

### Technical Specification for 3D Printer hardware and machine interface software

#### Bidder Eligibility Criteria-I

| Sl. No | Bidder Eligibility Criteria-I   | Complied / Not Complied | Reference Page No. | Remarks, If any |
|--------|---|-------------------------|--------------------|-----------------|
| 1      | The bidder/OEM should have supplied at least 5 similar items to IITs, NITs, IISERs, CSIR Labs or other Govt. other globally reputed R&D organizations in the last 5 years, PO copies or installation certificates along with contact details of end user need to be submitted as the proof of supply. IIT Madras reserves its right to verify the claims submitted by the bidder and the feedback from the previous customers will be part of technical evaluation. |                         |                    |                 |
| 2      | The bidder should have the annual turnover should be at least Rs. 5 Lakhs and be profitable during each of the previous three financial years i.e. during 2018-19, 2019-20 &2020-21. Audited financial Statements or Financial Statements showing turnover duly signed by a Chartered Accountant are to be submitted.   |                         |                    |                 |
| 3      | The bidder should be able to supply the above-mentioned specification only by the single party, and they should provide the authorized technical and service support personnel.   |                         |                    |                 |
| 4      | The bidder should be OEM or OEM authorized Dealers / Channel partners / Distributors of reputed brand having authorization for sales and after sales support. Valid OEM authorization letter is required for all supply component to participate in this tender.  |                         |                    |                 |

#### Technical Specifications II

| Sl. No. | SPECIFICATION   | Complied / Not Complied | Reference Page No. |
|---------|---|-------------------------|--------------------|
| 1       | <b>Technology:</b> Pneumatic-based micro extrusion system for printing of tissue/cell models, bio-inks or organs.                           |                         |                    |
| 2       | <b>Printheads:</b> 2 pneumatic-based extrusion printheads.  |                         |                    |
| 3       | <b>UV crosslinking:</b> Should have UV curing facility to use vast range of hydrogels. Should have wavelengths of 365 nm and 405 nm         |                         |                    |
| 4       | <b>Printhead Response Time:</b> ON: 5 ms or less<br>OFF: 4 ms or less   |                         |                    |
| 5       | <b>Nozzle Diameter:</b><br>50 to 1540 $\mu$ m   |                         |                    |
| 6       | <b>Build Volume (X*Y*Z):</b><br>- 125 * 75 * 100 mm or higher<br>- Printbed should have has insets for P100 petri dish and multiwell plates |                         |                    |
| 7       | <b>Print Platform Temperature:</b><br>Room Temperature to 65 $^{\circ}$ C   |                         |                    |
| 8       | <b>Layer Resolution:</b><br>100 microns or better   |                         |                    |
| 9       | <b>Z Positioning Precision:</b><br>10 microns or better   |                         |                    |

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|----|---|--|--|
| 10 | <b>X-Y Positioning Precision:</b><br>2.5 microns or better  |  |  |
| 11 | <b>Printhead Temperature:</b> Both Printheads should have a temperature range of RT- 130 °C   |  |  |
| 12 | <b>Calibration:</b> Automatically/manually which should be performed directly on the machine without the need to connect to a computer.   |  |  |
| 13 | <b>Maximum Operating Pressure:</b> 700 kPa or better  |  |  |
| 14 | <b>Set Pressure Range:</b> 5 - 400 kPa or better  |  |  |
| 15 | <b>Compressor:</b> The compressor should be given with the machine and should consist of appropriate filters.   |  |  |
| 16 | <b>Minimum Unit Setting:</b> 1 kPa or better  |  |  |
| 17 | Sensitivity Within $\pm 0.2\%$ F.S.   |  |  |
| 18 | Repeatability within $\pm 1\%$ F.S.   |  |  |
| 19 | <b>Hydrogel Viscosity Range:</b> Should have equipped facility for using range of hydrogels with viscosity ranging from 0.001 to 250 Pa.s   |  |  |
| 20 | <b>Standalone Sterility</b><br>- Build closed chamber must be integrated with sterile printing technology equipped with HEPA H13/ H14 or better filtration system<br>- The filter should be able to extract 99.9% or higher number of particles and micro-organisms to create a sterile airflow throughout the printing volume. |  |  |
| 21 | <b>Machine operation:</b><br>- Should be equipped with Stepper motor technology and capable of stand-alone operation.<br>- Should be able to pause or resume during a print process through an integrated control, without the dependence of a computer.  |  |  |
| 22 | <b>Materials:</b> Should be able to print wide range of bioinks including silk fibroin, collagen solutions, gelatin methacrylate, alginate, poloxamer, hyaluronic acid, and polycaprolactone (PCL). It should also be able to print novel synthesized polymers and new polymer blends and composites developed in-house.        |  |  |
| 23 | The bidder should provide the following sample bioinks for initial training and optimization purpose:<br>- GelMA Photoink<br>- Cellink Xplore<br>- Photo-HA   |  |  |
| 24 | <b>User Interface</b><br>- Machine should have inbuilt 3" LCD or better. Display should show the progress of the print and other parameters.<br>- User should be able to modify Pressure parameters (while the print is running) directly from the system without the need to connect to a computer                             |  |  |
| 25 | <b>Connectivity:</b> USB, SD Card. Printer should run as standalone, there should not be a need to keep computer connected after loading the file and during printing.  |  |  |
| 26 | Bidder should provide an additional laptop for modelling 3D structures in CAD software  |  |  |
| 27 | The instrument should come with a UPS with at least 30 min. power backup.   |  |  |
| 28 | <b>File Formats Supported:</b> STL/OBJ/AMF  |  |  |
| 29 | <b>Operating System Support:</b> Windows, MAC, Linux  |  |  |
| 30 | <b>IP Rating:</b> IP10 or better  |  |  |

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|-----------|--|--|--|
| 31        | <b>Model Library:</b> OEM/Bidder should provide a library/collection of printable models such as Human Organs, Tissue Models and Protocols   |  |  |
| 32        | <b>Physical Specifications:</b><br>- Closed Structure Frame with Chemical Resistant Powder Coated High Grade Steel or equivalent material<br>- Weight should not exceed >20 kg   |  |  |
| 33        | <b>Quality Standards:</b> CE, UL – Documentary Evidence to be attached   |  |  |
| 34        | <b>Manufacturer Qualification:</b> The manufacturer of the quoted equipment should be in existence and should have supplied same/similar machine in India/globally for a period of minimum of 5 years. Manufacturer should be ISO Certified Documentary proof to be attached |  |  |
| 35        | <b>Software:</b> Should have in-built Software Bundle: To control all print parameters and visualize the printing process  |  |  |
| 36        | <b>Security:</b> The usage of the software or firmware should not cause any security issues during installation or other processes   |  |  |
| 37        | <b>Processing Software:</b> Should be perpetual in nature and must be installed on a local computer and should be accessible offline without the need for an internet connection   |  |  |
| 38        | <b>Documentary Evidence:</b> The standard brochure and product website should contain all the specifications. Specifications and features not published in standard documentation will not be accepted as proof of compliance  |  |  |
| 39        | Consumables for a span of one year: Cell mixer, Nozzle kit, Needle kit, Luer locks, Pluronic ink.  |  |  |
| 40        | <b>Design Software:</b> CATIA V5 (single user) licensed software to generate CAD file, CAD modification and Reverse Engineering of CT scan & MRI data. Software support required for converting CT scan & MRI data to printable files.                                       |  |  |
| 41        | All spares and accessories should be available for next 10 years   |  |  |
| 42        | All shipping related charges including Freight Forwarding, Insurance, Custom Duty, Custom clearance, and local transportation should be included in the quoted price   |  |  |
| 43        | The quoted price should be inclusive of GST  |  |  |
| 44        | All software upgrades should be provided free of cost for next 5 years.  |  |  |
| <b>45</b> | <b>Vendor Qualification Terms</b>  |  |  |
| a         | 1 year warranty to be included on all the above Quoted components  |  |  |
| b         | Vendor should conduct workshop/training session as part of equipment installation for internal and external users and annually for the next 3 years.   |  |  |
| c         | Bidder should provide support for periodic instrument calibration and troubleshooting  |  |  |
| d         | The equipment must have one year warranty. Quote must include 2 years optional warranty and AMC for the 4 <sup>th</sup> and 5 <sup>th</sup> year..   |  |  |
| e         | Necessary training and installation to be provided.  |  |  |