and Development of Ultrasonic Stirrer	22	15	0	2	0	19	2	60.5
10	MEFGL,Rajkot	Prof. Amit Sata	Dr. B Jadeja	Process Monitoring & Data Analytics	22	1.5	0	0.8	0	10	1.5	36.2
<b>Total</b>					<b>273</b>	<b>72.5</b>	<b>6</b>	<b>100</b>	<b>6</b>	<b>315</b>	<b>52.2</b>	<b>825</b>


  
(Dr. S. Savithri)


  
(Dr. Nagahanumaiah)


  
(Dr. A.M. Kuthe)


  
(Dr. G. Sutradhar)


  
(Dr. Arati V. Mulay)

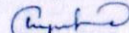
  
(Dr. Elizabeth Jacob)


  
(Dr. J.V.L. Venkatesh)

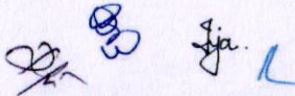
  
(Dr. Atul Sharma)

  
(Dr. Amit Sata)

  
(Dr. Mayur Sutaria)

  
(Dr. Shyamkaragadde)

  
(Dr. Vasudev Shinde)



# GUJARAT COUNCIL ON SCIENCE AND TECHNOLOGY

Department of Science & Technology, Government of Gujarat



Block : B, 7th Floor, M. S. Building, Nr. Pathikashram, Sector-11,  
Gandhinagar, Gujarat - 382011.

Phone : (079) 23259362-65 Fax : (079) 23259363

E-mail : info-gujcost@gujarat.gov.in

URL : www.gujcost.gujarat.gov.in



**Dr. Narottam Sahoo**

Advisor & Member Secretary

No. GUJCOST/Supercomputer/2020-21/ 1405

1<sup>st</sup> October 2020

To,

**Dr. Y. P. Kosta**

Provost, Marwadi University

Rajkot-Morbi Road, Rajkot-360003

Sub: Establishment of the Supercomputer facility at Institute of Marwadi University, Rajkot.

Dear Sir,

Greetings from the Gujarat Council on Science and Technology (GUJCOST), Gandhinagar.

It is our pleasure to inform you that your institution has been selected for the award of establishment of Supercomputer facility for the students and academic researcher for conducting high-end in-house advance computing studies and research work.

The supercomputing facilities through GUJCOST includes the Param Shavak system indigenously developed by C-DAC for high-performance computing and deep learning equipped with x86 based latest Intel processor, 96 GB RAM, 16 TB storage, Nvidia based co-processing accelerator technologies and software development environment. This brings innovative and ground breaking technological approaches to high end computing on table top platform and does not require costly data center infrastructure.

GUJCOST supercomputer facility aims to provide capacity building among students and faculties with advanced technologies to perform high-end computations for scientific, engineering and academic programs to address and catalyze the research using modelling, Simulation and data analysis. The facility will also help in promoting research by integrating Leading-edge emerging technologies at the grass root level.

The establishment of the supercomputing facility in your institution will be carried out as per the GUJCOST guidelines and terms and conditions, which is enclosed herewith as Annexure-I for your reference.

We once again thank you for your kind interest and look forward to creating high performance computing culture among an ideal platform for students to innovate.

Thank you and with best regards.

Yours sincerely,

(Narottam Sahoo)

Encl.: As above.

Marwadi University - Testing & Consultancy Revenue						
Particulars	AY 2017-18	AY 2018-19	AY 2019-20	AY 2020-21	AY 2021-22	Total
Environment Audit	3,642,483	5,855,157	4,108,992	6,570,097	4,184,280	24,361,009
Environment Consultancy	76,980	76,700	441,084	342,200	476,600	1,413,564
Material Testing	1,631,774	2,395,000	865,645	1,306,020	420,935	6,619,374
<b>Total</b>	<b>5,351,237</b>	<b>8,326,857</b>	<b>5,415,721</b>	<b>8,218,317</b>	<b>5,081,815</b>	<b>32,393,947</b>

*myadega*  
Registrar  
Marwadi University

