Creative Museum Designers

(A Section 8 Company Guaranteed by National Council of Science Museums)
Govt. of India
33 Block – GN, Sector-V, Bidhannagar,
Kolkata-700 091

NOTICE INVITING TENDER

For

Supply, Installation, Integration, Testing and Commissioning of hardware and software packages, aluminium dome screen, interfaces, tools and / or drivers of a complete and fully integrated functional Fulldome digital 2D immersive Planetarium projection system (12 mtr. diameter) including onsite comprehensive warranty for five years and operation for a period of five years.

At

Science City, Agartala (Science City), Projeni Orchard, Siddhi Asram, Badharghat, Agartala, West Tripura District Pin: 799003

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(A Section 8 Company Guaranteed by National Council of Science Museums)
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33 Block – GN, Sector-V, Bidhannagar,
Kolkata-700 091

Tender No. CMD 007.12.59(Works)/23-24/04

NOTICE INVITING TENDER

NAME OF THE WORK: Supply, Installation, Integration, Testing and Commissioning of hardware and software packages, aluminium dome screen, interfaces, tools and / or drivers of a complete and fully integrated functional Fulldome digital 2D immersive Planetarium projection system (12 mtr diameter) including onsite comprehensive warranty for five years and operation for a period of five years.

Creative Museum Designers invites sealed tender in two Bid System from the manufacturers or their authorized registered Indian agents for Supply, Installation, Integration, Testing and Commissioning of hardware and software packages, interfaces, tools and / or drivers of a complete and fully integrated functional Fulldome digital 2D immersive projection system for 12 meter diameter perforated aluminium dome screen with geometrical correction, image stitching and blending etc. for seamless projection of high resolution 2D digital full dome film shows and digital planetarium shows including onsite comprehensive warranty for five years, operation for a period of five years.
The tender includes fabrication, supply, installation, testing and commissioning of seating stepped platform, chairs, acoustics, server room and other minor civil and electrical works.

Interested bidders may download the tender documents from the tender section of Company's website http://cmdncsm.in and in the tender section (under 'Notice') section of NCSM's website https://ncsm.gov.in as per the following schedule:-

1	Bid Document Published Date	26.06.2023
2	Last Date of submission of Pre-Bid Queries or clarifications (No later queries shall be entertained)	05.07.2023, 06:00 p.m. only at the following email id: **cmd.ncsm.electronics@gmail.com**
3	Pre-Bid meeting (in hybrid mode) Date and Place	07.07.2023 at Creative Museum Designers, Kolkata from 11.30 a.m.
4	Bid Submission Start Date	10.07.2023
5	Bid Submission End Date	26.07.2023 till 05:00 pm.
6	Technical (Techno-commercial) Bid Opening	27.07.2023
7	Date and Place of Technical Presentation	To be notified later
8	Financial Bid Opening Date	To be notified later

The purchaser will open the tenders at the specified date & time and at the specified place as indicated in the NIT. However, in case the specified date of tender opening falls on subsequently declared holiday or closed day for the purchaser, the tenders will be opened at the appointed time and place on the next working day.

Note: In case of any changes, corrigendum / addendum will be published on CMD website (http://cmdncsm.in) and in the tender section (under 'Notice') section of NCSM's website (https://ncsm.gov.in). Eligible vendors are requested to check the website frequently.

1. **Visit of the site at Science City, Agartala:** Bidders are advised to visit the existing Science City, Agartala (Science City), Projeni Orchard, Siddhi Asram, Badharghat, Agartala, West Tripura District Pin: 799003 to ascertain and fully understand the nature and quantum of work before tendering. **Site inspection may be carried out at least one day before the scheduled pre-bid meeting at CMD, Kolkata. In case, the representative of the bidder is unable to attend the pre-bid meeting, the queries may be submitted through email.** However, lack of knowledge of site conditions cannot be considered as an excuse for mistake/ misrepresentation in the bid.

2. Submission of the Bid: Bids submitted only in physical forms will be accepted.

3. Details of submission of tender, etc. are indicated in the tender document as per **Annexure-A.**

4. The bid, both Technical (Techno-Commercial) Bid and Financial bid, duly furnished in Envelope – I and Envelope – II respectively and both enclosed inside a separate envelope, should be submitted within the due date and time as per the above schedule. The responsibility to ensure the same lies with the bidders.

5. It is intended to purchase the above equipment directly from the manufacturer without involving any agent or payment of any bidder commission. However, authorised registered Indian agents of foreign manufacturers who are capable of rendering After Sales Service (in case where foreign manufacturers do not quote any rate to the actual users) will be eligible to quote on behalf of their respective OEMs, but must submit along with the tender a copy of the Bidder-Agreement with foreign manufacturer proving that it is authorized to quote on behalf of the OEM and in such case, no bidder commission shall be paid by the Company.

6. CMD reserves the right to amend / withdraw any of the terms and conditions in the tender document or to reject any or all tenders, in full or part, without giving any notice or assigning any reason. CMD shall also not be bound to accept merely the lowest offer but the technical suitability, capability and superiority of the concept / technology interface / system etc. shall be of prime consideration for selection of the agency.

Place: Kolkata
Date: 26-06-2023

Managing Director
Creative Museum Designers

General Information and Instructions

1. The instructions given herein will be strictly binding on the bidders and deviation, if any will make the tender or tenders liable to be considered invalid. Tenders incorporating additional conditions by the bidder are liable for rejection.

2. The physical bids shall be dropped in Tender Box, 6th floor of Creative Museum Designers, 33, Block GN, Sector V, Bidhannagar, Kolkata – 700 091.

3. An agent of foreign OEM, for submitting the offer on behalf of overseas OEM, would be required to produce a copy of their legal bidder agreement with their principal and a copy of registration as an Indian agent failing which their bid would be disqualified.

4. **Earnest Money:**
   a) The Earnest Money of ₹30,00,000/- (Rupees Thirty Lakhs Only) being approx. 2.5% of the estimated tendered value of the work (rounded off to the nearest hundred), only in the form of Pay Order / Demand Draft / Banker's Cheque / NEFT*/RTGS*/Bank Guarantee from any Nationalized Bank / Scheduled Commercial Bank. For NEFT, the details of our Banker is furnished as below:

Bank Name:	INDIAN OVERSEAS BANK
Beneficiary Name:	CREATIVE MUSEUM DESIGNERS
Bank Address:	Indian Overseas Bank, GN 34/2, Sector – V, II Studio, Saltlake, Kolkata – 700091. West Bengal, India
A/c No.:	164201000001214
IFSC Code:	IOBA0001642

   Pay Order / Demand Draft / Banker's Cheque / NEFT/ RTGS/ Bank Guarantee to be drawn in favour of Creative Museum Designers and payable at Kolkata. Demand Draft / Banker's Cheque / Documents confirming NEFT/RTGS (the EMD amount must be credited to CMD's account as mentioned above on or before the last date of submission i.e. 26.07.2023 up to 5.00 PM) for the Earnest Money Deposit must accompany the part I of tender as indicated below. All tenderers must submit their complete document within the last date of submission i.e. 26.07.2023 up to 5.00 PM. Tenders received after the due date and / or without Earnest Money Deposit (EMD) will be summarily rejected. No deviation from the mode of depositing Earnest Money stipulated above will be permissible and any deviation will render the tenders liable for rejection.

   *Transaction Confirmation receipt of NEFT to CMD must be submitted.

   b) EMD of the unsuccessful bidders will be returned within 01 (one) month after the award of the contract to the successful bidder.
   c) Bank Gurantee submitted against EMD must be valid for 06 months from date of submission and claim period must be 06 months after end of validity period.

5. **Tender Fees:** Tenderers to submit **₹5,900/- (Rupees Five Thousand Nine Hundred only)** including GST towards the cost of Tender Document by Demand Draft / Banker's Cheque / Pay Order / NEFT* and to be drawn in favour of Creative Museum Designers

payable at Kolkata as per details given above in Clause 4. Tender fees is **NON-REFUNDABLE**.

*Transaction Confirmation receipt of NEFT/ Demand Draft / Banker's Cheque / Pay Order must be submitted to CMD in separate envelop superscribed "Tender Fee".

6. **Validity of Bids: The Bids shall remain valid for 180 days from the date of opening of Financial bid.**

7. **Rejection of Bids:** Canvassing by the Bidder(s) in any form, unsolicited letter, conditional tenders and post-tender correction may invoke summary rejection. Non-compliance of applicable General Information and Instructions will disqualify the Bid.

8. The Bidders shall fill up the Prescribed Format as per **"Annexure-B"** for submission of **Technical (Techno-commercial) Bid** duly signed by the authorized signatory. The person signing the tender document should be authorised for submitting the tender.

9. The Financial Bid shall be duly filled in and signed by the authorized signatory as per prescribed format given in **"Annexure-C".**

10. Tender must be submitted in two separate envelops marked **Part-1** (Technical Bid) and **Part-2** (Financial Bid/BOQ). The contents of Envelope-1 and Envelope-2 shall be as follows:-

Part-1 (Envelope-1)

i) Pay Order / Demand Draft / Banker's Cheque / NEFT/RTGS/ Bank Guarantee to be drawn in favour of Creative Museum Designers and payable at Kolkata. Demand Draft / Banker's Cheque / Documents confirming NEFT (the EMD amount must be credited to CMD's account as mentioned above on or before the last date of submission i.e. 26.07.2023 up to 5.00 PM) for the Earnest Money Deposit.

ii) "Technical (Techno-Commercial) Bid" (as per **Annexure-B)** duly filled in and signed with the official stamp.

iii) All relevant documents related to the "Technical (Techno-commercial) Bid" as per **"Annexure-B"**

iv) "General Terms & Conditions" duly signed on each page by the Authorized Signatory with the official stamp as a token of acceptance by the bidders.

v) "Technical specifications and Scope of Work" duly signed on each page by the Authorized Signatory with the official stamp as a token of acceptance by the bidders.

vi) "Technical Compliance Table" (as per **Annexure-D** format) duly filled in and signed on each page by the Authorized Signatory with the official stamp.

vii) Bidder must submit "Past Experience" (as per **Annexure-E** format) and "Annual Turnover" (as per **Annexure- F** format) duly filled in and signed on each page by the Authorized Signatory with the official stamp.

viii) Prescribed Undertaking by the "Original System Integrator" as per **"Annexure-G"** format, if applicable, duly signed on each page by the Authorized Signatory with office stamp.

ix) The Technical Brochures of each equipment with technical explanation for every feature of the product offered by the bidders.

x) Name, Address, Name of the contact person and his/her mobile number etc. of the Indian agents as well as OEM for each product of the system.

xi) All the documents pertaining to eligibility criteria as per relevant clauses of GTC of NIT.

Part-2 (Envelope-2)

i. The "Financial Bid (BOQ)" (as per **Annexure-C** format) i.e. Schedule of Price duly filled and signed on each page by the Authorized Signatory with office stamp.

ii. "Cost Break-up" (as per **Annexure-H** format Part A & B) duly filled in and signed with official stamp. It should be ensured that all the columns of Cost break-up sheet are filled up, failing which the same will be rejected.

The Envelope-1, i.e. Technical (Techno-commercial) Bid shall be opened by the Company at the first stage and evaluated by the competent authority of the Company. At the second stage, the Envelope-2 containing Financial Bid of only acceptable techno-commercial offers shall be opened for further evaluation and ranking before awarding the contract.

Annexure A

Creative Museum Designers

(A Section 8 Company Guaranteed by National Council of Science Museums)
Govt. of India
33 Block – GN, Sector-V, Bidhannagar,
Kolkata-700 091

Tender No. CMD 007.12.59(Works)/23-24/04

Instructions for Bid Submission

1. The bidders are required to submit hard copies of their bids physically at CMD office, Kolkata. The instructions given below are meant to assist the bidders to prepare their bids in accordance with the requirements and submit their bids accordingly.

A. PREPARATION OF BIDS

i. Bidders should take into account the original NIT and any subsequent corrigendum / published on the tender document before submitting their bids.

ii. Please go through the tender advertisement and the tender document carefully to understand the documents required to be submitted as part of the bid. Please note the number of covers in which the bid documents have to be submitted, and the number of documents including the names and content of each of the documents that need to be submitted. Any deviations from these may lead to the rejection of the bid.

B. ASSISTANCE TO BIDDERS

i. Any enquiry relating to the tender document and the terms and conditions contained therein should be addressed to the Tender Inviting Authority.

ii. All communications related to the tender including the submission of the Proposal should be addressed to:

The Managing Director
Creative Museum Designers
33, Block GN, Sector – V,
Bidhannagar, Kolkata – 700091.
email id.: cmd.ncsm.ksmurali@gmail.com,
cmd.ncsm.electronics@gmail.com

Annexure-B

Creative Museum Designers

(A Section 8 Company Guaranteed by National Council of Science Museums)
Govt. of India
33 Block – GN, Sector-V, Bidhannagar,
Kolkata-700 091

Tender No. CMD 007.12.59(Works)/23-24/04

TECHNICAL (Techno-Commercial) BID

Notes: ALL PARTICULARS / INFORMATION SHOULD BE GIVEN IN THE FOLLOWING FORMAT WITH COMPLETE DETAILS.

i.	Name of the Bidder	:	
ii.	The mailing address of the Bidder with PIN/ZIP Code	:	
iii.	Contact details	:	
	Name of the contact person Mobile no of the contact person	:	
	Telephone number(s) Mobile	:	
	E-mail address	:	
	Website	:	
iv.	a. Background details of the Bidders (State whether original manufacturer / authorised Registered Indian Agent of the manufacturer).	:	
	b. In case of authorised Registered Indian Agent, submit a notary certified copy of the valid Bidder Agreement authorizing to bid on behalf of the OEM for the project. (Please mention "ATTACHED' or "NOT ATTACHED")	:	
	c. Name and Address of the Vendor to whom the order will be placed. CMD would like to procure the ensure system from a single source.	:	
v.	Whether capable to supply and install the Fulldome System as per minimum requirement of Technical Specification given in the tender document. (Please mention "YES" or "NO") Please fill up technical compliance sheet as per **Annexure-D.**	:	

	a) If it is mentioned "NO" above, submit a detailed deviation to be made from the enclosed Technical Specification. (Attach extra sheet, if required)	:	
	b) Submit the detailed specifications of the offered product including copies of the Product brochure	:	
vi.	Submit the proposed drawings of projection system, audio system, dome screen, seating arrangement, reclining chairs, server room, Electrical schemes of the proposed solution. **Note:** a. Projectors to be mounted in the periphery of the dome. b. Seating arrangement should be unidirectional with minimum number of 100 seats + 5 spare seats	:	
vii.	Single point contact details for all post-installation services related issues with hierarchy levels (if any)	:	
viii.	Please provide detailed address and set up link from where support for maintenance during post warranty shall be offered by the firm at Tripura	:	
ix.	Shelf-life time of the Digital immersive full dome 2D projection system (i.e. up to which period technical support as well as spare parts including consumables shall be available with the firm).	:	
x.	Submit technical brochures indicating the detailed technical specifications of the system as given in the table below:-	:	

Detailed Information to be submitted by the Bidders as per following table

Sl. No.	**Details of Information Required**	**Qty**
i.	Details of civil, seating layout and electrical work including air-conditioning for the projectors and servers enclosures to be taken up by the bidder.	1 Set
ii.	Details of the two Projectors with special mountings. This set should contain projectors proposed, its make, complete specifications, its weight, dimensions, details about lenses, heat load, noise generated etc.	1 Set

iii.	Edge blending and geometric correction details	1 Set
iv.	Image Generator, Interactive planetarium software and playback system details including specifications and product catalogues. Digital library and software for playback and creation of planetarium shows.	1 Set
v.	Display management, calibration and alignment system details	1 Set
vi.	Show Control System details	1 Set
vii.	Networking and data cabling schematic layout	1 Set
viii.	5.1 surround sound system details including product catalogues, location of speakers etc.	1 Set
ix.	LED cove lighting, exit and emergency exit signage and LED step lighting with all associated electrical wiring works.	1 Set
x.	Complete details of U.P.S. of 20 kVA with 30 minutes back up including technical catalogues/brochures.	1 Set
xi.	Seating layout and design details of reclining chairs along with line of sight diagrams **(locally available materials may be considered).**	1 Set
xii.	Details of Acoustic treatment (mineral wool, 48 kg/ meter cube density, 50 mm thickness) and heat insulation (rock wool, 48 kg/ meter cube density, 50 mm thickness) with aluminium foil vapour barrier on the inner surface of the outer concrete dome covered with matt black acoustic fibre is required, to be executed and shall be submitted along with specifications of material **(locally materials may be considered),** schematic drawings with expected outcome.	1 Set
xiii.	Details of modular acoustic panels to be installed on the peripheral wall of the dome theatre to achieve NRC 0.6-0.8. as per details specification mentioned in the tender.	1 Set
xiv.	Indicative list of documents/manuals/drawings that shall be provided to CMD while handing over. Suggested training scheme, topics may also be included in this set.	1 Set
xv.	Timeline (PERT/CPM) for execution of the entire work from the date of placement of order indicating therein parallel activities and critical path to establish completion of the entire work within the stipulated time schedule.	1 Set
xvi.	List and quantity of each spare that shall be provided by the bidder initially to fulfil onsite comprehensive warranty of five years and operation of five years. All the tools, tackles, gadgets, devices that shall be required for measuring, operation, maintenance, testing etc. shall be included in this list and shall form part of the initial supply.	1 Set
xvii.	The bidders must provide a list of free shows and licensed shows as detailed below : a) At least 08 Free shows available in house or from international producers like NASA/ESO/ESA etc. in English and at least two shows to be selected by CMD to be translated in Bengali. b) One Licensed digital 4K 2D fulldome film (**Film title : Voyager: The Never-Ending Journey**) show in English and Bengali for 3 years of about 30 minutes duration is to be supplied, encoded and tested for satisfactory projection.	1 Set

xviii.	Information/Details regarding any other items not included above may be submitted in this set.	1 Set

Note: Bidders shall provide proposed detailed Bill or Quantities of each item as mentioned in the above table along with schematic system architecture and product catalogues for all hardware items.

I / We hereby declare that the above statements are true and correct. I / We also declare that I / We shall abide by the decision of Creative Museum Designers regarding selection of eligible firm(s) / type of equipment or system / multimedia show contents scheme for opening of Financial Bid (Part-II).

Date:

Official Seal & Signature of the Bidder/Constituted Attorney

Place:

Creative Museum Designers

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Govt. of India
33 Block – GN, Sector-V, Bidhannagar,
Kolkata-700 091

Tender No. CMD 007.12.59(Works)/23-24/04

GENERAL TERMS AND CONDITIONS

Creative Museum Designers invites sealed tender in two Bid System from the manufacturers or their authorized registered Indian agents for Supply, Installation, Integration, Testing and Commissioning of hardware and software packages, interfaces, tools and/or drivers of a complete and fully integrated functional Fulldome digital 2D immersive projection system for 12 meter diameter perforated aluminium dome screen with geometrical correction, image stitching and blending etc. for seamless projection of high-resolution 2D digital full dome film shows and digital planetarium shows including onsite comprehensive warranty for five years, and operation for a period of five years.
The tender includes fabrication, supply, installation, testing and commissioning of seating stepped platform, chairs, acoustics, server room and other minor civil and electrical works.

1.0 DEFINITIONS:

1.1 In this Contract, the following terms will be interpreted as indicated**:**

i. **"The Contract"** means that the agreement entered into between the Purchaser and the Supplier, as recorded in the contract form signed by the Parties, including all attachments and appendices thereto and all documents incorporated by reference therein.

ii. **"The Contract Price"** means that price payable to the supplier under the Contract for the full and proper performance of its contractual obligations.

iii. **"The Materials/Equipment"** means all of the equipment, machinery, and/or other materials which the Supplier is required to supply to Purchaser under the Contract.

iv. **"The Services"** means those services ancillary to the supply of the Materials/equipment, such as transportation and insurance, and any other incidental Services, such as installation, commissioning, provision of technical assistance, training, and other such obligations of the Supplier covered under the Contract.

v. **"GTC"** means the General Terms and Conditions of Contract contained in the section.

vi. **"The Purchaser"** means the organization purchasing the Materials/equipment.

vii. **"Bidder"** is a supplier who has registered with the purchaser for supply of materials/equipment.

viii. **"The Supplier"** means the firm supplying the Materials/equipment and Services under this Contract.

ix. **"Day"** means calendar day.

1.0 APPLICABILITY:

These General Conditions of the contract will apply to the extent that they are not superseded by provisions of salient features of the Bid.

a) STANDARDS:

The Materials/equipment supplied under this Contract will conform to the Standards mentioned in the Technical specification, and, when no applicable standard is mentioned, the authoritative standards appropriate to the Materials/equipment' viz., BIS, such standards will be the latest. All materials will be of the best class and will be capable of satisfactory operation under tropical conditions without distortion or deterioration.

b) INTERCHANGEABILITY:

All similar materials and removable/replaceable parts of similar equipment will be interchangeable with each other. A specific confirmation of this should be furnished in the bid.

1.1 Bidders are required to submit with the tender in Envelope-1, all the documents as per eligibility criterion mentioned in clause 3 along with **schematic design, schematic drawings of proposed control room/console, mechanisms with complete technical specifications, procurement strategy, flow chart of the work, fabrication strategy with CPM/PERT chart, on how the work shall be completed and** within the stipulated time as per **Clause 7** of the General terms and conditions.

1.2 The successful Bidder shall submit the following within 7 (Seven) days from the date of placement of the work order:

a) Duplicate copy of the work order / LOI duly signed and with official stamp on all the pages as a token of acceptance of the order.
b) Non-judicial stamp paper of appropriate value for entering into an agreement as per prescribed format.

2. ELIGIBLE BIDDERS:

The following are the Qualifying Eligibility Criterion for the bidders (OEM)

i. Limited Company/Corporation/Agency/Consortium/JV etc. are allowed to bid for the work.

ii. Limited Company/Corporation/Agency/Consortium/JV etc. shall have the experience of implementing 2D Fulldome immersive projections system. The Bidder/manufacturer must be an original manufacturer of the Digital Fulldome system software and/or the planetarium shows or authorized agent of the

manufacturer. In case the bidder is an authorized agent of the manufacturer then authorization letters from OEM should be furnished with all the details.

iii. The Bidder/manufacturer must have previous experience of having supplied and installed Digital Fulldome 2D theatres/planetariums in India and elsewhere. The bidder must have installed at least 1 (one) 4K or higher resolution 2D immersive projection system of 12-meter diameter dome or higher in India and elsewhere which is currently operational (supporting document must be furnished).

iv. The Bidder/manufacturer must be an original manufacturer of the Digital Planetarium system software and the planetarium shows or authorized agent of the manufacturer and the content of show generator. In case the bidder is authorized agent of the manufacturer and the show producers, then the authorization letters should be furnished with all the details.

v. The Bidder/manufacturer must have trained staff in service and maintenance of digital planetarium systems. The service and support infrastructure for digital planetarium system available with Indian counterpart to be provided. Bidder/manufacturer must attach copy of certificates showing factory trained staff.

vi. **Work Experience Eligibility:** The Bidder should have completed similar works during the last 07 (seven) years from the date of the issue of this TENDER.

Estimated cost of the project (Supply, Installation, Integration, Testing and Commissioning of hardware and software packages, aluminium dome screen, interfaces, tools and / or drivers of a complete and fully integrated functional Fulldome digital 2D immersive Planetarium projection system (12 mtr. diameter) including onsite comprehensive warranty for five years and operation for a period of five years and civil & electrical works, acoustics works, interiors including seating arrangements) is INR 12 Crore (including taxes & duties) . The bidder should fulfil the following eligibility criteria.

One similar work of value not less than 80% of the estimated cost of work.

Or

Two similar works each of value not less than 50% of the estimated cost of work.

Or

Three similar works each of value not less than 40% of the estimated cost of work.

Notes:

- Here the **similar works** shall mean concept, design, supply, installation, testing & commissioning of Digital Fulldome 2D immersive projection system including seating gallery and other interior works.
- In the case of Consortium/JV participating in this TENDER, the works of all the individual member of the Consortium/JV done independently will be considered as valid work experience.

- If any bidder has executed similar work as a part of a consortium/JV in the past, then the work experience of the bidder shall be considered as valid only if all the consortium/JV partners are participating together in the PRESENT TENDER also.

- The details of qualifying works/projects shall be furnished as per the proforma in **Annexure-E** and if required, the bidder shall also facilitate inspection of the above qualifying project(s) by CMD's officials to ascertain the performance of the system.

- **Documents Required:** The bidder should submit a copy/copies of the work order(s) issued in the name of the agency as well as copies of work completion certificate of the same work, clearly indicating the value of the work of similar nature. If the work order contains several works, only the value of the works of a similar nature shall be considered for work experience. If the value of the works of similar nature is not specifically mentioned in the cost breakup, the work experience against the work order will not be considered as valid.

  CMD may inspect any of those works at its discretion to verify the credentials of the bidder for the qualifying works/ projects indicated above for which the Bidder shall provide references (including Referee names and contact details) in respect of projects implemented.

The bidder should provide valid documentary proof to clearly substantiate each eligibility criteria, failing which the bid will be summarily rejected.

vii. Equipment manufacturing capability and up to date testing facilities. Bids may not be considered if the past manufacturing experience in the field of digital planetarium is found to be un-satisfactory or is of less than 5(five) years for OEM.

viii. Balance sheet and profit and loss account of the bidder duly verified by the Chartered Accountant for the immediately 3 (three) preceding years should be enclosed to assess the financial soundness.

ix. No bankruptcy letter issued by appropriate Government authority or respective bank of the respective country.

x. Certificate of the existence issued by Department of the commerce/Government accredited agencies of the respective country.

xi. Letter of Good Standing (tax clearance) issued by Tax Commission of the respective authorises/country.

xii. Certificate of incorporation / Business License issued by Government authority of the respective state/country.

xiii. The Average Annual Turnover of the Bidder (of the lead partner in case of consortium/JV) for the five financial years (2016-17, 2017-18,2018-19, 2019-20, and 2020-21) should be minimum INR 12 Crore.

Documents Required: Turnover of the bidder **(of the lead partner in case of consortium/JV)** and the duly certified document from CA clearly indicating the

Turnover for the five financial years (2016-17, 2017-18,2018-19, 2019-20, and 2020-21) as per **Annexure – F.**

- Even though the bidders meet the above qualifying criteria, they are subject to be disqualified if they have:
- Made misleading or false representation in the forms, statements and attachments submitted in proof of the qualification requirements; and/or recorded for poor performance such as abandoning the works, not properly completing the contract, inordinate delays in completion, litigation history, or financial failures etc.

Note:

1. Notwithstanding anything stated above the purchaser reserves the right to assess bidder's capability and capacity to perform the contract should circumstances warrant such an assessment in the overall interest of the purchaser.

2. Submitting unnecessary documents may lead to disqualification of bidders.

3. All the documents shall be notarized.

4. JOINT VENTURES/CONSORTIUM

i. In the event that the successful bidder is a consortium/joint venture formed, lead partner/prime contractor in whose name the bid was issued, shall be fully and solely responsible for the performance of contract and all works designed and executed under the contract.

ii. Bids submitted by a consortium or joint venture of at least two firms including the lead partner, all partners shall comply with the following requirements:

a. The consortium as a whole must be a sound entity technically and the lead partner must be a sound entity financially.

b. The consortium as a whole must satisfy the qualification criteria set forth herein. The turnover of the lead partner must satisfy the eligibility criteria of the tender. The bid shall contain a statement of the members of the consortium and shall provide all information necessary to satisfy Client/Employer that the Consortium fulfils the qualifying criteria.

c. The Bids shall contain original copy of the Memorandum of Understanding (MOU) on ₹100/- Non-Judicial Stamp paper (or as applicable) between the consortium members clearly identifying the lead partner, scope and responsibility and financial part of each member in the performance of the contract.

d. The consortium members will obtain approval of the client for any change in the shareholding structure and scope of work or any other terms of MOU.

e. The lead partner of the consortium shall be nominated as being in-charge to represent the Consortium in all dealings with the Client/Employer and for providing any information or clarification sought from the Consortium.

f. The Bid shall be signed by all the consortium firms by their authorized person. The lead partner shall be authorized to incur liabilities and receive instructions for and on behalf of any and all member(s) of the Consortium and all dealings including billing and payments, shall be done exclusively with the leader of the consortium.

g. Only firms or joint ventures that have been qualified under this procedure will be eligible to bid for this project.

h. All members of the Consortium shall be liable for the execution of the project in accordance with the terms of the MOU and Contract agreement.

i. Any individual bidder or member of a consortium cannot be a member in another consortium and participate in this tender.

j. All correspondence or communications will be done by the Lead partner (or authorized representative of Lead partner) of the consortium.

k. Bidder submitted their bid shall not be under liquidation, court receivership or similar proceeding.

Notes:

1. Technical bids of only the agencies that fulfil the above pre-qualification criteria shall be opened.

2. The bidder has to submit the compliance letter on its letterhead duly signed by the authorized signatory & other supporting documents as asked for in the bid. Failing to submit the same or non-compliance/deviation from any bid terms and conditions, eligibility criteria or technical specifications may result in rejection of the bid.

5. EVALUATION / SELECTION CRITERIA

A two-stage Evaluation will be adopted in evaluating the proposals

i. **Eligibility Criteria Evaluation:** Any shortcoming of the documents will lead to rejection of the bid and other envelopes will not be opened.

ii. **Technical Presentation Evaluation:** Only the agencies qualifying on the basis of their credentials / evaluation will be called for Technical Presentations which can be at a very short notice of even three days.

iii. **Financial Evaluation:** Only the bidders/firms securing the minimum qualifying marks based on Eligibility Criteria Evaluation and Technical / Presentation Evaluation as described in detail below will be eligible for their Financial Bid Opening & Financial Evaluation.

A. Technical Evaluation

i. The Evaluation Committee appointed by the competent authority shall carry out its evaluation applying the evaluation criteria specified in the bid document. Evaluation of the application would be done as per the documents submitted. Bidders/agencies who are in the trade and are fulfilling the eligibility criteria as per the documents required would only be called for presentation which can be at a very short notice of even three days.

ii. Further, technical presentation will be evaluated and maximum marks be given up to 100.

iii. Each responsive proposal shall be attributed a technical score. On the basis of the technical assessment, **agencies securing minimum 70 marks out of 100 will** be shortlisted and the financial bids of **only** the shortlisted agencies will be opened. The date and time of opening of the financial bids will be intimated to the selected / shortlisted agencies through CMD's website/email.

B. Financial Evaluation

Financial Bid:

i. The Financial Bids of the technically qualified bidders will be opened at CMD Office, Kolkata.
ii. The lowest financial bid completed in all respects shall be selected for the award of contract.
iii. Only fixed price financial bids indicating total price for all the work/services specified in this bid document will be considered.
iv. Details of the applicable taxes and duties on the basic cost are to be indicated clearly in the financial bid.
v. Errors & Rectification: Arithmetical errors will be rectified on the following basis: "If there is a discrepancy between the unit price and the total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price shall be corrected accordingly. If there is a discrepancy between words and figures, the amount in words will prevail".
vi. In the event that the financial bid amount of two bidders are "tied", the bidder securing the highest technical score will be declared as the Best Value Bidder for award of the Project.
vii. The final bid value will be arrived at by converting all the quoted currency to INR based on the currency conversion rate on the date of opening of the financial bid.

Note:

Technical Bids will be evaluated on the basis of documents as detailed above & presentations to be made by the eligible agencies before the Constituted Committee. The date and time of the presentations will be conveyed to the eligible agencies.

C. Technical Evaluation Marking Scheme

The Technical Bids will be evaluated on the basis of the indicated parameters in the table below:

Evaluation of bids found eligible as per eligibility criteria would be undertaken by the Technical Evaluation Committee Constituted by the competent authority as per parameters cited below.

Sl. No.	Parameter	Criteria	Max. Marks
1.	Experience of applicant/agency in the tendered work	5 Years – 10 Marks More than 5 years upto 10 years – Bonus 2 Marks More than 10 years-Bonus 5 Marks **Maximum Marks – 15 marks**	15
2.	Financial Soundness (average annual turnover [**of Lead Partner in case of consortium]** during the five years (2020-21, 2019-20,2018-19, 2017-18,2016-17)	i.For average annual turnover upto ₹15.00 Crore – 10 marks ii. For average turnover in excess of ₹15.00 Crore @ 1 mark per ₹1.00 Crore each **Maximum Marks -15 marks**	15
	Financial Soundness (average annual turnover [**of Indian representative**] during the five years (2020-21, 2019-20,2018-19, 2017-18,2016-17)	i. For average annual turnover above ₹1.5 Crore – 5 marks **Maximum Marks -5 marks**	5
3.	Similar Work Experience	• For one similar completed works having value ≥ ₹9.6 Crore – 10 marks • For two or more similar completed works each having value ≥ ₹9.6 Crore – 15 marks • For two similar completed works having value ≥ ₹6.0 Crore < ₹9.6 Crore – 5 marks • For three similar completed works having value ≥ ₹4.8 Crore < ₹6.0 Crore -5 marks **Maximum Marks – 15 marks**	15
4.	Operation and regular Maintenance experience of your Indian agent for 2D	• Minimum 1 project for minimum period of 3 years – 3 Marks • 1 mark for each additional project **Maximum Marks – 05 Marks**	5

	Fulldome shows/ Planetarium.		
5.	Technical presentation before the Technical Evaluation Committee	a. Soundness of design and proposed execution of Fulldome 2D theatre as per scope of work and technical specifications given in the tender document – 25 Marks	45
		b. Technology adopted / quality of proposed equipment – 10 Marks	
		c. Experience in execution of ancillary works such as supply and fixing of chairs, acoustic insulation, civil works, electrical works etc. – 10 Marks **Maximum Marks – 45 Marks**	

The bidder will have to enclose a presentation on the proposed solution along with the technical proposal to CMD. The presentation shall cover the comprehensive details, approach & methodology, Organization structure, Work program, Implementation strategy, offered equipment list, Technical brochures and specification sheet, timeline etc.

6. Price:

The price and rates indicated shall include all incidental charges like packing, forwarding, freight, insurance, and delivery etc. as may be applicable to this tender for supply, installation, commissioning, testing and training along with onsite **comprehensive** warranty for 5 years, and operation for a period of 5 years of the complete and integrated functional Fulldome 2D digital immersive Planetarium projection system at Science City, Agartala. The price should include the cost of all civil work inside the dome, electrical work, installation of planetarium chairs, interiors, acoustic, carpeting, cove lighting, step lighting, server room etc., and providing training for the operation of the system to the representatives of CMD/ Science City, Agartala in detail.

The Project Cost Includes the following:

- **SITC of Planetarium System including SITC of UPS.**
- **Minor Civil and Electrical work, acoustics as mentioned in the document.**
- **Interior and SITC of planetarium chairs.**
- **Comprehensive warranty for 5 years.**
- **Operation of the planetarium for 5 years.**
- **1 Licensed film for 3 years.**

The selected bidder shall be responsible for proper co-ordination with CMD and continuous supervision of these works at site to ensure the desired quality of workmanship and use of specified materials to achieve the desired result.

Bidders may submit the rates in US $ / Euro / British £ / Japanese Yen etc. only for the imported components of the supply. For all other items of supply, prices shall be quoted in INR.

However, the final bid value of the total work will be arrived at by converting to INR based on the currency conversion rate on the date of opening of the financial bid.

Science City, Agartala may provide custom duty exemption certificate, if any, as per norms. Science City, Agartala will have the final ownership of this project, all necessary invoices/documents of the planetarium / projection equipment including UPS, servers, dome, sound system, cove light etc. should be in the name of Science City, Agartala. All other invoices for interior works like chairs, sitting platform, acoustics, etc. shall be made in the name of CMD. However, CMD shall accept offers on Delivery at site basis only. Offer(s) on High Sea Sales or through Bond to Bond transfer (Warehousing Bond under Section 59 of Indian Customs Act, 1962) shall not be accepted since CMD desires to acquire Propriety of the goods neither in transit nor in any Bonded Warehouse but after possessing the goods directly in their custody at Airport Terminal from the Airport Authority after due customs clearance. Transport cost from the nearest Airport / Seaport to the site shall be borne by the bidder.

The rates of Excise Duty /Custom Duty (if any), Goods and Service Tax and other taxes / levies to be imposed on the quoted rates as the case may be shall be clearly mentioned in the offer form with proper break-up. No GST exemption (Form C/E/D) will be issued. Prices and rates quoted shall be firm and fixed for the entire period of execution of the order and no escalation of rates on any ground whatsoever shall be accepted.

7. Time of Completion:

Time is the essence of the work. The entire work comprising supply, installation, commissioning, testing and training for the complete **integrated functional full dome 2D digital immersive projection system** for a 12 meter diameter perforated aluminium dome screen with geometrical correction, image stitching and blending etc. for seamless projection of high resolution 2D digital full dome film shows and digital planetarium shows shall be completed with **12 (TWELEVE) months from the date of placement of confirmed order or opening of Letter of Credit, whichever is later.**

8. Every effort should be made to complete the entire work by the successful bidder within the specified time. **In case the successful bidder fails to comply with the specified time schedule as per the approved bar chart and accepted terms and conditions, and where the progress of work is not found satisfactory, and commensurate with the expected progress as per the bar chart, CMD reserves the right to cancel the order.** The decision of **CMD** in this regard shall be final and binding on the successful bidder. The successful bidder cannot claim any compensation for such cancellation of contract.

9. Inspection:

The successful bidder shall also mandatorily facilitate for inspection of the equipment including its accessories at the site on completion of supply, whenever desired by the authorized officials of CMD. Any / all defect(s) pointed out to the successful bidder by the competent representative of CMD during such inspection shall be promptly rectified at the cost (including material cost) of the successful bidder to meet the desired quality, and specification as per requirement of CMD failing which penal action shall be taken as deemed fit by CMD. The decision of CMD in this regard shall be final and binding on the successful bidder.

10. General Terms of payment

An irrevocable and confirmed Letter of Credit shall be opened for 100% value of the imported items quoted in foreign currency immediately upon receipt of the order confirmation. The mode of payment shall be as follows: -

i. **60% (Sixty percent)** of the total sum of the imported items on shipment of the entire materials/consignment and presentation of the dispatch documents.

ii. **30%(Thirty percent)** of the total sum of the imported items after successful installation and commissioning of the fully integrated high resolution Fulldome digital 2D immersive projection system at site and successful trial runs of the Fulldome 2D film shows and planetarium shows.

iii. **Balance 10% (Ten percent)** of the total sum of the imported items on successful operational training and handing over of the equipment to our authorized representative and satisfactory running of the entire Fulldome digital 2D immersive projection system for a minimum period of 10 (ten) consecutive days and on submission of a certificate issued by CMD stating that installation and commissioning of the ordered system has been done satisfactorily and also on submission of warranty certificate as detailed in clause No.10.

For items quoted in INR, the payment terms shall be as follows:

i. **60% (Sixty percent)** of the total sum of the items quoted in INR on delivery of the entire materials/consignment at site and submission of bills.

ii. **30% (Thirty percent)** of the total sum of the items quoted in INR after successful installation and commissioning of the fully integrated high resolution immersive Fulldome digital 2D immersive projection system at site.

iii. **Balance 10% (Ten percent)** of the total sum of the items quoted in INR on successful operational training and handing over of the equipment to the authorized representative of Science City, Agartala and satisfactory running of the entire Fulldome digital 2D immersive projection system for a minimum period of 10 (ten) consecutive days and on submission of a certificate issued by CMD stating that installation and commissioning of the ordered system has been done satisfactorily and also on submission of warranty certificate as detailed in clause No.10.

The successful bidder

A) shall submit security deposit equalling to 10% of the total value of the order in the form of demand draft/electronic fund transfer/irrevocable Bank Guarantee Prior to release of any payment including opening of LC for of the total value of the items quoted. The Bank Guarantee shall be valid for the period of five years and having a claim period of 6 years as security for fulfilment of warranty/defect liability obligations.

B) shall organize Training of Science City, Agartala personnel in operation and maintenance of the entire ordered system at every stage of installation and also after satisfactory commissioning of the equipment at site.
For annual operations (for a period of five years) and maintenance contract for two years (beyond the warranty period of five years) if awarded, the payment shall be made half-yearly on satisfactory completion of the work and this payment schedule shall

continue for the entire duration of the contract. Annual operation contract will be awarded by Science City, Agartala to the Indian associate of the foreign bidder after successful commissioning and handing over of the system. Comprehensive maintenance contract for two years (beyond the warranty period of five years) shall be awarded by Science City, Agartala to the OEM.

11. Penalty Clause

In case of non-completion of the entire work within the stipulated time, and when the delay is not attributable to site requirements, **Liquidated Damage (L.D.) @ 1% of the tendered value per week** shall be recovered from the bill of the successful bidder subject to a maximum of 10% of the tendered value.

12. Defect Liability Period/ Onsite comprehensive warranty period for the planetarium/ projection system (Projectors, Dome, servers, associated software, UPS, Audio system, cove lights, calibration equipment):

The Defect Liability / Warranty period shall be **five years** from the date of certification of the completion of satisfactory installation and commissioning of the system. The successful bidder shall be responsible for setting right all defects of the installed equipment, manufacturing or other defects of components, playback and associated software etc. for a period of five years from the date of satisfactory completion of the installation and commissioning of the system. The successful bidder, shall at their own cost, rectify the defects and or replace the defective parts/equipment, up to the complete satisfaction of the competent authority of the CMD/Science City, Agartala within reasonable time. **The successful bidder shall maintain an inventory of all necessary components to reduce downtime.**

Note: Defect Liability period of chairs will be for two years.

13. Specifications of the items under this tender are enclosed for guidance. However, if any ambiguity in the specification is detected, it shall be promptly brought to the notice of CMD for clarification. The successful bidder should obtain written approval of CMD for any deviation from the approved specifications, if required due to site conditions or for betterment and safety of visitors and installations.

14. The authorities of CMD reserve the right to amend, alter or modify the terms and conditions, specifications of the items if necessary for betterment and safety of visitors. No additional cost shall be borne by CMD for such amendments.

15. In case the successful bidder refuse to accept the offer after finalization or does not comply with clause 2.2 of General Terms & Conditions within 07 (seven) days from the date of placement of the order as per the finalized and accepted terms & conditions, earnest money deposit would be automatically forfeited and the order shall be cancelled forthwith.

16. The authorities of CMD do not bind themselves to accept the lowest tender and reserves the right to accept or reject any or all tenders wholly or partially without assigning any reason whatsoever.

17. The successful bidder shall obtain necessary trade and other licenses/permission as may be required to carry out the tendered job at Science City, Agartala and shall also be responsible for Compliance of all statutory rules and regulations which maybe in force from time to time from the appropriate authorities at their own cost.

18. CMD/Science City, Agartala shall not be liable for any injury or death of an employee who is deployed by the successful bidder within/outside the work site during the time of execution of the work order.

19. SECURITY DEPOSIT:

i. The Security Deposit shall be 10% of the gross value of work ordered and shall be submitted by the successful tenderer in the form of demand draft/electronic fund transfer/Bank Guarantee before release of any payment including opening of LC. In case, the gross value of the work executed is more than the ordered value, the successful tenderer shall submit additional Bank Guarantee for the differential amount before the release of final payment. For NEFT the details are as mentioned below:

Bank Name:	INDIAN OVERSEAS BANK
Beneficiary Name:	CREATIVE MUSEUM DESIGNERS
Bank Address:	Indian Overseas Bank, GN 34/2, Sector – V, II Studio, Saltlake, Kolkata – 700091. West Bengal, India
A/c No.:	164201000001214
IFSC Code:	IOBA0001642

ii. The security deposit shall be released after expiry of the defect liability period of 6 years (including one year of claim period) from the date of satisfactory completion of the installation and commissioning of the system.

iii Bank Gurantee submitted against Security Deposit must be valid for 5 years from date of submission and claim period must be 12 months after end of validity period.

iv. In case of cancellation of the contract, the Security Deposit submitted by the tenderer in the form of demand draft/electronic fund transfer/Bank Guarantee shall be revoked and the amount necessary to make up this amount shall be recovered from any money due to the successful bidder under this or any other contract with CMD/NCSM/Science City, Agartala.

v. In case of death of successful bidder, Security Deposit shall be returned/refunded to the legal heir of the successful bidder after adjustment of dues, if any, post the actual completion of the work & upon expiry of the specified guarantee/defects liability period.

20. FORCE MAJEURE

Neither the successful bidder nor CMD shall be considered in default in performance of its obligations under the terms of this MoU, if such performance is prevented or delayed for any causes beyond the reasonable control of the parties affected such as war, hostilities, revolution, riots, civil commotions, strikes, lockouts, epidemic, explosion, flood, earthquake or because of any law and other proclamation, regulations or ordinance of any government or sub-division thereof or because of any act of God or any other cause beyond the control of the concerned party which could not have been foreseen or avoided by the exercise of due diligence and so it becomes impossible to perform, provided notices in writing of any such cases, with necessary evidence that the obligation under this tender thereby affected or prevented or delayed is hereby given within 14 days from the happening of the event. In case it is not possible to serve the notice within the said 14 days period, then within the shortest possible period without delay. As soon as the cause of Force Majeure has been removed, the party whose liability to perform its obligation has been affected shall notify the other party the actual delay occurred in such affected activity and resume the performance immediately.

21. The successful bidder shall not transfer the whole order of supply, installation, testing and commissioning of the equipment to any other person(s) / firm / company for any reason whatsoever and in which case the order shall automatically stand cancelled.

22. The successful bidder may engage suitable and competent agencies to take up the necessary civil, electrical, etc. related works inside the dome as per **Annexure L.**

23. All disputes and differences between the successful bidder and CMD of any kind whatever arising out of or in connection with the order on carrying out supply, installation, testing and satisfactory commissioning of the system and during the period of five years (onsite warranty and operation) and further during the subsequent period of two years of operation and comprehensive maintenance beyond the warranty period (whether during the progress of the work or after the completion of work and whether before or after the determination, abandonment or breach of the terms and conditions of the order) shall be referred to the sole arbitration of a person nominated by the Creative Museum Designers, whose decision in this regard will be final and binding on both the successful bidder and the Creative Museum Designers. The provisions of the Arbitration and Conciliation Act, 1996 or any modification or re-enactment thereof and of the rules made here under for the time being in force shall apply to arbitration's proceedings under this Clause.

24. Errors & Rectification: Arithmetical errors will be rectified on the following basis: "If there is a discrepancy between the unit price and the total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price shall be corrected. If there is a discrepancy between words and figures, the amount in words will prevail"

25. Make-in India products would be preferred as far as practicable.

26. All other conditions given in the tender document under various sections shall stand valid and the successful bidder shall abide by them.

Technical Specifications and Scope of Work

Section I

This is a two-part bid (**Envelope: 1 –** Technical & Commercial bid without Price and **Envelope: 2-** Price bid).

This is a Tender document for an integrated system with High-end heavy-duty SXRD projectors with LASER phosphor light source to be deployed with a 12-meter diameter perforated aluminium dome screen non-tilted with auto calibration, image stitching and blending etc. for seamless projection of high resolution 2D digital full dome film shows and digital planetarium simulation.

A) Supply, installation, integration, training, and commissioning along with onsite comprehensive warranty of five years with operation for five years of following sub systems. All of these provisions will be considered for evaluation of comparative statements of bids:

1. High resolution visualization system with minimum 9 Million effective Pixel on the 12 meter perforated dome screen.

2. Phosphor Laser Projector with 10,000 Lumen per projector, minimum individual native contrast ratio of 16000:1 and minimum individual native resolution of 4096 pixel x 2160 pixel (4K) with frame rate operational capability of 60 Hz, the brightness of the image across the dome must be the same and be of at least 45 lux with effective screen resolution of minimum 9 Million Pixel after seamless blending on the dome screen mentioned below.

3. Each Projector shall have an operational life of minimum 20000 hrs of the light source Unit.

4. Image geometry and uniformity correction for seamless display and accurate mapping to screen geometry shall have to be executed.

5. A high performance multi-channel media creation, image generator and playback system which can create as well as play high resolution 2D full dome shows, 2D large format films and 2D digital planetarium shows. It should provide a user friendly Graphical User Interface to control system configuration, content creation, distortion correction and blending configuration.

6. Display management system shall control the display configuration like tilting, positioning, alignment etc.

7. Data cabling to carry lossless video signals from sources viz. Media Servers and playback system, projectors and/or video players and high speed data path network (if any) among computing and storage elements through fibre optic cables.

8. Properly dressed power and data cabling for all systems and devices so as not to cause interference with video signals and data networks.

9. Estimation of power required for the complete integrated system and providing suitable 20 kVA UPS system having with suitable rack mounted battery backup for at least 30 minutes for the complete display and illumination system shall be provided. The bidder must clearly specify the number and type of batteries that will be used for providing 30 minutes backup. All batteries supplied must be from same batch of production.

10. For distribution of power to the UPS, Science City, Agartala / CMD shall only provide a 3 phase supply as per requirement which shall be terminated inside the control room. All electrical panels for power distribution conforming to prevailing Indian Electricity Rules shall be supplied, installed and arranged by the bidder as part of their scope of work. All safety devices comprising circuit breakers, bus bars, etc. shall be suitable designed. A detailed drawing with full specifications of the proposed power distribution panel shall be submitted to CMD for approval before initiating the work.

11. Design of seating arrangement with enhanced space between two rows. The chairs should have reclining arrangement as per required field of view of the visitors seated in different positions from the dome screen with sufficient leg space.

12. A 5.1 surround audio system with **minimum 5 speakers** and one subwoofer for 12 metre dome theatre complete with amplifier, mixer and high quality speakers etc. giving appropriate audio power output shall be provided for the Full dome Digital Immersive 2D theatre of the Science City, Agartala.

13. LED cove lighting of the full dome theatre and its integration with show control system. It is mandatory to have brightness of minimum 1600 Lumens per unit including fixture for a Dome of 12m and sufficient number of fixtures to avoid any dark zone in the Dome. Separate additional white LED light is required to be installed for theatre maintenance purpose, controllable from single switch and Tablet.

14. Public address system inside the theatre for making announcements and or for conducting the live show with necessary wiring & cabling work.

15. Sound proofing and acoustic treatment of the Full dome theatre shall be under the scope of the bidder. The bidder executing the project must submit a detailed design and specifications in Cover – 1 of the tender towards acoustic treatment that will be undertaken for the Full dome theatre. The expected outcome of this sound and acoustic treatment shall be provided by the bidder and shall be measured on completion of the work. The bidder shall arrange to execute this work based on the design, drawings and specifications submitted by the selected bidder and duly approved by CMD authorities. The Bidder shall be responsible for closely supervising the work at site and shall coordinate with CMD to ensure desired results.

16. The bidder shall submit proposed modifications of HVAC ducts if necessary for the purpose of cooling of projectors etc. for Full dome Theatre including area of placement

of projectors, U.P.S. system, Image Generators as per the requirement of site. This work will be taken up by the bidder after approval of CMD.

17. The bidder shall provide site plan document with plan, elevation and mounting details for placement of Projectors, Screen, Viewers seating Gallery, and Rack Mounted assemblies for Image Generators and Playback system, Speakers and Display Management System.

18. Touch panel based control systems shall be provided for general illumination, dome lighting control, exit signage control and emergency exit signage control, audio, projectors, device control units, colour correction, colour matching, etc.

19. Touch panel based show control system shall be located in the viewer platform with wireless iPad/Tablet for operation of the show.

20. The system should be designed keeping in view that it must be manageable from a single control unit. All accessories needed for easy accessibility of devices for maintenance must be considered under the scope of the work.

21. **The bidder shall provide the requirement of fire extinguishers (type and quantity) to be placed in different areas of full dome theatre. CMD shall install it after obtaining the approval from fire department.**

22. Special mounting for the projectors and all required alignments for final adjustments etc. shall remain within the scope of the selected bidder. The selected bidder must consider cost effective non rusting materials and anti-corrosive treatment for all metallic structures of projectors. All safety measures shall be considered while designing for safety of people and equipment. The selected bidder shall remain responsible for closely monitoring the work at site to ensure that desired quality of work is executed.

23. The system is to be designed with very high up-time commitment (99% over 364 days a year or 365 days in case of a leap year). The selected bidder shall maintain inventory of spares for the designated up-time commitment for on-site warranty.

24. **Preventive maintenance** shall be carried out by the bidder at regular intervals during the Warranty period of five years and post warranty period of two years (if the AMC is awarded by Science City, Agartala) and a log book to this effect shall be maintained at site. **Suggested schedule for preventive maintenance shall be clearly defined and submitted in Envelope 1.**

25. If any disparity in terms of projector intensity, colour, alignment or otherwise is noticed and reported during the warranty period, immediate readressal of the issue through repair or replacement shall be within the scope of the successful bidder.

26. Integration of all subsystems as indicated above to configure the **"Full dome digital 2D immersive projection system"** shall be the responsibility of the bidder.

27. The bidders shall also quote for annual charges for operation of the installed facility for five years on year to year basis for the visitors of Science City, Agartala, Tripura from 10:30 a.m. to 6:30 p.m. This timing may vary during peak season. The show shall remain operational for 270 days in a year (and 271 days in a leap year).

28. **The order for operation of Planetarium systems for five years on year to year basis will be placed by Science City, Agartala separately after SITC of the complete planetarium system. However, the price offerd for the operation for five years will be considered for selection of L1 bidder.**

29. For Technical & Commercial (Envelope-1) bid evaluation, the bidders shall provide detailed bill of quantities (without cost) of each item proposed for their offer along with schematic system architecture and product catalogues for all hardware/software items.

30. Science City, Agartala shall provide incoming power cable of required capacity which the bidder shall connect to their main distribution panel.

Note:

All civil and electrical works relating to the installation of the system/show, acoustic panelling, fabrication/installation of base steel structure for mounting of projectors array are to be taken up by the selected bidder, and all necessary materials, machines and any other machine tools required for the fabrication and installation are to be arranged by the selected bidder at their own cost. The selected bidder will provide design, drawings, details and complete specifications for acoustic treatment/dome structure/panelling and steel structure for installation of projectors array as described earlier. Selected bidder shall also submit the design, drawings , details and complete specifications for fabricating stepped gallery & chairs and any other work required for completion of the planetarium interiors.

All safety precautions and compliance with statutory obligations shall be taken care of by the selected bidder during the execution of the entire project at the site.

Client's responsibilities:

1. Science City, Agartala shall provide electrical power for the execution of the work.
2. Science City, Agartala shall provide lockable space for the storage of materials by the selected bidder.

Section II

TECHNICAL SPECIFICATIONS OF INTEGRATED HIGH RESOLUTION FULL DOME DIGITAL IMMERSIVE PLANETARIUM PROJECTION SYSTEM FOR A 12 METER DIAMETER PERFORATED ALUMINIUM DOME SCREEN NON TILTED WITH GEOMETRICAL CORRECTION, IMAGE STITCHING AND BLENDING ETC. FOR SEAMLESS PROJECTION OF HIGH RESOLUTION DIGITAL FULL DOME FILM SHOWS AND DIGITAL PLANETARIUM SHOWS.

1.1 Fully High Resolution Full dome digital immersive Planetarium projection system

The integrated High Resolution Full dome Digital Immersive Projection System consists of Projectors array, perforated dome screen, Blending & Geometric Correction units, Image Generator Servers & GUI server for playback, show control, Server for dome slicing and content creating for full dome planetarium shows, Display Management, Alignment & Calibration System, UPS system, 5.1 surround sound system, LED Cove lighting and Exit signage, emergency exit signage. This system is a multi-channel display system with combined resolution of **9 Million effective Pixels.** The specifications of the complete system are provided in section 1.1.1 to 1.10.

1.1.1 Supply & Installation of 12-meter diameter Dome Projection Screen

Acceptable OEMs: Astro-tec, Spitz

DESIGN PARAMETERS FOR DOME PROJECTION SCREEN

1. The projection dome shall be **chain** suspended **(to be provided by the OEM)** and capable of maintaining its circular characteristics when supported by its tension ring as required by the design of the theatre.

2. The shell shall consist, in parts, an aluminium structural rib network system of evenly spaced rib, with a calculated depth and sufficient number of cross-members to maintain its correct shape. The inside diameter of the dome screen shall be 12 meter.

3. The ribs shall be accurately formed and reinforced in accordance with the manufacturer's drawings. Framework must be at least 180 mm wide and allow people to climb ladders without their foot hitting the dome panels and climbing on the back of the dome for maintenance.

4. A girt system shall be incorporated to maintain proper rib spacing, and complete X-bracing shall be provided to maintain proper rib alignment of the dome screen. Sizing and spacing shall be as indicated on manufacturer's drawings as approved by CMD.

5. A circular compression ring shall be provided and located at the zenith or apex of the dome to accommodate the terminal points for the main ribs and the perforated top circle.

   An aluminium base tension rings shall be provided at the base of the hemisphere, which shall be so constructed that the ring will support the dome and provide the necessary connection points around its periphery.

6. The 12m diameter dome design must incorporate perforated aluminium panels either to be painted on site or powder coated and prefabricated structural aluminium ribs, equally spaced. The dome's panels must be shaped with a special stretch form machine. There must be no more than 109 panels on the dome. The panel perforations are made of 1.6 mm diameter holes (smaller than star images). The holes will create a void area of approximately 23%.

   Framework must be at least 180 mm wide and allow people to climb ladders without their foot hitting the dome panels and climbing on the back of the dome for maintenance.

7. 360° Aluminium Cove Trough should be provided and be fixed at the Horizon level of the Projection Dome without compromising projection Horizon. Cove Facia should not be more than 100 mm in light.

8. One Fixed Ladder should be provided in North-South direction of the purpose of human access & maintenance.

9. The aluminium panels must be connected to the supporting structure by low profile dome head rivets. The rivets must be the same colour as the screen.

10. The structural gauge of the dome shall be sufficiently stiff so that deflection and settlement of the structure will not lead to deformation of the screen panels, based on the stiffness of the support system provided by the owner.

11. The dome must be strong enough to support audio speakers and special effects mounted behind the dome itself. This construction technique must provide for outstanding acoustic and visual properties.

12. The dome must allow optimum air circulation.

13. The projection surface is to be factory primed then painted-in-place, by a factory technician with non-bridging flat coating or powder coated. The suggested reflectivity should be of 0.53.

SEAMS AND JOINTS

1. The seams where the panels join shall be overlapped and shall have a patented opaque flat black material of minimum thickness between the layers.

2. The panels shall be secured to the ribs using low-profile aluminium rivets. Vertical and horizontal seams shall not be located where there are no structural elements available for support.

Scopes Included:

i. Necessary scaffolding, man power and all installation related equipment and resources shall be provided by the bidder.

ii. All necessary modifications of civil structure inside the dome for installation of screen shall be designed and executed by the bidder with due concurrence of CMD. It is in the scope of the bidder and the same may be vetted by CMD.

Table 1.1.1

Specifications	Detailed description
Screen type and dimensions	• The 12 meter diameter dome should be made of good quality aluminium perforated sheets with necessary ribs and support structures. • The perforation should be 1.6 mm in diameter living – 23% of voids. • Framework of more than 180 mm wide. • Less than 109 panels (at least one spare panel should be provided for every course) • The panels should be painted to appear seamless with single line of rivets with seamless overlaps. • One fixed ladder to be delivered. • One 360 degree cove trough of aluminium make to be delivered. • The final reflectivity of the panels should be 0.53.

Insulation of outer concrete dome, inner surface:

- **Insulation:** Appropriate Thermal & Acoustic insulation shall be installed by the successful bidder. Thermal Insulation material shall be laid with Vapour Barrier to achieve at least R-35 as a first layer on the concrete surface. Acoustic insulation should be laid over the thermal insulation to achieve a NRC of 0.6-0.8 for the Dome Theatre. Please refer to the table below for overall minimum specification for the materials to be used:

S. No.	Item
1.	Resin bonded mineral fibre 48 kg density, 50mm thick with one side fsk (aluminium foil) size – 900 x 600 mm (slab)
2.	Rockwool (slag fibre based) resin bonded size-1m x 1/2m, 48 density, **50mm thick**
3.	Acoustic tissue paper
4.	Solution for fixing tissue paper
5.	Synthetic fibre netting mesh
6.	Nuts and bolts with rawal plug and wire 18 gauge, screws with fasteners set of at least 10 per meter square

Acoustic panelling below the dome screen:

Wall panelling system to provide excellent acoustical performance in the Full dome theatre by attaining at least 0.6-0.8 NRC. Modular Panels should be Perforated Aluminium or super fine wood with Acoustical Mineral Wool backing with integrated mounting system to be fabricated all along the peripheral wall of the Dome theatre below the Dome Horizon from stepped floor to Cove Bottom. Panels should come in modular sizes and should meet ASTM standards of Surface Burning (Fire), Moisture & Fungus. All panels should be butt joint with good aesthetical finish. Colour should be carefully chosen to reduce cross-reflectance from Projection and should be approved before application.

- Total area should be measured before fabrication and prior approval should be obtained.
- Preferred Manufacturers: Hunter Douglas, Armstrong, Anutone

S. No.	Item
1.	Resin bonded mineral fibre 48 kg density, 50mm thick with one side fsk (aluminium foil) size – 900 x 600 mm (slab)
2.	Rockwool (slag fibre based) resin bonded size-1m x 1/2m, 48 density, **50mm thick**
3.	Acoustic tissue paper
4.	Solution for fixing tissue paper
5.	Synthetic fibre netting mesh
6.	Nuts and bolts with rawal plug and wire 18 gauge, screws with fasteners set of at least 10 per meter square

1.1.2 Projection System

Immersive Projection System: An array of projectors and allied systems with the requisite overlap and edge blending is to be provided along with suitable geometry correction for the dome screen as specified, to provide a seamless display of at least **9 MP arranged in a cove projection configuration (after blending)** with the specifications as per table 1.1.2. The projectors are to be mounted on a suitable structure. Selected bidder will fabricate and install the projector mounting structure at site as per the design, details, drawings and specifications provided by the bidder. The bidder must visit the site before submission of tender and identify the most suitable place in the building for keeping the Image Generator Server, projectors, Audio racks, UPS and other necessary units and routing of the cables needed to connect all constituent components of the system.

Table 1.1.2

Specifications	Detailed description
Number of Projectors	2
Type of Projector	Phosphor Laser Projector, 4K resolution, 10,000 Lumen from solid state illumination, 16 000:1 of native contrast ratio, 60 hz frame rate.
Projector array comprising multiple projectors	To cover 12 meter dome screen non titled
Total Resolution after blending	9MP or higher (after blending)
Mounting	Projectors are to be mounted on the specially designed structure around the dome periphery.

Projector

The specifications of individual projector are provided at table 1.1.3: The Projector model quoted by the bidder must be capable of running continuously for at least 12 hours a day and 364 days a year. All projectors must be of same specifications and manufactured by the same OEM in their own factory. 2 projectors must be proposed by bidder.

Acceptable OEMs: Sony/Christie

Table 1.1.3

Specifications	Detailed description
Display Technology	4K SXRD / DLP
Light Source	Phosphor Laser
Minimum native Resolution	Minimum 4096 pixel x 2160, 60 Hz, at minimum 16 000: 1 native contrast ratio.
Internal Input / Output ports	HDMI 10 bits minimum
Input / Output Control and networking	RS-232C, LAN
Lens Options	Must be fitted with fish-eye lenses specifically designed for dual projector configurations on a dome-screen Fisheye conversion lenses or adaptors will not be accepted. The fisheye lenses must include a build-in blending mask. They must ensure adequate illumination and low distortion at the edge of the image. They must offer a Horizontal FOV of minimum 105° and an F-Theta Distortion of maximum 8.1%.
Source Life	Minimum 20000 hrs
Operating Hours	The System shall be capable of being used for twelve hours per day 364 days in a year.
Monitoring Parameters	Source life, Fan status, Temperature status, etc.
Noise	<40 db at 25°C per projector
Cooling	Self-contained
Accessories	All standard accessories including IR remote, Line cord etc.
Warranty	Manufacturer's standard warranty of not less than three years on projectors.

If the projectors require additional cooling or air supply, the Contractor shall install them on his own.

For Blending: The fisheye lenses must include a built-in blending mask.

1.2 Image Generator Server and Playback System with full dome and planetarium show software (1 master + 2 nodes + 1 spare)

A suitable solution shall be ensured to drive the required projector array with the specifications given below. Image Generator server shall drive one projector connected through fibre optic cables and planetarium shows to be displayed in real time onto digital immersive dome projection screen.

Acceptable OEMs: Dell, HP

Table 1.2

Specifications	Detailed description
Image Generators	a) 8 cores, 16 threads, minimum 16 MD Cache. b) RAM 32 GB DDR4 with a frequency of at least 2900 MHz. Solid state Hard drives simulation software data and 30 hours of video at native resolution c) Graphics card with at least 5880 CUDA Core, 1.5 GHz base frequency, 1.7 GHz boost frequency, 8 Go GDDR6, Ampere architecture graphic cards. d) SSD drives with enough space to store system, simulation software data and 30 hours of video at native resolution. e) Integrated backup SSD allowing backup of data & system.
Pre-process Data transfer Rate	No jerks, flicker or image tearing should appear on screen. Frame rates up to 60 fps.
External video playback	HDMI or Display port inputs should be added to allow connecting external HDMI or Display Port signals and capture them into the planetarium digital projection system. These inputs must be able to capture the image in a resolution of 3840x2160@60Hz. In this way, the Planetarium digital projection system will enable real-time display of any content from an external source connected by the presenter in flat mode with a resolution of 3840x2160@60Hz or a 3840x3840@60Hz fulldome content. NDI low latency video streaming technology must be used between those inputs and the image generators.
Content	a) Astronomy software, calculated in real time b) Previously prepared shows, encoded in popular formats such as XVID-H.263, AVC-H.264, HEVC-H.265 c) Obtained from an external source via streaming. d) Obtained from an external source via External video Playback input.

Additional SSD and RAMs may be configured to meet the overall specifications, if necessary.

1.3 Content creation Server/Player

One separate workstation / server for creation of planetarium shows as well as for conversion of large format shows into Fulldome shows shall be provided by the bidder with specification as mentioned in **Table 1.3.** The workstation server should be connected to the Master GUI Server of the main cluster for seamless transfer & access of data/resource.

Software:

- **Latest full version of OEM software with perpetual license for playback of Fulldome shows and planetarium shows and with facility to convert large format shows into Fulldome shows.**
- **Digital library/cloud access of the planetarium datasets for development of in-house planetarium shows.**
- **Interactive Astronomy Simulation tool & Datasets:**

Table 1.3

Specifications	Detailed description
1	Full dome projection system must be controlled by a fulldome simulation software with real time astronomy as one of the main features.
2	All images and databases provided with the fulldome simulation software must be completely free of copyrights and can be used to create shows as many times as desired. Automatic updation of database must be available at free of charge.
3	The fulldome software must incorporate the following: **Simulation of the followings:** • Night sky • Solar system • Extrasolar (multiple star systems, exoplanet systems) • Deep sky objects • Milky way • Earth sciences **Requirement of the following components:** • Fulldome video player • Slideshow player to allow the display of flat, fish-eye or panoramic videos and Images with transition like a "PowerPoint" presentation. • Data 2 Dome compatibility • Cloud sharing and social media **Requirement of the following interfaces:** • User Friendly Graphical Interface • Wireless interface • VR Compatibility
4	**Astronomical features required:** • The simulation of the sky including the following celestial objects: Sun, planets, dwarf planets, natural and artificial satellites, asteroids, comets, stars depending on the date over an interval of + or – 100,000 years, the position and the orientation of the observer using the VSOP87 and SPICE calculations. • The calculation and correct representation of the apparent magnitude of stars, planets and natural satellites depending on the position of the observer and the date.

	• The proper movement of the stars. • Steller parallax. • The representation of the variability in magnitude of at least 1,500 variable stars. • Simulation of multiple star systems • Simulating the position of at least 2,000 exoplanets around their star • Moon Libration • Real-time shadow projection: dark side of astronomical objects, shadow of a satellite on its planet, shadow of a planet on its rings, shadow of a planet on its satellites. The user should be able to remove the shadow from the dark side of planets and satellites. • The possibility of modifying the astronomical parameters of a body: diurnal movement, annual movement at constant solar time, annual movement at constant sidereal time, precession movement, size of the body, speed of rotation, of revolution, resizing of the orbit.
5	The fulldome simulation software must be able to move from wide view up to 10^{27} m universe wide and zoom in to particles of 10^{-18} m anywhere in this universe in continuous without any visual jump or transition.
6	The fulldome simulation software must include a movement management to switch from one reference to another at any time with no visual jump.
7	All parameters of the system (simulation date, observer position and orientation, parameters of objects such as intensity, colour, etc.) must be modifiable with a duration from an initial stage to a target state using different models of Interpolation.
8	For time control, following features should be available: • Instantaneous or progressive movement forward or backward in time. The time can be defined in Julian day or in GMT or any local date / time. • Change the data gradually, stopping at a target date etc. • Change the date in increments with stopping at a target date etc. • Automatically stop the evolution of the date when a star passes to certain position (rising and setting of a star, passage at 0° south, etc.).
9	The fulldome simulation software must include labels to display names for any objects represented (Sun, Planets, Dwarf Planets, Satellites, Stars, Milky Way, Messier, etc.).
10	The fulldome simulation software and the GUI must include language management and switch between various languages, including atleast English, Hindi and Bengali.
11	Facility for searching, downloading and uploading resources from / to a Cloud (images, videos, audio, scripts, 3D models)
12	The fulldome simulation software shall include a Domecasting capability, i.e. the possibility that a Planetarium broadcast its live presentation to other domes.

13	Most of the data sets of the software shall be issued from public scientific institutions (observatories, universities, laboratories, etc.). It shall be possible for such datasets to be updated easily by the planetarium with a simple click in the GUI.
14	The fulldome simulation software shall offer the possibility to visualise HiPS Sky Surveys from CDS servers. It shall be possible to display the Sky Survey on dome and to zoom in any area with a refinement of the resolution of the image.
15	The fulldome simulation software shall offer the possibility to visualise WMS terrain data at the surface of at least Earth, Mars and Moon.
16	The fulldome simulation software must be compatible with Data 2 Dome. The Data 2 Dome must be integrated in the graphical user interface.
17	The fulldome simulation software shall be able to download and display any NASA JPL Horizons trajectory data with a few clicks in the GUI and allows to visualize the full path or a path evolving with the date of the simulation. It shall be possible to add a 3D Model that will follow the path accordingly.
18	The fulldome simulation software shall be able to download 3D models of known asteroids from a reputed server and display it at its position in the GUI.
19	The Fulldome simulation software must be compatible with VR Glasses for show production and for pre-show or exhibit purpose.
20	The fulldome simulation software must include realistic atmospheres based on algorithms accounting for the physical phenomena (like Rayleigh scattering and Mie scattering) for at least Earth and Mars. Atmosphere model should simulate multiple scattering. The ground of the planet should also react according to atmosphere thickness.
21	The fulldome simulation software must allow a continuous view of planets from, outer space up to several meters on the surface for Earth, Mars, Moon, Venus, Mercury, Ceres Vesta, Pluto, Charon etc. Such representation must include known data for terrain and ground imagery. Such visualisation should be at least 60 frames per second during motion. For the Earth • Satellite Imagery reaching a resolution of at least 15m per pixel based on various satellites over the entire surface with homogeneous colors over the whole globe. • Elevation with a resolution of minimum 30m • Cloud cover seen from space. This cloud cover can be modified by the user. • The Belt of Venus must be represented by the atmosphere of the Earth (shadow of the Earth on its atmosphere) • The reflection of the Sun on the oceans, sea and river must be simulated • The light reflected by the Moon must impact the atmosphere of Earth as well as the lighting of the ground of Earth and reflection on water according to its phase. • On the night side, light pollution in cities must be visible • The software should allow users to display the Earth following the different seasons, or speed up the time to show the changes of appearance of the Earth over a year. For the Moon • Images reaching a resolution up to 120mm per pixel

	• Elevation with a resolution up to 120m • Taking into account the illumination of the sun and the indirect illumination of the Earth (Earthshine) For Mars • Images reaching a resolution up to 230m per pixel • Elevation with a resolution up to 200m For Mercury • Images reaching a resolution up to 165m per pixel • Elevation with a resolution up to 665m For Venus • Images reaching a resolution up to 4,500m per pixel • Elevation with a resolution up to 4,500m The fulldome simulation software must include the terrain simulation of Pluto and Charon based on New Horizon mission. All the data must be stored on the NAS or hard drives.
22	It must be possible to load "on the fly" high resolution satellite imagery and high resolution relief files (Geotiff, JPEF2000 format, etc.) for a specific georeferenced area on at least Venus, Earth, Moon and Mars. Such images should be loaded on-line or off-line directly from the images generators.
23	The fulldome simulation software must include shadow management as: • Shadow of the Moons on their planet • Shadow of the rings on their planet • Shadow of the planet on its rings • Shadow of the planet on satellites • Shadow of satellites on satellites • Shadow projected from mountains and craters for at least: Earth, Moon, Mars, Mercury, Ceres, Vesta, Phobos, Deimos, Comets nucleus, Asteroid's
24	It shall be possible to display rainbow at the surface of the planets, with proper position according to the observer position and orientation. The simulation should also allow to show primary and secondary rainbow as well as Alexander's band.
25	On Earth it shall be possible to show Aurora (shown in 3D and therefore visible from the surface as from space continuously)
26	On Earth, it shall be possible to visualize shooting stars. • 2 modes shall be available: Generation of shooting stars according to defined parameters / Random generation of shooting stars. • The user will define a precise position of a radian point with an area (expressed in degrees) around the radian point in which the shooting stars can start, as well as a number of stars per minute. • It will also be possible to load these parameters from a meteor shower database. The database of shooting stars shall include at

	least the Leonids, the Perseids, the Orionids, Eta aquarids. The database can be updated by the user.
27	It shall be possible to show Animated volumetric procedural clouds when the observer is on the ground. Like the terrain and atmosphere, clouds shall use advanced lighting routines to provide the following realistic effects: red sunset, magnitude-based star hiding, light scattering, moonlight, glory, fogbow, illumination of the clouds by the Sun and the Moon, projection of the cloud's shadows on the terrain. The volumetric clouds need to be fully customizable directly from the user interface. It must be possible to choose their thickness, altitude, and type.
28	The fulldome simulation software must represent lunar and solar eclipses. During solar eclipses, the atmosphere must react according to their magnitude and to the percentage of the eclipse. During a total solar eclipse, it must be possible to see the solar corona. It must be possible to see the Baily grain and the diamond ring effect. During a lunar eclipse the color of the Moon become reddish according to Earth shadow position.
29	The simulation software should allow to simulate Zodiacal Light and Gegenschein under the Earth's atmosphere and also to leave the Earth for an extrapolated view of the dust cloud around the Sun.
30	The fulldome simulation software must include Saturn's rings made up of endless particles of dirty ice. Each particle of the ring must react properly to the lighting of the Sun and allow to see the dark side of the particle.
31	The fulldome simulation software must include a realistic representation of the sun view from Earth and Mars atmosphere and view from space
32	The fulldome simulation software must include 3D animated model of the Sun showing variation of our Sun's surface in UV helium ionised 30.4mm wavelength and in visible wavelength.
33	The fulldome simulation software must include various 3D models of known asteroids.
34	The fulldome simulation software should include at least one 3D model of an interstellar object.
35	The fulldome simulation software must include 3D animated models of comets with automatic orientation of the comet's dust and plasma trails according to its position with respect to the Sun. The plasma trail and the dust trail must adjust their length according to the comet distance to the Sun. The dust trail must simulate syndyne and synchrone.
36	At least 5 different 3D animated comets must be supplied to show the variety of comet's types: Bradfield like comet, Hale-Bopp like comet, Halley like comet, Hyakutake like comet and McNaught like comet.
37	It must be possible to show 3D model of Comets Nucleus, such model must show outgassing jets on the side illuminated by the Sun. 67P/Churyumov-Gerasimenko Comet Nucleus should be provided as such model.
38	The software must include the possibility to show bolides entering the Earth atmosphere It must be possible to visualize the bolide in 3D, meaning that it must be possible to take off the Earth Surface and visualize the bolide trajectory properly from atmosphere or from space.

	The lighting of the bolides must affect the Earth's atmosphere and terrain, providing realistic renderings when visualized from the ground as well as from space looking down to the ground. The famous Chelyabinsk bolide shall be available natively in the system, with a realistic rendering and accurate date and times of the phenomenon.
39	The luminosity of the stars, planets, satellites, in distant observation where the object is represented like a star, having a point representation and which are endowed with magnitude (stars, planets, satellites) will have to be calculated by a configurable function. The color of such "stars representation" will be rendered and it will be possible to increase or decrease the visibility of their color
40	The star database should contain more than 110,000 stars from the Hipparcos catalogue, more than 2 million stars from the Tycho-2 catalogue, and more than 1.3 billion stars from the Gaia DR2 catalogue. The stars will be positioned in 3D within the limits of the details provided in the original catalogues, during an interstellar movement, the apparent magnitude of each star will be recalculated taking into account for its representation.
41	It must be possible to get closer to at least 500 stars, during these movements, these stars will have to go from a point representation to a 3D representation as they approach. The labels of these stars can be displayed. It shall be possible to visit at least 100 stars in multiple systems with proper motion around their barycentre.
42	The stars will have to move according to their own movement, within the limits of the information contained in the catalogues, according to a date parameter of the simulation.
43	It should be possible to filter the stars, meaning to show only a part of the stars of these catalogues, according to information such as at least the spectral type, the absolute magnitude, the apparent magnitude, the distance, temperature, luminosity class, and radius.
44	The software has to represent the variability in magnitude of at least 1500 variable stars
45	The Milky Way must be represented in different ways. From the inside, it will be represented by an image wrapped around the viewer. From the outside, the galaxy will be represented by a volumetric 3D model. This volumetric model should represent the barred and spiral structure of our Milky Way and make it possible to show the absorption of dust clouds, particularly in side/edge-on view.
46	In order to present the Milky Way in different forms from the solar system and allow the animator to narrate his speech, several such images must be provided: • Blurry texture giving the best possible perception of the Milky Way in a night sky. • Visible texture (real photo). • FERMI, IRAS and COBE image • HDR image accumulating the brightness of more than 1.6 billion stars from the Gaia DR2 catalog, whose appearance can be customized by the operator for color, brightness and contrast.
47	The fulldome simulation software must include an advanced volumetric representation of the Milky way when leaving the solar system. This representation must be based on scientific data and must represent when flying inside the model: • Population of Individual stars

	• Population of Individual Open clusters • HII Regions
48	The fulldome simulation software must include at least 25 Volumetric Deep Sky Objects represented in real time at their proper location. Orion Nebulae shall be represented with a volumetric model Eagle Neabulae shall be represented with a volumetric model allowing the visualisation of the Pillar of creation
49	All known Globular clusters with their accurate position, size and stars composition be represented with a 3D representation showing the proper number of stars as well as proper distribution in space and in number of type of stars.
50	It must be possible to move the observer to black holes inside the volumetric Milky Way. The transition from the Volumetric Galaxy to the black hole environment must be smooth. Two kinds of black holes should be represented. One with accretion disk, the second one without accretion disk. The black hole has to distort the light of object located behind it, and the model with accretion disk has to show the accretion disk distortion. It has to be possible to display a representation of a space and time grip showing that there is a singularity due to the black hole.
51	The offered software must include a 3D model of a Pulsar. The pulsar magnetosphere, radio jets and gravitational effect close to the star should also be available.
52	The software will have to allow to visualize the Hubble sequence and also to be able to move continuously through it thanks to the integration of at least 10 different 3D volumetric models of galaxies.
53	It must be possible to visualize a set of 3D models to form an explanatory diagram of the stellar evolution cycle showing he different phases of evolution.
54	The fulldome simulation software must include advanced 3D models with reflection of light on the objects, and with projection of shadow of elements composing the 3D Model. The catalogue must at least include the following objects: • Cassini • Crew Dragon • Apollo CSM • Gaia • Galileo • Hubble telescope • International Space Station with the possibility to visit the inside of the station • James Webb Space Telescope • Juno • Messenger • New Horizons • Pioneer • Rosetta • Soyuz spacecraft • Space shuttle • Sputnik • Voyager • Curiosity

	• Philae • Venera 9 Probe • Ariana 5 • Falcon9 • Saturn V • Soyuz Rocket • Perseverance • Ingenuity • Several Indian spacecraft, with at least Chandrayaan-2, Chandrayaan-3, Megalayaan-1 and Magalayaan-2 Those objects shall have a photo realistic representation including effect such as reflection on the metallic and reflective parts
55	The Fulldome simulation software must include the superclusters of Laniakea, Perseus-Pisces and Shapley. The data and their integration in the software used has to be validated and certified by the scientist behind those datas.
56	On Earth and on Mars it will have to be possible to adjust the altitude of the sea, to simulate a rise in water on Earth and the presence of liquid water on Mars
57	The fulldome simulation software must include the Earth's magnetosphere.
58	The fulldome simulation software must include simulation of the internal structure of planets, main satellites and Sun.
59	The fulldome software must include a set of Science on a Sphere dataset from NOAA. The user must be able to include any Science on a Sphere dataset from NOAA released after installation.
60	The software shall allow the visualisation of Placemark datasets at the surface of planets, including at least: • Earthquakes on Earth • Craters on Earth, Moon, Mars • Volcanoes on Earth and Mars
61	The software shall allow users to add new datasets of by importing external files. Such file contain at least elevation, longitude and altitude data, color and label for each placemark.
62	The software must load KML files for vectorial GIS information. The software has to draw the lines directly on the ground, and has to allow to create area with specific color with the possibility to adjust the opacity.
63	The software should also allow users to add any standard image (non-georeferenced) on the surface of planets and satellites following its elevation. The size, position should also be adaptable and the rotation of the image to fit perfectly with the real terrain data should also be possible.
64	The fulldome simulation software must include a massive open source dataset or it needs to be under a license agreement with a third party which should not add any extra cost for any future update of the dataset. It shall also be possible to use the datasets to create shows for the planetarium as well as for selling it to any other third party without any limitation or additional costs. The datasets must include at least: • Full Gaia DR2 star catalog with possibility to show information from Tycho2, Henry Draper (HD/HDE/HDEC), Hipparcos, Yale Bright Stars (BSC), Gliese & Jahreiss catalog as well as Flamsteed & Bayer designation.

	• 110 Messier object and more than 100 NGC-IC objects, represented with an image at the proper position. • Exoplanets System with more than 2000 individual exoplanets orbiting their stars with a 3D model with appropriate texture according to exoplanet type. • Data base of the location of artificial satellites of the Earth: SPACETRACK data base with over 14,000 objects. • Location of Asteroid database: ASTORB data base from Lowel Observatory with over 460,000 objects. The software should also offer the possibility to download and visualize 3D models of asteroids online from a reputable website (e.g. Damit). • Location of Comet database: Jet Propulsion Laboratory and NASA database with over 800 comets represented at the same time • Oort cloud data base • Location of Brown Dwarfs database with more than 1500 stars • Location of Exoplanets and Exoplanet candidates locating more than 8000 of them • Location of Supernova remnants with more than 150 of them • Location of Planetary nebulae with more than 280 of them • Location of HII regions with more than 120 of them • Location of Ob Associations, with more than 100 of them • Location of Open Clusters, with more than 2600 of them • Location of Variable stars with more than 9000 of them • Location of pulsar with more than 3000 of them • Location of Globular Cluster with more than 160 of them • Location of NGC-IC objects with more than 14000 of them located in the star field (view form Earth) and more than 7500 of them in 3D • Location of Galaxies of the local group with more than 140 of them • Location of Galaxy groups, with more than 150 of them • Location of Galaxies from Tully Catalog with more than 30000 of them • Location of voids, with more than 30 of them • Location of Galaxies from 2dF catalog with more than 225 000 of them • Location of Galaxies from 6dF catalog with more than 110000 of them • Over 17,000 galaxies of the Cosmicflows-3 catalog, from the Cosmicflows Collaboration • Location of Galaxy clusters, with more than 3000 of them • Location of Superclusters with more than 170 of them • Location of Galaxies from SDSSRD16, with more than 3 million of them • Location of Supernova with more than 10000 of them • Location of Quasars with more than 700000 of them from 2dF, 6dF and SDSS datasets • WMAP, COBE and PLANCK cosmic microwave background • Boundaries of stellar halo of the Milky Way, of the local group, of Virgo and Laniakea • Star orbits in the Milky Way of at least 8 stars and the Sun

	• Uncertainties of star position of at least 100 stars from Hipparcos or Gaia catalog • Location of at least 20 stellar black holes The presenter must have the possibility to decide which datasets are shown (on/off) automatically depending on the distance to the observer.
65	The fulldome simulation software must include the 88 IAU constellations with asterisms, graphic representations, IAU limits and names of the constellations.
66	It must be possible to change easily the images used for constellation, size of the image, position and orientation of the image, as well as its color.
67	Video constellation must be provided at least for the zodiacal constellations
68	The software must include ready to use astronomical grids such as: • Cardinal points • Meridian • Azimuth • Equator • Ecliptic with a graduation in day month that automatically adjust labels and graduations depending on the year of the simulation as well as with a fix representation (fixed on one year). • Circum polar circle with automatic adjustment depending on observer latitude • Earth's rotation axis • Earth's pole in star field
69	Fulldome simulation software must allow operator to draw a line between two objects among planets, moons or stars. The operator should be able to lengthen the line and to add graduations on such line.
70	All astronomical objects should be able to display their label as well as a pointer to help the audience locate the object in the dome.
71	The fulldome simulation software must include trace mode to see the trail left by the stars during a diurnal motion and to track for instance the artificial satellites in the sky.
72	The fulldome simulation software must include modification of astronomical parameters like: size, distance ratio between a satellite and its planet, the factor of revolution of a planet around its star, the factor of rotation of a planet around its axis, the factor of revolution of a satellite around its planet, the factor of rotation of a satellite around its axis.
73	It must be possible to show trajectory of a planet, a satellite and the Sun in the dome referential. This feature will be used for example to show Sun analema, planets retrogradation.
74	It must be possible to load a spacecraft trajectory from JPL website (a conversion of format is acceptable, in such case, the conversion must be explained in the documentation), with such load, it must be possible to add a 3D model of the spacecraft that will automatically follow the trajectory according to the date of the simulation.
75	It must be possible to define orbital motion to objects following Kepler's law and TLE. It must be possible to attach a 3D model to this orbit.
76	The fulldome simulation software must include image and video inserts (virtual slides and video). Image and video insert can be placed on the dome or in the 3D model. The following parameters must be accessible for the user: opacity, intensity, position, orientation, color filter and

	chroma key with a tolerance that can be adjusted by the operator. For videos, the following commands must also be available: play, loop play, pause, stop, etc.
77	The fulldome software must support fish-eye format, spherical projection format, panoramic format and flat format.
78	It has to be possible to create a presentation "like MS PowerPoint" using images and video. The software has to allow to create transition between different configurations of images on the dome. One configuration has to remember the position, the orientation for several images or video. Then it has to be possible to define transition such as fading to make new images/video appear or disappear.
79	It must be possible to alter image parameters (color, intensity, opacity, etc.) depending on the height of the Sun.
80	The fulldome simulation software should be able to show shadow cones of satellites on planets.
81	It must be possible to display the habitable zone for at least 100 stars.
82	The software shall be able to display the radio sphere and to show its propagation according to the date of simulation.
83	The fulldome simulation software must include a fulldome video player.
84	Controls of the fulldome video player must be available on the live control interface. Accessible controls must be Play, Pause, Stop, Seek, Fastforward and FastRewind
85	Audio track must be synchronized automatically with the Fulldome video player.
86	The Fulldome video player must be able to play at least 4K @60fps fulldome video without slicing.
87	The fulldome simulation software must be able to support various streaming protocols including at least NDI, UDP and HTTP protocol. Such stream shall be displayed on the dome as a standard rectangular video or as a fish-eye video.
88	The software must support AVM files. For such files, the AVM Image should be placed and sized according to the metadata information.
89	The fulldome simulation software must include 3D inserts to incorporate 3D objects into the simulation with the following format: DAE (Collada), 3DS (3D Studio), OBJ (Wavefront), LWO (Light Wave Objects), LWS (Light Wave Scenes), CMOD (Celestia models).
90	It must be possible to import 3D models with embedded animation, for such import the documentation has to describe the process to load the animation in a proper way.
91	The fulldome simulation software must include text inserts to display texts. They must be placed on the dome or into the scene and users can define the following parameters: position of the text in the 3D scene and position of the text in the dome 3D projection, content of the text.
92	Such text should be fit by operator set of characters, and in the operator sentence, it has to be possible to add information calculated by the software such as: date and time of the simulation, speed of the camera, distance of the camera to an object.
93	The system shall be able to project other content than astronomy. Various STEAM modules shall be offered in order to make sessions about at least some of the topics listed below: • Heart Anatomy showing Heart in motion • Human Body anatomy (male and female) showing nervous system lymphatic system, circulatory system, urinary system,

	reproductive system, respiratory system, digestive system, integumentary system, muscles, bones. • Eye Anatomy • Animal cell, vegetal cell, bacteria cell, fungal cell • Periodic Table of elements • Fourier mathematical equation • Optical path • Magnetic field • Fractals • Combustion engine • Color (additive and subtractive) • Trigonometry • State of matter
94	The system shall allow users to create content using Unity 3D Engine and to display it on the dome at the native resolution of the projection system.
95	The GUI should be simple and user friendly. • Creation of scripts to automatize actions shall be possible with a graphical interface without writing any complex codes. • Drag & Drop features shall be possible to add images, play videos, play a script, move to one astronomical object to another. • A Dome View shall be represented in the GUI showing in real-time in a fish-eye style the content of what is displayed on the dome, this Dome View shall be interactive allowing to click directly on an astronomical object (such as sun, planet, satellites, constellations, stars) to access features such as intensity, orbit, trajectory, label. The software shall allow to move in a fluid motion to astronomical objects with a simple "Go to" function available in the GUI for the astronomical objects available.
96	The GUI shall have a dedicated GUI for direct control typically for doing night sky presentation. It shall be possible to control below function within the GUI without any additional scripting: • Switch on/off of starry sky, milky way, planets, satellites, sun, atmosphere, atmospheric effects (rainbow, clouds, aurora, rain, snow, lighting, moonlight, twinkling), shooting stars, zodiacal light, messier & deep sky objects. • Customize the atmospheric effects directly from the graphical user interface • Switch on/off orbits of planets and satellites, trajectories in the sky of sun, planets and satellites, pointers, constellations, asterisms, pictures, boundaries and names • Scale up Sun, Planets, Satellites • Control time (pick a date, start diurnal motion, start annual motion, start analemma motion, start precession motion) • Modify orientation of the theatre • Control the camera (Sky View, Terrain View, Space View) with various manipulators possibility (Rotation, Free Fly) • Adjust the Sky quality (number, size, color factor of stars, Milky Way representation and brightness) • Show proper motion of stars • Apply filters on StarrySky, composed of various catalog including at least Hipparcos and Gaia DR2 catalog, in order to highlight or reduce the visualization depending spectral type,

	luminosity class, temperature, absolute magnitude, apparent magnitude, distance, catalog, radius, proper motion, distance, right ascension and declination). • It shall be possible to let the software switch on/off datasets automatically according to the position of the observer, for example, when getting close to the Earth showing the artificial satellites dataset, when viewing the solar system, showing the asteroids dataset, when leaving the solar system showing the oort cloud etc. • GUI shall allow to switch on/off on the dome classical astronomical grids and information with dedicated buttons (cardinal points, azimuth, equator, ecliptic, precession circle, meridian, longitude, latitude, date, time etc.) • It shall be possible to directly visualize the current position and change the position and orientation of the camera easily, giving access to a zoomable map of the planet with a mapped terminator (on Solar System planets, dwarf planets and satellites). • It shall be possible for the user to create its own control page with buttons linked to scripts. • A list of pre-produced user pages must be available in additional to the ones users can create by themselves. It must be possible to open any web page in the user page tabs by setting its URL.
97	The GUI shall allow to control lighting, audio, power on/off projectors and computer, etc. with dedicated windows.
98	The GUI has to offer a visualization of the dome image.
99	It shall be possible to directly click on Sun, planets, satellites, stars represented on the dome (picking technology) and access the menu showing various actions for this object.
100	It shall be possible to use the mouse within the dome view to control the position and orientation of the observer.
101	It shall be possible to use the mouse in the dome view and see it as a virtual laser pointer on the dome.
102	It shall be possible to click in the dome view to define a precise point to zoom, using the mouse it shall be possible to zoom like with a telescope on the selected point.
103	It shall be possible to draw directly on the interactive dome view.
104	The software shall allow the possibility to play several scripts at the same time.
105	The GUI shall allow a control of the scripts and full-dome video being played (pause/stop/play)
106	The GUI has to allow the view of all resources included in the software (planets, moons, stars, etc.) as well as all resources added by the user in a library (images, video, 3D models, scripts, fulldome shows, etc.)
107	It shall be possible to browse the library of objects of resource, as well as by searching keywords.
108	It shall be possible to drag & drop a resource directly on the dome view to start an appropriate action depending on the resource type.
109	Installing a new image or a new video, has to be as simple as a drag & drop from operating system files explorer to the GUI. Such drag & drop will automatically install the resource properly on the system, especially it will copy the resource on all necessary computers. The software has to

	automatically detect the type of file (standard, fish-eye, and panorama) so the resource will be projected properly once added to the dome.
110	Users must be able add/modify/delete files only in the MASTER computer and the software will handle the synchronization.
111	An interactive help center needs to be accessible directly form the graphical user interface.
112	The help center must include a field search to find information easily.
113	The GUI must include an editor for creating scripts without need for coding.
114	
115	It also shall be possible to record a script while doing action in live with the GUI. In this fast script creation mode, any action done with the GUI can be recorded as a script.
116	The software shall be able to render a show created with a script. "Render" means that the full-dome software has to record the dome view image per image (one image for each frame for 30 frames per second and for 60 frames per second).
117	The rendering mode must be able to render up to 8K frames.
118	The software shall allow the possibility to create script that will allow deep control of the simulation software.
119	The software shall allow the possibility to develop a web application and control the software from an external web application.

1.4 Show Control System

The display environment should include an integrated Show Control System, capable of controlling all hardware, other equipment, including the display system, audio, media, cove, lighting system, exit and emergency exit signage lighting. The Show Control System should provide following features:

Table 1.4

Detailed description
• Table top control panel with Communication protocols: RS 232, TCP/IP. On/Off Control: Projectors, Illumination, Audio and Dimmer control for COVE lighting
• Interactive screen for controlling DIGITAL IMMERSIVE FULLDOME PROJECTION SYSTEM
• The screens (multiple) should have following: Display size: minimum 24 inch (diagonal) for multiple screen, Display Resolution: Upto 1920X1080 or better.

1.5 Calibration and Alignment

For Fulldome Projection System with multiple projectors, manual adjustments for calibration and alignment are not feasible and hence automatic features are required to maintain calibration and alignment as per table 1.5.1 & 1.5.2.

Table 1.5.1

Specifications	Detailed description
Auto alignment and calibration	Software, hardware and camera based mechanisms to be included in order to ensure error free edge blending / geometric correction on screen as well as to maintain uniform colour and contrast on projectors and dome screen.
	Auto alignment, auto edge blending and correction system shall be available in the system through GUI.
	Software Preset to manage optimum brightness levels of Projectors in 2D mode.

Table 1.5.2

Specifications	Detailed description
Tools for Verification of calibration and alignment	Set of Instrument and software for verification of calibration and alignment parameters at site as per table 1.5.1

1.6 Integrated Audio System

A 5.1 surround audio system of Harman, BOSE, Sony, AKG or Yamaha brand shall be an integrated part of the overall system. It shall be fully controlled under the **Show Control System** as per table 1.6 and needs to be supplied and installed and it shall address the requirements of Fulldome projection environment to ensure maximum immersive experience. The system shall also provide public address system inside the theatre.

Table 1.6

Specifications	Detailed description
5.1 channel surround audio system	The audio system shall be fully integrated with the show control system. Audio system shall consist of 5 speakers with single subwoofer system mounted suitably above the viewing platform or else at suitable locations as may be required. Amplifiers are to be solid state and network controlled.
Front Left/Front Right/Centre Speakers	Large Format 12" High Power Cinema Surround. Power Rating 1:400 Watts continuous pink noise, 1600 Watts peak Sensitivity (1W/1m) 2:98 dB-spl half space/wall mounted. Maximum Peak SPL3: 124 dB/1m Nominal Impedance: 8 ohms.
Surround Speakers with wall Mount U-Brackets for all Speakers	Very High Power Cinema Surround Speaker for Digital Applications Frequency Range (-10 dB): 60 Hz – 19 kHz Frequency Response (+3): 75 Hz – 17kHz Power Rating 1:350 watts continuous pink noise, 1400 watts peak Nominal Impedance: 8 ohms.

Subwoofer:	Single 460 mm (18in) Subwoofer System Rated Impedance : 4 ohms. Minimum Impedance: 3.2 ohms POWER HANDLING CAPABILITY: Continuous Pink Noise1: 1200 Watts Continuous Program2: 2400 Watts Peak Power3: 4800 Watts.
Power Amplifiers for Speakers: Centre/Front/Surround	Minimum Guaranteed Power, 1 kHz: 650 Watts. Stereo, 8 ohms (per channel.) Frequency Response (At 1 watt into 4 ohms, 20Hz – 20 kHz) Crosstalk (below rated power, A-weighted) 20 Hz to 1kHz > 70 dB
Power Amplifiers for Subwoofer	Minimum Guaranteed Power, 1 kHz:- 1600 Watts. Bridge- Mono.8 Ohms Frequency Response (At 1 watt into 4 ohms, 20Hz -20 kHz) Crosstalk (below rated power, A-weighted)20 Hz to 1 kHz > dB
Audio Mixer	16-Input channel 25-bus digital mixing 8XLR outputs plus 6 additional line in/outputs 16 x 16 channel USB 2.0 audio interface Motorised Faders.
Microphones	The audio system should be integrated with microphones (2 numbers or more). It is to be mounted in the console area and 2 or more numbers wireless collar microphones are to be integrated.

1.7 U.P.S. System

A minimum 20 KVA online ph3-ph3 UPS system with isolation transformer, reputed make and having backup time of **30 minutes** to be provided by the bidder for digital immersive full dome 2D projection system as per table 1.7 given below.

Table 1.7

Specifications	Detailed description
U.P.S. system (True IGBT with 30 minutes backup time and including isolation transformer of reputed brand: APC, Emersion, Numeric, Veritv or Schneider	Please provide specifications of the U.P.S. system including make and model.
Battery bank with suitable rack	Please specify number of SMF batteries with detailed specifications. All batteries supplied must be from same batch of production.

1.8 Seating Arrangement (Minimum 100 chairs + 5 spare chairs)

The bidder shall submit scheme including sight line drawings for layout of seats, and detailed engineering drawings for change of existing layout if required. Specification of the chairs is given in table below.

Table 1.8

Specifications	Detailed description
Reclining Chair	1. Tip-up and back push reclined chair 2. Centre to centre 21". 3. ABS moulded housing for seat & back cushions 4. All sheet metal parts with powder coated 5. Arm rest in Polyurethane injection moulded. 6. Seat numbering on inner both the side of the chair stands with silicon fluorescent thin stickers. 7. Row number for seat along the aisles. 8. Provision for LED lights on sides along with aisles with the row and the seat number display. 9. For Noise Reduction Nylon components on moving parts. 10. Angle of tilt of the chairs shall be adjusted as per the location of the seat for easy and optimal viewing of the shows.
Frames	15 mm thick high pressure steam pressed hard ply wood for seat and the back, out of which the back is of 12 mm bent ply.
Fabric	Colour to be approved by CMD authorities. All fabric to be used shall be fire retardant. Test certificates should be submitted.
Spring	Spring for tip-up and back push mechanism shall be torsion spring with spring steel IS:4454-1 (2001) grade III.
Sheet-metal components	DRCA/CRCA Sheet metal IS:1079 1994 a) Side stand 3mm (+/- 0.2 mm) thick, size: 415 mm(+/- 5 mm) x 345 mm (+/- 5 mm) both side bottom circular cutting with 140 mm radius. b) 75mm x 25mm 16g 190 mm length tubular pipe form the leg welded to the 3 mm plate. c) Flat for base of the stands 280 mm (+/- 2 mm) length 50 mm (+/- 2 mm) x 5 mm (+/- 0.2 mm). d) Mechanism components 2 mm HRCA Back push box 180 mm(+/-2 mm) x 70 mm (+/-2 mm) & height of the box 15 mm (+/-2 mm), ear "L" bracket attached to be box 190 mm (+/-2 mm) x 135 mm (+/- 2 mm). With two slot holes for fixing the back. Tip-up box 180 mm (+/-2mm) x 70 mm (+/-2mm) & height of the box 15mm (+/-2mm), ear "L" bracket attached to the box 35 mm (+/-2mm) x 125 mm (+/-2mm). With two slots holes to fix the seat.

Seat and Back cushion housing	ABS moulded vacuum forming out of 2 mm sheet.
Vinyl Flooring	Dark coloured vinyl flooring with minimum 2 mm thickness.
Vinyl Flooring / Carpet Flooring	**(a)** Supply & laying of Nylon loop pile carpet over an under layer of 6 mm thick kinny foam in Planetarium of Science City, Agartala as per following specifications: Make: Heritage Labelle, Colour: 6906 Peninsula or equivalent approved make & colour. Specifications construction: 1/10" or 1/8" Tufted Cut & Loop pattern, Fibre: 100% Solution Dyed Nylon, 2-Ply Headset., Pile weight: can 1085g/sqm (32oz/y2), Pile height: ca 6.5mm (+/-3%), total height: ca 8.5mm (+/-3%), total height: ca 8.5nn (+/-3%), Density: 4500, Primary Backing: PP woven cloth, Secondary Backing: Action Bac Standard Roll size: 3.66m x 30m Performance: Stain Resistance: 10 (AATCC-175-2003), 3M Scotchguard Treatment, Static Control: Build in Permanent, Tuft
	Bind 6.51bs (ASTM-D-1335), Dimensional stability: Max 0.2% change (AACHEN), Flammability Radiant Panel 0.12W/cm2 (ASTM-E-648), US Federal Flammability Std: Passed (GB20286 – 2006/Cfl-S1-T0), (ASTM-D-2859-96), Smoke density: Max 450 (ASTM-E-662-06), Colorfastness: to light 5 (AATCC-16E), to wet & dry cleaning 5 (AATCC-1654), to ozone: 5 (AATCC-129), Indoor Air Quality: CRI Green Label Plus No. GLP1350. **(b)** Supply & fixing of 2" x 0.5" x 3mm Aluminum color anodised stair nosing of approved quality.

1.9 LED Cove light

Cove lighting to be integrated with show control system.
Make: Philips or chroma cove

Table 1.9

Specifications	Detailed description
Cove Light	a) Beam Angle 120° x 120° b) Lumens : As per BIS norms c) LED Channels Red / Green / Blue d) Mixing Distance 2 in (51 mm) to uniform light e) Lumen Maintenance *50,000 hours L50 @ 50° C (Full output).

Design	360° Layout in Aluminium Cove Trough in aesthetical indirect lighting arrangement. Ample amount of LED Modules to be provided to avoid dark zones. Provision for software programmability of different modes and colour effects along with programmable hardware presets.
Maintenance lighting	Separate additional white LED light is requied to be installed for theatre maintenance purpose, controllable from single switch.
Foot lighting, Exit signage and Emergency Exit signage	• **Foot Lighting:** The lighting effect should be created using a fibre opticrod that is end-illuminated with high intensity LEDs with 50,000 hour life expectancy. • The unit should flush with 6mm Carpet. • **Entry & Exit Ramps Lighting**: Led wall light Should provide 2.2 lux at 1.9m distance when mounted 300 mm above floor. • **Seat Row Indicators:** Seat row indicators should be installed to identify the location of seating rows, to provide illumination for guidance (e.g. by emergency exits) or to illuminate the floor for sage movement in full dome theatre when the main lighting is dimmed.

1.10 Full dome planetarium/ astronomy sky shows

1.10.1 One Licensed digital 4K 2D fulldome film (**Film title : Voyager: The Never-Ending Journey**) show in English and Bengali for duration of about 30 minutes for 3 years is to be supplied, encoded and tested for satisfactory projection.

1.10.2 The selected bidder shall provide at least 8 free 2D full dome Planetarium as well as Astronomy Sky Shows available in-house or from international producers like NASA/ESO/ESA etc. in English and Bengali. The agency will also provide Bengali version of the shows with voice over.

Note:

i. Necessary scripts and original sound tracks in digital format must be supplied.
ii. The shows should be of around 30-35 minutes duration.
iii. The selected vendors should provide list of all latest available shows in DVDs or other information storages from which CMD will select above shows.

2.0 Brochures and complete specifications

Bidders shall provide printed brochures and detailed specifications for various OEM products. The brochures, documents and engineering drawings as per Table 2.0 have to be provided along with technical bid including compliance Table 2.0. The bidders have to respond with stipulated time for additional information/clarifications sought afterwards, if any.

Bidders may be required to make technical presentations explaining their offered scheme after opening of Technical & Commercial Bids (Envelope-1), if decided by CMD. The decision of the CMD in respect of techno-commercial evaluation of

Envelope-1 of the tender and selection of qualified and eligible vendors for opening of Financial Bid (Envelope-2) shall be final and binding on the bidders.

Information to be submitted by the bidders in Envelope-1

Table 2.0

Detailed description
Brochures and specifications of Projectors, Lenses, Mounts, Blending and Geometric Correction Units, Display Management System, etc.
Brochures and specifications for Image generator servers interactive Planetarium software, Fulldome configuration & playback system and projection systems.
Brochures and specifications for Show Control System.
Brochures and specifications for Calibration and related instruments and software.
Brochures and specifications of Software Elements along with licensing details.
Brochures and specifications for Audio systems.
Brochures and specifications for UPS system with 30 minutes backup.
Engineering drawing (plan, elevation and sectional views wherever necessary for viewer's gallery and image servers from in pdf and Auto CAD file format), complete solution diagram, connectivity diagram, system deployment and foot print detail, electrical power requirement and location marked diagram/drawings, system cooling requirement (in BTU) with proper layout drawings.
Detailed write-up and specific system solution document explaining the integrated working of offered solution with the hardware and software describing various technical, interface and performance aspects, writing / network diagram of the proposed solution. This has to explain how the proposed design or solution meets to specifications and overall requirements as mentioned in the tender document.
Schematic diagram and broad material specifications of the structure for mounting the projectors showing suggested location of the projectors including arrangement for accessibility to the projectors for maintenance.
Details and product catalogues of acoustic treatment of inner surface of concrete dome and acoustic panelling below the aluminium dome inside the theatre proposed and with relevant drawings, material specifications etc.
Details and product catalogues of LED Cove light, exit signage and emergency exit signage.
Details regarding source of content development for planetarium shows using datasets/ library of 3D models/cloud assets.

2.1 Write Ups Related to Design

Bidders shall provide following documents as per Table 2.1 along with technical bid.

Table 2.1

Detail Description
Document on design techniques highlighting how Fulldome Digital 2D immersive projection system will be met by the offered solution using the proposed sub-systems. Detailed write-up of functional role of each sub system solution shall be described.

2.0 User Training and Documentation

Two levels of training are to be arranged – Basic training of two days for 5 executives and 10 days of technical training for 5 participants is required to be organized at **Science City Agartala, Planetarium, Tripura. Training material and complete installation manual in both hard and soft copies is to be provided (two sets of each).** The faculty providing training should be certified from parent company (OEM) or technical and experienced persons from system integrator.
During operation and maintenance period agency shall provide online assistance for the development of new programmes as per the requirement of the Science City, Agartala.

Training Topics on FULLDOME PROJECTION SYSTEM

Table 3.0

Sl. No.	Detailed Description
1.	Architecture of FULLDOME PROJECTION SYSTEM
2.	Hardware components of FULLDOME PROJECTION SYSTEM (Projectors, screen, controller, image servers, network elements, storage etc.)
3.	FULLDOME PROJECTION SYSTEM Administration: Hardware and Software Installation, Configuration, Trouble-shooting and Maintenance procedure including preventive maintenance.
4.	Alignment and Calibration with usage of instrument and tools
5.	Field replaceable components and applicable procedures for field repalcement
6.	Special features of the show control software
7.	FAQs

4.0 Delivery Schedule

The entire work shall be completed within **12 (TWELEVE) months** from the date of placement of order or opening of Letter of Credit whichever is later.

5.0 Warranty and AMC:

Warranty: The successful bidder shall provide a **Single Window Onsite Comprehensive Warranty** on all the items supplied under the purchase order as has been enumerated in detail below. **The warranty period for the entire installation is for five years for all components of the system except chairs for which warranty will be 2 years from the date of issue of acceptance certificate by CMD.**

AMC: The comprehensive annual maintenance contract will be for a period of two years, after expiry of the warranty period of five years.

i. Bidders shall quote **comprehensive annual maintenance charges** along with applicable taxes **for two years**, after expiry of warranty period of five years from the date of commissioning and handing over to CMD on year to year basis. The tax break-up for all such rates shall be clearly spelt out as on the date of submission of the tender.

ii. **During defect liability period of five years and subsequent comprehensive maintenance contract, comprising of two years, the following terms shall be applicable.**

a) Preventive Maintenance for all the equipment and peripherals supplied by the bidder. The bidders shall submit a schedule for such preventive maintenance and shall form part of the agreement.

b) Repair of faulty / defective parts and peripherals.

c) Replacement of faulty parts and peripherals. All replaced parts shall remain as property of Science City, Agartala.

d) During the AMC period (when the life of the batteries is like to be over) the selected bidder has to replace all the UPS batteries. The batteries shall be provided by Science City, Agartala.

e) All the parts including networking cables, connectors, etc. that may be required to maintain the system shall be supplied by the bidder at their own cost.

f) Any break-down, failure or malfunctioning of the system shall be attended to and put back in service within 48 hours. However, all round efforts must be made to set right the system in shortest possible time. Service shall be available for at all times for 364 days in a year.

g) The selected bidder will maintain the minimum essential spares at their own stores and the required tools/test equipments/software so as to reduce the break-down time.

h) Spare parts manufactured by Original Equipment manufacturer (OEM) will be preferred. However, in unavoidable situations spares manufactured by equivalent manufacturers may be used with prior approval of CMD.

In case of any requirement for replacement of any supplied spares by the bidder, CMD shall not be responsible for re-export of the damaged components and that will be replaced by the successful bidder.

6.0 Operation of 2D Full dome planetarium and film shows for a period of 5 years:

Successful bidder shall operate full dome shows from 10:30 a.m to 6:30 p.m for the visitors of Science City, Agartala. This timing may vary during the peak seasons and also based on the requirement of Science City, Agartala. The show shall remain operational for 270 days in a year (and 271 days in a leap year).

Manning, operation and maintenance of the system shall be the sole responsibility of the successful bidder at their risk and cost by mobilising their resources and trained technical manpower. Adequate manpower shall be deployed for the complete duration of the operation of the theatre.

- Successful bidder shall operate the system in proper and professional manner without downtime and shall fulfil the statutory obligatory requirements and bidder's part for the purpose of contract.

- All necessary manpower, tools and tackles with allied requirements will be arranged by the successful bidder for operation of the system.

- **The order for operation of Planetarium systems for five years on year to year basis will be placed by Science City, Agartala separately after SITC of the complete planetarium system. However, the price offerd for the operation for five years will be considered for selection of L1 bidder.**

- The date for commencement of operation shall be communicated by Science City, Agartala/ CMD at an appropriate time after successful commissioning of the entire installation. This shall be through a separate written communication after completion of Supply, Installation, Testing Commissioning and successful completion of training and other compliances and may be applicable to commence operation.

- The bidder or its authorized agency will have to give separate quotation for operations & maintenance part.

- The bidder company, if it is a foreign company, can authorize an Indian agency to take complete responsibility of O&M and payments of the O&M amount can be made to the authorized agency directly. Quoted price will be given to authorize agency over a period of 5 years with each year payment being one fifth of total quoted Operation & Maintenance cost.

An overall remote supervision of the operations and maintenance should be observed by the foreign bidder in case the O&M responsibility is undertaken by their local agency.

TECHNICAL COMPLIANCE TABLES

Table 1.1.1

Specifications	Detailed description	Compliance (Yes/No)	Reason for deviation, if any, with complete justification
Screen type and dimensions	• The 12 meter diameter dome should be made of good quality aluminium perforated sheets with necessary ribs and support structures. • The perforation should be 1.6 mm in diameter living – 23% of voids. • Framework of more than 180 mm wide. • Less than 109 panels (at least one spare panel should be provided for every course) • The panels should be painted seamless joints, with single line of rivets with seamless overlaps. • One fixed ladder to be delivered. • One 360 degree cove trough of aluminium make to be delivered. • The final reflectivity of the panels should be 0.53.		
Insulation for Dome Screen	Blackout insulation jacket with ASTM E84 standard with minimum 1 inch thickness and NRC 0.6 to 0.8 to be installed on the top of the Dome screen and to be supplied and installed by the Dome manufacturer.		

Table 1.1.2

Specifications	Detailed description	Compliance (Yes/No)	Reason for deviation, if any, with complete justification
Number of Projectors	2		
Type of Projector	Phosphor Laser Projector, 4K resolution, 10,000 Lumen from solid state illumination, 16 000:1 of native contrast ratio, 60 Hz frame rate.		
Projector array comprising multiple projectors	To cover 12 meter dome screen (non titled)		
Total Resolution after blending	9MP or higher (after blending)		
Mounting	Projectors are to be mounted on the specially designed structure around the dome periphery.		

1.1.3 Projector

Table 1.1.3

Specifications	Detailed description	Compliance (Yes/No)	Reason for deviation, if any, with complete justification
Display Technology	4K SXRD panel		
	Source: Phosphor Laser		
Minimum native Resolution	Minimum 4096 pixel x 2160, 60 Hz, at minimum 16 000: 1 native contrast ratio.		
Internal Input / Output ports	HDMI 10 bits minimum		
Input / Output Control and networking	RS-232C, LAN		

Lens Options	Must be fitted with fish-eye lenses specifically designed for dual projector configurations on a dome-screen Fisheye conversion lenses or adaptors will not be accepted. The fisheye lenses must include a built-in blending mask. They must ensure adequate illumination and low distortion at the edge of the image. They must offer a Horizontal FOV of minimum 105° and an F-Theta Distortion of maximum 8.1%.		
Source Life	Minimum 20000 hrs		
Operating Hours	The System shall be capable of being used for twelve hours per day 364 days in a year.		
Monitoring Parameters	Source life, Fan status, Temperature status, etc.		
Noise	<40 db at 25°C per projector		
Cooling	Self-contained		
Accessories	All standard accessories including IR remote, Line cord etc.		
Warranty	Manufacturer's standard warranty of not less than 3 (three) years on projectors.		

1.2 Image Generator Server and Playback System with full dome and planetarium show software (1 master + 2 nodes+ 1 spare)

Table 1.2

Specifications	Detailed description	Compliance (Yes/No)	Reason for deviation, if any, with complete justification
Image Generators	a) 8 cores, 16 threads, mini 16 MD Cache. b) RAM 32 GB DDR4 with a frequency of at least 2900 MHz. Solid state Hard drives simulation software data and 30 hours of video at native resolution c) Graphics card with at least 5880 CUDA Core, 1.5 GHz base frequency, 1.7 GHz boost frequency, 8 Go GDDR6, Ampere architecture graphic cards. d) SSD drives with enough space to store system, simulation software data and 30 hours of video at native resolution. e) Integrated backup SSD allowing backup of data & system.		
Pre-process Data transfer Rate	No jerks, flicker or image tearing should appear on screen. Frame rates up to 60 fps.		
External video playback	HDMI or Display port inputs should be added to allow connecting external HDMI or Display Port signals and capture them into the planetarium digital projection system. These inputs must be able to capture the image in a resolution of 3840x2160@60Hz. In this way, the Planetarium digital projection system will enable real-time display of any content from an external source connected by the presenter in flat mode with a resolution of 3840x2160@60Hz or a 3840x3840@60Hz fulldome content. NDI low latency video streaming technology must be used between		

	those inputs and the image generators.		
Content	a) Astronomy software, calculated in real time b) Previously prepared shows, encoded in popular formats such as XVID-H.263, AVC-H.264, HEVC-H.265 c) Obtained from an external source via streaming. d) Obtained from an external source via External video Playback input.		
Acceptable make	Dell/HP		

Additional SSD and RAMs may be configured to meet the overall specifications, if necessary.

1.3 Content creation Server/ Player

Table 1.3

Specifications	Detailed description	Compliance (Yes/No)	Reason for deviation, if any, with complete justification
1	Full dome projection system must be controlled by a fulldome simulation software with real time astronomy as one of the main features.		
2	All images and databases provided with the fulldome simulation software must be completely free of copyrights and can be used to create shows as many times as desired. Automatic updation of database must be available at free of charge.		
3	The fulldome software must incorporate the following: **Simulation of the followings:** • Night sky • Solar system • Extrasolar (multiple star systems, exoplanet systems) • Deep sky objects • Milky way • Earth sciences **Requirement of the following components:** • Fulldome video player		

	• Slideshow player to allow the display of flat, fish-eye or panoramic videos and Images with transition like a "PowerPoint" presentation. • Data 2 Dome compatibility • Cloud sharing and social media **Requirement of the following interfaces:** • User Friendly Graphical Interface • Wireless interface • VR Compatibility		
4	Astronomical features required: • The simulation of the sky including the following celestial objects: Sun, planets, dwarf planets, natural and artificial satellites, asteroids, comets, stars depending on the date over an interval of + or – 100,000 years, the position and the orientation of the observer using the VSOP87 and SPICE calculations. • The calculation and correct representation of the apparent magnitude of stars, planets and natural satellites depending on the position of the observer and the date. • The proper movement of the stars. • Steller parallax. • The representation of the variability in magnitude of at least 1,500 variable stars • Simulation of multiple star systems • Simulating the position of at least 2,000 exoplanets around their star • Moon Libration • Real-time shadow projection: dark side of astronomical objects, shadow of a satellite on its planet, shadow of a planet on its rings, shadow of a planet on its satellites. The user should be able to remove the shadow from the dark side of planets and satellites.		

	• The possibility of modifying the astronomical parameters of a body: diurnal movement, annual movement at constant solar time, annual movement at constant sidereal time, precession movement, size of the body, speed of rotation, of revolution, resizing of the orbit.		
5	The fulldome simulation software must be able to move from wide view up to 10^{27} m universe wide and zoom in to particles of 10^{-18} m anywhere in this universe in continuous without any visual jump or transition.		
6	The fulldome simulation software must include a movement management to switch from one reference to another at any time with no visual jump.		
7	All parameters of the system (simulation date, observer position and orientation, parameters of objects such as intensity, color, etc.) must be modifiable with a duration from an initial stage to a target state using different models of Interpolation.		
8	For time control, following features should be available: • Instantaneous or progressive movement forward or backward in time. The time can be defined in Julian day or in GMT or n local date / time. • Change the data gradually, stopping at a target date etc. • Change the date in increments with stopping at a target date etc. • Automatically stop the evolution of the date when a star passes to certain position (rising and setting of a star, passage at 0° south, etc.).		
9	The fulldome simulation software must include labels to display names for any objects represented (Sun,		

	Planets, Dwarf Planets, Satellites, Stars, Milky Way, Messier, etc.).		
10	The fulldome simulation software and the GUI must include language management and switch between various languages, including at least : English, Hindi and Bengali.		
11	Facility for searching, downloading and uploading resources from / to a Cloud (images, videos, audio, scripts, 3D models)		
12	The fulldome simulation software shall include a Domecasting capability, i.e. the possibility that a Planetarium broadcast its live presentation to other domes.		
13	Most of the date sets of the software shall be issued from public scientific institutions (observatories, universities, laboratories, etc.). It shall be possible for such datasets to be updated easily by the planetarium with a simple click in the GUI.		
14	The fulldome simulation software shall offer the possibility to visualise HiPS Sky Surveys from CDS servers. It shall be possible to display the Sky Survey on dome and to zoom in any area with a refinement of the resolution of the image.		
15	The fulldome simulation software shall offer the possibility to visualise WMS terrain data at the surface of at least Earth, Mars and Moon.		
16	The fulldome simulation software must be compatible with Data 2 Dome. The Data 2 Dome must be integrated in the graphical user interface.		
17	The fulldome simulation software shall be able to download and display any NASA JPL Horizons trajectory data with a few clicks in the GUI and allows to visualize the full path or a path evolving with the date of the simulation. It shall be possible to add a 3D Model that will follow the path accordingly.		
18	The fulldome simulation software shall be able to download 3D models of known asteroids from a reputed server and display it at its position in the GUI.		

19	The Fulldome simulation software must be compatible with VR Glasses for show production and for pre-show or exhibit purpose.		
20	The fulldome simulation software must include realistic atmospheres based on algorithms accounting for the physical phenomena (like Rayleigh scattering and Mie scattering) for at least Earth and Mars. Atmosphere model should simulate multiple scattering. The ground of the planet should also react according to atmosphere thickness.		
21	The fulldome simulation software must allow a continuous view of planets from, outer space up to several meters on the surface for Earth, Mars, Moon, Venus, Mercury, Ceres Vesta, Pluto, Charon etc. Such representation must include known data for terrain and ground imagery. Such visualisation should be at least 60 frames per second during motion. For the Earth • Satellite Imagery reaching a resolution of at least 15m per pixel based on various satellites over the entire surface with homogeneous colors over the whole globe. • Elevation with a resolution of minimum 30m • Cloud cover seen from space. This cloud cover can be modified by the user. • The Belt of Venus must be represented by the atmosphere of the Earth (shadow of the Earth on its atmosphere) • The reflection of the Sun on the oceans, sea and river must be simulated • The light reflected by the Moon must impact the atmosphere of Earth as well as the lighting of the ground of Earth and reflection on water according to its phase. • On the night side, light pollution in cities must be visible		

	• The software should allow users to display the Earth following the different seasons, or speed up the time to show the changes of appearance of the Earth over a year. For the Moon • Images reaching a resolution up to 120mm per pixel • Elevation with a resolution up to 120m • Taking into account the illumination of the sun and the indirect illumination of the Earth (Earthshine) For Mars • Images reaching a resolution up to 230m per pixel • Elevation with a resolution up to 200m For Mercury • Images reaching a resolution up to 165m per pixel • Elevation with a resolution up to 665m For Venus • Images reaching a resolution up to 4,500m per pixel • Elevation with a resolution up to 4,500m The fulldome simulation software must include the terrain simulation of Pluto and Charon based on New Horizon mission. All the data must be stored on the NAS or hard drives.		
22	It must be possible to load "on the fly" high resolution satellite imagery and high resolution relief files (Geotiff, JPEF2000 format, etc.) for a specific georeferenced area on at least Venus, Earth, Moon and Mars. Such images should be loaded on-line or off-line directly from the images generators.		

23	The fulldome simulation software must include shadow management as: • Shadow of the Moons on their planet • Shadow of the rings on their planet • Shadow of the planet on its rings • Shadow of the planet on satellites • Shadow of satellites on satellites • Shadow projected from mountains and craters for at least: Earth, Moon, Mars, Mercury, Ceres, Vesta, Phobos, Deimos, Comets nucleus, Asteroid's		
24	It shall be possible to display rainbow at the surface of the planets, with proper position according to the observer position and orientation. The simulation should also allow to show primary and secondary rainbow as well as Alexander's band.		
25	On Earth it shall be possible to show Aurora (shown in 3D and therefore visible from the surface as from space continuously)		
26	On Earth, it shall be possible to visualize shooting stars. • 2 modes shall be available: Generation of shooting stars according to defined parameters / Random generation of shooting stars. • The user will define a precise position of a radian point with an area (expressed in degrees) around the radian point in which the shooting stars can start, as well as a number of stars per minute. • It will also be possible to load these parameters from a meteor shower database. The database of shooting stars shall include at least the Leonids, the Perseids, the Orionids, Eta aquarids. The database can be updated by the user.		

27	It shall be possible to show Animated volumetric procedural clouds when the observer is on the ground. Like the terrain and atmosphere, clouds shall use advanced lighting routines to provide the following realistic effects: red sunset, magnitude-based star hiding, light scattering, moonlight, glory, fogbow, illumination of the clouds by the Sun and the Moon, projection of the cloud's shadows on the terrain. The volumetric clouds need to be fully customizable directly from the user interface. It must be possible to choose their thickness, altitude, and type.		
28	The fulldome simulation software must represent lunar and solar eclipses. During solar eclipses, the atmosphere must react according to their magnitude and to the percentage of the eclipse. During a total solar eclipse, it must be possible to see the solar corona. It must be possible to see the Baily grain and the diamond ring effect. During a lunar eclipse the color of the Moon become reddish according to Earth shadow position.		
29	The simulation software should allow to simulate Zodiacal Light and Gegenschein under the Earth's atmosphere and also to leave the Earth for an extrapolated view of the dust cloud around the Sun.		
30	The fulldome simulation software must include Saturn's rings made up of endless particles of dirty ice. Each particle of the ring must react properly to the lighting of the Sun and allow to see the dark side of the particle. The ring must have the correct illumination to show proper lighting depending on the Sun's position and therefore the incident angle of the light reflecting on the rings particles		
31	The fulldome simulation software must include a realistic representation of the sun view from Earth and Mars atmosphere and view from space		

32	The fulldome simulation software must include 3D animated model of the Sun showing variation of our Sun's surface in UV helium ionised 30.4mm wavelength and in visible wavelength.		
33	The fulldome simulation software must include various 3D models of known asteroids.		
34	The fulldome simulation software should include at least one 3D model of an interstellar object.		
35	The fulldome simulation software must include 3D animated models of comets with automatic orientation of the comet's dust and plasma trails according to its position with respect to the Sun. The plasma train and the dust train must adjust their length according to the comet distance to the Sun. The dust trail must simulate syndyne and synchrone.		
36	At least 5 different 3D animated comets must be supplied to show the variety of comet's types: Bradfield like comet, Hale-Bopp like comet, Halley like comet, Hyakutake like comet and McNaught like comet.		
37	It must be possible to show 3D model of Comets Nucleus, such model must show outgassing jets on the side illuminated by the Sun. 67P/Churyumov-Gerasimenko Comet Nucleus should be provided as such model.		
38	The software must include the possibility to show bolides entering the Earth atmosphere It must be possible to visualize the bolide in 3D, meaning that it must be possible to take off the Earth Surface and visualize the bolide trajectory properly from atmosphere or from space The lighting of the bolides must affect the Earth's atmosphere and terrain, providing realistic renderings when visualized from the ground as well as from space looking down to the ground. The famous Chelyabinsk bolide shall be available natively in the system, with a realistic rendering and accurate date and times of the phenomenon.		

39	The luminosity of the stars, planets, satellites, in distant observation where the object is represented like a star, having a point representation and which are endowed with magnitude (stars, planets, satellites) will have to be calculated by a configurable function. The color of such "stars representation" will be rendered and it will be possible to increase or decrease the visibility of their color		
40	The star database should contain more than 110,000 stars from the Hipparcos catalogue, more than 2 million stars from the Tycho-2 catalogue, and more than 1.3 billion stars from the Gaia DR2 catalogue. The stars will be positioned in 3D within the limits of the details provided in the original catalogues, during an interstellar movement, the apparent magnitude of each star will be recalculated taking into account for its representation.		
41	It must be possible to get closer to at least 500 stars, during these movements, these stars will have to go from a point representation to a 3D representation as they approach. The labels of these stars can be displayed. It shall be possible to visit at least 100 stars in multiple systems with proper motion around their barycentre.		
42	The stars will have to move according to their own movement, within the limits of the information contained in the catalogues, according to a date parameter of the simulation.		
43	It should be possible to filter the stars, meaning to show only a part of the stars of these catalogues, according to information such as at least the spectral type, the absolute magnitude, the apparent magnitude, the distance, temperature, luminosity class, and radius.		
44	The software has to represent the variability in magnitude of at least 1500 variable stars		
45	The Milky Way must be represented in different ways. From the inside, it will be represented by an image wrapped around the viewer. From the outside, the galaxy will be represented by a volumetric 3D model. This		

	volumetric model should represent the barred and spiral structure of our Milky Way and make it possible to show the absorption of dust clouds, particularly in side/edge-on view.		
46	In order to present the Milky Way in different forms from the solar system and allow the animator to narrate his speech, several such images must be provided: • Blurry texture giving the best possible perception of the Milky Way in a night sky. • Visible texture (real photo). • FERMI, IRAS and COBE image • HDR image accumulating the brightness of more than 1.6 billion stars from the Gaia DR2 catalog, whose appearance can be customized by the operator for color, brightness and contrast.		
47	The fulldome simulation software must include an advanced volumetric representation of the Milky way when leaving the solar system. This representation must be based on scientific data and must represent when flying inside the model: • Population of Individual stars • Population of Individual Open clusters • HII Regions		
48	The fulldome simulation software must include at least 25 Volumetric Deep Sky Objects represented in real time at their proper location. Orion Nebulae shall be represented with a volumetric model Eagle Neabulae shall be represented with a volumetric model allowing the visualisation of the Pillar of creation		
49	All known Globular clusters with their accurate position, size and stars composition be represented with a 3D representation showing the proper number of stars as well as proper distribution in space and in number of type of stars.		

50	It must be possible to move the observer to black holes inside the volumetric Milky Way. The transition from the Volumetric Galaxy to the black hole environment must be smooth. Two kinds of black holes should be represented. One with accretion disk, the second one without accretion disk. The black hole has to distort the light of object located behind it, and the model with accretion disk has to show the accretion disk distortion. It has to be possible to display a representation of a space and time grip showing that there is a singularity due to the black hole.		
51	The offered software must include a 3D model of a Pulsar. The pulsar magnetosphere, radio jets and gravitational effect close to the star should also be available.		
52	The software will have to allow to visualize the Hubble sequence and also to be able to move continuously through it thanks to the integration of at least 10 different 3D volumetric models of galaxies.		
53	It must be possible to visualize a set of 3D models to form an explanatory diagram of the stellar evolution cycle showing he different phases of evolution.		
54	The fulldome simulation software must include advanced 3D models with reflection of light on the objects, and with projection of shadow of elements composing the 3D Model. The catalogue must at least include the following objects: • Cassini • Crew Dragon • Apollo CSM • Gaia • Galileo • Hubble telescope • International Space Station with the possibility to visit the inside of the station • James Webb Space Telescope • Juno • Messenger • New Horizons • Pioneer		

	• Rosetta • Soyuz spacecraft • Space shuttle • Sputnik • Voyager • Curiosity • Philae • Venera 9 Probe • Ariana 5 • Falcon9 • Saturn V • Soyuz Rocket • Perseverance • Ingenuity • Several Indian spacecraft, with at least Chandrayaan-2, Chandrayaan-3, Megalayaan-1 and Magalayaan-2 Those objects shall have a photo realistic representation including effect such as reflection on the metallic and reflective parts		
55	The Fulldome simulation software must include the superclusters of Laniakea, Perseus-Pisces and Shapley. The data and their integration in the software used has to be validated and certified by the scientist behind those datas.		
56	On Earth and on Mars it will have to be possible to adjust the altitude of the sea, to simulate a rise in water on Earth and the presence of liquid water on Mars		
57	The fulldome simulation software must include the Earth's magnetosphere.		
58	The fulldome simulation software must include simulation of the internal structure of planets, main satellites and Sun.		
59	The fulldome software must include a set of Science on a Sphere dataset from NOAA. The user must be able to include any Science on a Sphere dataset from NOAA released after installation.		

60	The software shall allow the visualisation of Placemark datasets at the surface of planets, including at least: • Earthquakes on Earth • Craters on Earth, Moon, Mars • Volcanoes on Earth and Mars		
61	The software shall allow users to add new datasets of by importing external files. Such file contain at least elevation, longitude and altitude data, color and label for each place mark.		
62	The software must load KML files for vectorial GIS information. The software has to draw the lines directly on the ground, and has to allow to create area with specific color with the possibility to adjust the opacity.		
63	The software should also allow users to add any standard image (non-georeferenced) on the surface of planets and satellites following its elevation. The size, position should also be adaptable and the rotation of the image to fit perfectly with the real terrain data should also be possible.		
64	The fulldome simulation software must include a massive open source dataset or it needs to be under a license agreement with a third party which should not add any extra cost for any future update of the dataset. It shall also be possible to use the datasets to create shows for the planetarium as well as for selling it to any other third party without any limitation or additional costs. The datasets must include at least: • Full Gaia DR2 star catalog with possibility to show information from Tycho2, Henry Draper (HD/HDE/HDEC), Hipparcos, Yale Bright Stars (BSC), Gliese & Jahreiss catalog as well as Flamsteed & Bayer designation. • 110 Messier object and more than 100 NGC-IC objects, represented with an image at the proper position.		

	• Exoplanets System with more than 2000 individual exoplanets orbiting their stars with a 3D model with appropriate texture according to exoplanet type. • Data base of the location of artificial satellites of the Earth: SPACETRACK data base with over 14,000 objects. • Location of Asteroid database: ASTORB data base from Lowel Observatory with over 460,000 objects. The software should also offer the possibility to download and visualize 3D models of asteroids online from a reputable website (e.g. Damit). • Location of Comet database: Jet Propulsion Laboratory and NASA database with over 800 comets represented at the same time • Oort cloud data base • Location of Brown Dwarfs database with more than 1500 stars • Location of Exoplanets and Exoplanet candidates locating more than 8000 of them • Location of Supernova remnants with more than 150 of them • Location of Planetary nebulae with more than 280 of them • Location of HII regions with more than 120 of them • Location of Ob Associations, with more than 100 of them • Location of Open Clusters, with more than 2600 of them • Location of Variable stars with more than 9000 of them • Location of pulsar with more than 3000 of them • Location of Globular Cluster with more than 160 of them • Location of NGC-IC objects with more than 14000 of them located in the star field (view form Earth) and more than 7500 of them in 3D		

	• Location of Galaxies of the local group with more than 140 of them • Location of Galaxy groups, with more than 150 of them • Location of Galaxies from Tully Catalog with more than 30000 of them • Location of voids, with more than 30 of them • Location of Galaxies from 2dF catalog with more than 225 000 of them • Location of Galaxies from 6dF catalog with more than 110000 of them • Over 17,000 galaxies of the Cosmicflows-3 catalog, from the Cosmicflows Collaboration • Location of Galaxy clusters, with more than 3000 of them • Location of Superclusters with more than 170 of them • Location of Galaxies from SDSSRD16, with more than 3 million of them • Location of Supernova with more than 10000 of them • Location of Quasars with more than 700000 of them from 2dF, 6dF and SDSS datasets • WMAP, COBE and PLANCK cosmic microwave background • Boundaries of stellar halo of the Milky Way, of the local group, of Virgo and Laniakea • Star orbits in the Milky Way of at least 8 stars and the Sun • Uncertainties of star position of at least 100 stars from Hipparcos or Gaia catalog • Location of at least 20 stellar black holes The presenter must have the possibility to decide which datasets are shown (on/off) automatically depending on the distance to the observer.		

65	The fulldome simulation software must include the 88 IAU constellations with asterisms, graphic representations, IAU limits and names of the constellations.		
66	It must be possible to change easily the images used for constellation, size of the image, position and orientation of the image, as well as its color.		
67	Video constellation must be provided at least for the zodiacal constellations		
68	The software must include ready to use astronomical grids such as: • Cardinal points • Meridian • Azimuth • Equator • Ecliptic with a graduation in day month that automatically adjust labels and graduations depending on the year of the simulation as well as with a fix representation (fixed on one year). • Circum polar circle with automatic adjustment depending on observer latitude • Earth's rotation axis • Earth's pole in star field		
69	Fulldome simulation software must allow operator to draw a line between two objects among planets, moons or stars. The operator should be able to lengthen the line and to add graduations on such line.		
70	All astronomical objects should be able to display their label as well as a pointer to help the audience locate the object in the dome.		
71	The fulldome simulation software must include trace mode to see the trail left by the stars during a diurnal motion and to track for instance the artificial satellites in the sky.		
72	The fulldome simulation software must include modification of astronomical parameters like: size, distance ratio between a satellite and its planet, the factor of revolution of a planet around its star, the factor of rotation of a planet around its axis, the factor of revolution of a satellite around its planet, the factor of rotation of a satellite around its axis.		

73	It must be possible to show trajectory of a planet, a satellite and the Sun in the dome referential. This feature will be used for example to show Sun analema, planets retrogradation.		
74	It must be possible to load a spacecraft trajectory from JPL website (a conversion of format is acceptable, in such case, the conversion must be explained in the documentation), with such load, it must be possible to add a 3D model of the spacecraft that will automatically follow the trajectory according to the date of the simulation.		
75	It must be possible to define orbital motion to objects following Kepler's law and TLE. It must be possible to attach a 3D model to this orbit.		
76	The fulldome simulation software must include image and video inserts (virtual slides and video). Image and video insert can be placed on the dome or in the 3D model. The following parameters must be accessible for the user: opacity, intensity, position, orientation, color filter and chroma key with a tolerance that can be adjusted by the operator. For videos, the following commands must also be available: play, l;oop olay, pause, stop, etc.		
77	The fulldome software must support fish-eye format, spherical projection format, panoramic format and flat format.		
78	It has to be possible to create a presentation "like MS PowerPoint" using images and video. The software has to allow to create transition between different configurations of images on the dome. One configuration has to remember the position, the orientation for several images or video. Then it has to be possible to define transition such as fading to make new images/video appear or disappear.		
79	It must be possible to alter image parameters (color, intensity, opacity, etc.) depending on the height of the Sun.		
80	The fulldome simulation software should be able to show shadow cones of satellites on planets.		

81	It must be possible to display the habitable zone for at least 100 stars.		
82	The software shall be able to display the radio sphere and to show its propagation according to the date of simulation.		
83	The fulldome simulation software must include a fulldome video player.		
84	Controls of the fulldome video player must be available on the live control interface. Accessible controls must be Play, Pause, Stop, Seek, Fast-forward and Fast Rewind		
85	Audio track must be synchronized automatically with the Fulldome video player.		
86	The Fulldome video player must be able to play at least 4K @60fps fulldome video without slicing.		
87	The fulldome simulation software must be able to support various streaming protocols including at least NDI, UDP and HTTP protocol. Such stream shall be displayed on the dome as a standard rectangular video or as a fish-eye video.		
88	The software must support AVM files. For such files, the AVM Image should be placed and sized according to the metadata information.		
89	The fulldome simulation software must include 3D inserts to incorporate 3D objects into the simulation with the following format: DAE (Collada), 3DS (3D Studio), OBJ (Wavefront), LWO (Light Wave Objects), LWS (Light Wave Scenes), CMOD (Celestia models).		
90	It must be possible to import 3D models with embedded animation, for such import the documentation has to describe the process to load the animation in a proper way.		
91	The fulldome simulation software must include text inserts to display texts. They must be placed on the dome or into the scene and users can define the following parameters: position of the text in the 3D scene and position of the text in the dome 3D projection, content of the text.		

92	Such text should be fit by operator set of characters, and in the operator sentence, it has to be possible to add information calculated by the software such as: date and time of the simulation, speed of the camera, distance of the camera to an object.		
93	The system shall be able to project other content than astronomy. Various STEAM modules shall be offered in order to make sessions about at least some of the topics listed below: • Heart Anatomy showing Heart in motion • Human Body nantomy (male and female) showing nervous system lymphatic system, circulatory system, urinary system, reproductive system, respiratory system, digestive system, integumentary system, muscles, bones. • Eye Anatomy • Animal cell, vegetal cell, bacteria cell, fungal cell • Periodic Table of elements • Fourier mathematical equation • Optical path • Magnetic field • Fractals • Combustion engine • Color (additive and subtractive) • Trigonometry • State of matter		
94	The system shall allow users to create content using Unity 3D Engine and to display it on the dome at the native resolution of the projection system.		
95	The GUI should be simple and user friendly. • Creation of scripts to automatize actions shall be possible with a graphical interface without writing any complex codes. • Drag & Drop features shall be possible to add images, play videos, play a script, move to one astronomical object to another. • A Dome View shall be represented in the GUI		

	showing in real-time in a fish-eye style the content of what is displayed on the dome, this Dome View shall be interactive allowing to click directly on an astronomical object (such as sun, planet, satellites, constellations, stars) to access features such as intensity, orbit, trajectory, label. The software shall allow to move in a fluid motion to astronomical objects with a simple "Go to" function available in the GUI for the astronomical objects available.		
96	The GUI shall have a dedicated GUI for direct control typically for doing night sky presentation. It shall be possible to control below function within the GUI without any additional scripting: • Switch on/off of starry sky, milky way, planets, satellites, sun, atmosphere, atmospheric effects (rainbow, clouds, aurora, rain, snow, lighting, moonlight, twinkling), shooting stars, zodiacal light, messier & deep sky objects. • Customize the atmospheric effects directly from the graphical user interface • Switch on/off orbits of planets and satellites, trajectories in the sky of sun, planets and satellites, pointers, constellations, asterisms, pictures, boundaries and names • Scale up Sun, Planets, Satellites • Control time (pick a date, start diurnal motion, start annual motion, start analemma motion, start precession motion) • Modify orientation of the theatre • Control the camera (Sky View, Terrain View, Space View) with various		

	manipulators possibility (Rotation, Free Fly) • Adjust the Sky quality (number, size, color factor of stars, Milky Way representation and brightness) • Show proper motion of stars • Apply filters on StarrySky, composed of various catalog including at least Hipparcos and Gaia DR2 catalog, in order to highlight or reduce the visualization depending spectral type, luminosity class, temperature, absolute magnitude, apparent magnitude, distance, catalog, radius, proper motion, distance, right ascension and declination). • It shall be possible to let the software switch on/off datasets automatically according to the position of the observer, for example, when getting close to the Earth showing the artificial satellites dataset, when viewing the solar system, showing the asteroids dataset, when leaving the solar system showing the oort cloud etc. • GUI shall allow to switch on/off on the dome classical astronomical grids and information with dedicated buttons (cardinal points, azimuth, equator, ecliptic, precession circle, meridian, longitude, latitude, date, time etc.) • It shall be possible to directly visualize the current position and change the position and orientation of the camera easily, giving access to a zoomable map of the planet with a mapped terminator (on Solar System planets, dwarf planets and satellites). • It shall be possible for the user to create its own control page with buttons linked to scripts.		

	• A list of pre-produced user pages must be available in additional to the ones users can create by themselves. It must be possible to open any web page in the user page tabs by setting its URL.		
97	The GUI shall allow to control lighting, audio, power on/off projectors and computer, etc. with dedicated windows.		
98	The GUI has to offer a visualization of the dome image.		
99	It shall be possible to directly click on Sun, planets, satellites, stars represented on the dome (picking technology) and access the menu showing various actions for this object.		
100	It shall be possible to use the mouse within the dome view to control the position and orientation of the observer.		
101	It shall be possible to use the mouse in the dome view and see it as a virtual laser pointer on the dome.		
102	It shall be possible to click in the dome view to define a precise point to zoom, using the mouse it shall be possible to zoom like with a telescope on the selected point.		
103	It shall be possible to draw directly on the interactive dome view.		
104	The software shall allow the possibility to play several scripts at the same time.		
105	The GUI shall allow a control of the scripts and full-dome video being played (pause/stop/play)		
106	The GUI has to allow the view of all resources included in the software (planets, moons, stars, etc.) as well as all resources added by the user in a library (images, video, 3D models, scripts, fulldome shows, etc.)		
107	It shall be possible to browse the library of objects of resource, as well as by searching keywords.		
108	It shall be possible to drag & drop a resource directly on the dome view to start an appropriate action depending on the resource type.		

109	Installing a new image or a new video, has to be as simple as a drag & drop from operating system files explorer to the GUI. Such drag & drop will automatically install the resource properly on the system, especially it will copy the resource on all necessary computers. The software has to automatically detect the type of file (standard, fish-eye, and panorama) so the resource will be projected properly once added to the dome.		
110	Users must be able add/modify/delete files only in the MASTER computer and the software will handle the synchronization.		
111	An interactive help center needs to be accessible directly form the graphical user interface.		
112	The help center must include a field search to find information easily.		
113	The GUI must include an editor for creating scripts without need for coding.		
114			
115	It also shall be possible to record a script while doing action in live with the GUI. In this fast script creation mode, any action done with the GUI can be recorded as a script.		
116	The software shall be able to render a show created with a script. "Render" means that the full-dome software has to record the dome view image per image (one image for each frame for 30 frames per second and for 60 frames per second).		
117	The rendering mode must be able to render up to 8K frames.		
118	The software shall allow the possibility to create script that will allow deep control of the simulation software.		
119	The software shall allow the possibility to develop a web application and control the software from an external web application.		

1.4 Show Control System

Table 1.4

Specifications	Detailed description	Compliance (Yes/No)	Reason for deviation, if any, with complete justification
Control panel	Table top control panel with Communication protocols: RS 232, TCP/IP. On/Off Control: Projectors, Illumination, Audio and Dimmer control for COVE lighting		
Console Desk	Wooden Console Desk for ergonomic operation of the system with all integrated control for Audio, Cove Lighting & Fulldome operation.		
Console Screen	The screen (single/multiple) should have following: Display size: 32 inch (diagonal) for single screen and minimum 24 inch (diagonal) for multiple screen, Display Resolution: Upto 1920X1080 or better.		

1.5 Calibration and Alignment

Table 1.5.1

Specifications	Detailed description	Compliance (Yes/No)	Reason for deviation, if any, with complete justification
Auto alignment and calibration	Software, hardware and camera based mechanisms to be included in order to ensure error free edge blending / geometric correction on screen as well as to maintain uniform colour and contrast on projectors and dome screen.		
	Auto alignment, auto edge blending and correction system shall be available in the system through GUI.		
	Software Preset to manage optimum brightness levels of Projectors in 2D mode.		

Table 1.5.2

Specifications	Detailed description	Compliance (Yes/No)	Reason for deviation, if any, with complete justification
Tools for Verification of calibration and alignment	Set of Instruments and software for verification of calibration and alignment parameters at site as per table 1.5.1		

1.6 Integrated Audio System

Table 1.6

Specifications	Detailed description	Compliance (Yes/No)	Reason for deviation, if any, with complete justification
5.1 channel surround audio system	The audio system shall be fully integrated with the show control system. Audio system shall consist of 5 speakers with single subwoofer system mounted suitably above the viewing platform or else at suitable locations as may be required. Amplifiers are to be solid state and network controlled.		
Front Left/Front Right/Centre Speakers	Large Format 12" High Power Cinema Surround. Power Rating 1:400 Watts continuous pink noise, 1600 Watts peak Sensitivity (1W/1m) 2:98 dB-SPL half space/wall mounted. Maximum Peak SPL3: 124 dB/1m Nominal Impedance: 8 ohms.		
Surround Speakers with wall Mount U-Brackets for all Speakers	Very High Power Cinema Surround Speaker for Digital Applications Frequency Range (-10 dB): 60 Hz – 19 kHz		

	Frequency Response (+3): 75 Hz – 17kHz Power Rating 1:350 watts continuous pink noise, 1400 watts peak Nominal Impedance: 8 ohms.		
Subwoofer:	Single 460 mm (18in) Subwoofer System Rated Impedance : 4 ohms. Minimum Impedance: 3.2 ohms POWER HANDLING CAPABILITY: Continuous Pink Noise1: 1200 Watts Continuous Program2: 2400 WattsPeak Power3: 4800 Watts.		
Power Amplifiers for Speakers: Centre/Front/Surround	Minimum Guaranteed Power, 1 kHz: 650 Watts. Streo, 8 ohms (per ch.) Frequency Response (At 1 watt into 4 ohms, 20Hz – 20 kHz) Crosstalk (below rated power, A-weighted) 20 hz to 1kHz > 70 dB.		
Power Amplifiers for Subwoofer	Minimum Guaranteed Power, 1 kHz:- 1600 Watts. Bridge-Mono.8 Ohms Frequency Response (At 1 watt into 4 ohms, 20Hz -20 kHz) Crosstalk (below rated power, A-weighted)20 Hz to 1 kHz > dB.		
Audio Mixer	16-Input channel 25-bus digital mixing 8XLR outputs plus6 additional linein/outputs 16 x 16 channel USB 2.0 audio interface Motorised Faders.		
Microphones	The audio system should be integrated with microphones (2 numbers or more). It is to be mounted in the console area and 2 or more numbers wireless collar microphones are to be integrated.		
Make	Harman/ Bose/ Sony/ AKG/ Yamaha		

1.7 Online U.P.S. system with parallel redundancy

Table 1.7

Specifications	Detailed description	Compliance (Yes/No)	Reason for deviation, if any, with complete justification
Online 20 KVA U.P.S. system (True IGBT with 30 minutes backup time and including isolation transformer of reputed brand: APC, Emersion, Numeric Veritv or Schneider	Please provide specifications of the U.P.S. system including make and model.		
Battery bank with suitable rack	Please specify number of SMF batteries with detailed specifications. All batteries supplied must be from same batch of production.		

1.8 Seating Arrangement (Minimum 100 chairs + 5 spare chairs)

Table 1.8

Specifications	Detailed description	Compliance (Yes/No)	Reason for deviation, if any, with complete justification
Reclining Chair	1. Tip-up and back push reclined chair 2. Center to center 21". 3. ABS molded housing for seat & back cushions 4. All sheet metal parts with powder coated 5. Arm rest in Polyurethane injection moulded. 6. Seat numbering on inner both the side of the chair stands with silicon fluorescent thin stickers. 7. Row number ofr seat along the aisles. 8. Provision for LED lights on sides along with aisles with the row and the seat number display.		

	9. For Noise Reduction Nylon components on moving parts. 10. Angle of tilt of the chairs shall be adjusted as per the location of the seat for easy and optimal viewing of the shows.		
Frames	15 mm thick high pressure steam pressed hard ply wood for seat and the back, out of which the back is of 12 mm bent ply.		
Fabric	Colour to be approved by CMD authorities. All fabric to be used shall be fire retardant. Test certificates should be submitted.		
Spring	Spring for tip-up and back push mechanism shall be torsion spring with spring steel IS:4454-1 (2001) grade III.		
Sheet-metal components	DRCA/CRCA Sheet metal IS:1079 1994 e) Side stand 3mm (+/- 0.2 mm) thick, size: 415 mm(+/- 5 mm) x 345 mm (+/- 5 mm) both side bottom circular cutting with 140 mm radius. f) 75mm x 25mm 16g 190 mm length tubular pipe form the leg welded to the 3 mm plate. g) Flat for base of the stands 280 mm (+/- 2 mm) length 50 mm (+/- 2 mm) x 5 mm (+/- 0.2 mm). h) Mechanism components 2 mm HRCA Back push box 180 mm(+/-2 mm) x 70 mm (+/-2 mm) & height of the box 15 mm (+/-2 mm), ear "L" bracket attached to		

	be box 190 mm (+/- 2 mm) x 135 mm (+/- 2 mm). With two slot holes for fixing the back. Tip-up box 180 mm (+/-2mm) x 70 mm (+/-2mm) & height of the box 15mm (+/- 2mm), ear "L" bracket attached to the box 35 mm (+/- 2mm) x 125 mm (+/-2mm). With two slots holes to fix the seat.		
Seat and Back cushion housing	ABS moulded vacuum forming out of 2 mm sheet.		
Vinyl Flooring	Dark coloured vinyl flooring with minimum 2 mm thickness.		
Vinyl Flooring / Carpet Flooring	**(a)** Supply & laying of Nylon loop pile carpet over an under layer of 6 mm thick kinny foam in Planetarium of Science City, Agartala as per following specifications: Make: Heritage Labelle, Colour: 6906 Peninsula or equivalent approved make & colour. Specifications construction: 1/10" or 1/8" Tufted Cut & Loop pattern, Fibre: 100% Solution Dyed Nylon, 2-Ply Headset., Pile weight: can 1085g/sqm (32oz/y2), Pile height: ca 6.5mm (+/-3%), total height: ca 8.5mm (+/-3%), total height: ca 8.5nn (+/-3%), Density: 4500, Primary Backing: PP woven cloth, Secondary Backing: Action Bac Standard Roll size: 3.66m x 30m		

	Performance: Stain Resistance: 10 (AATCC-175-2003), 3M Scotchguard Treatment, Static Control: Build in Permanent, Tuft		
	Bind 6.51bs (ASTM-D-1335), Dimensional stability: Max 0.2% change (AACHEN), Flammability Radiant Panel 0.12W/cm2 (ASTM-E-648), US Federal Flammability Std: Passed (GB20286 – 2006/Cfl-S1-T0), (ASTM-D-2859-96), Smoke density: Max 450 (ASTM-E-662-06), Colorfastness: to light 5 (AATCC-16E), to wet & dry cleaning 5 (AATCC-1654), to ozone: 5 (AATCC-129), Indoor Air Quality: CRI Green Label Plus No. GLP1350. **(b)** Supply & fixing of 2" x 0.5" x 3mm Aluminum color anodised stair nosing of approved quality.		

1.9 LED Cove Light

Table 1.9

Specifications	Detailed description	Compliance (Yes/No)	Reason for deviation, if any, with complete justification
Cove Light	a) Beam Angle 120° x 120° b) Lumens : As per BIS norms c) LED Channels Red / Green / Blue d) Mixing Distance 2 in (51 mm) to uniform light e) Lumen Maintenance		

	*50,000 hours L50 @ 50° C (Full output).		
Design	360° Layout in Aluminium Cove Trough in aesthetical indirect lighting arrangement. Ample amount of LED Modules to be provided to avoid dark zones. Provision for software programmability of different modes and colour effects along with programmable hardware presets.		
Maintenance lighting	Separate additional white LED light is requied to be installed for theatre maintenance purpose, controllable from single switch.		
Foot lighting, Exit signage and Emergency Exit signage	• **Foot Lighting:** The lighting effect should be created using a fibre opticrod that is end-illuminated with high intensity LEDs with 50,000 hour life expectancy. • The unit should flush with 6mm Carpet. • **Entry & Exit Ramps Lighting**: Led wall light Should provide 2.2 lux at 1.9m distance when mounted 300 mm above floor. • **Seat Row Indicators:** Seat row indicators should be installed to identify the location of seating rows, to provide illumination for guidance (e.g. by		

	emergency exits) or to illuminate the floor for sage movement in full dome theatre when the main lighting is dimmed.		

1.10 Free Full dome planetary as well as Astronomy Sky Shows

Specifications	Detailed description	Compliance (Yes/No)	Reason for deviation, if any, with complete justification
Complete Full dome Planetarium as well as Astronomy Sky Shows in English and Bengali	a) At least 08 Free shows available in house or from international producers like NASA/ESO/ESA etc. in English and at least two shows to be selected by CMD to be translated in Bengali. a) One Licensed digital 4K 2D fulldome film (**Film title : Voyager: The Never-Ending Journey**) show in English and Bengali for of about 30 minutes duration for 3 years is to be supplied, encoded and tested for satisfactory projection.		

1.2 Brochures & Complete Specifications

Information to be submitted by the bidders in Envelope-1

Table 2.0

Detailed description	Compliance (Yes/No)	Reason for deviation, if any, with complete justification
Brochures and specifications of Projectors, Lenses, Mounts, Blending and Geometric Correction Units, Display Management System, etc.		

Brochures and specifications for Image generator servers interactive Planetarium software, Fulldome configuration & playback system and projection systems.		
Brochures and specifications for Show Control System.		
Brochures and specifications for Calibration and related instruments and software.		
Brochures and specifications of Software Elements along with licensing details.		
Brochures and specifications for Audio systems.		
Brochures and specifications for UPS system with 30 minutes backup.		
Engineering drawing (plan, elevation and sectional views wherever necessary for viewer's gallery and image servers from in pdf and Auto CAD file format), complete solution diagram, connectivity diagram, system deployment and foot print detail, electrical power requirement and location marked diagram/drawings, system cooling requirement (in BTU) with proper layout drawings.		
Detailed write-up and specific system solution document explaining the integrated working of offered solution with the hardware and software describing various technical, interface and performance aspects, writing / network diagram of the proposed solution. This has to explain how the proposed design or solution meets to specifications and overall requirements as mentioned in the tender document.		
Schematic diagram and broad material specifications of the structure for mounting the projectors showing suggested location of the projectors including arrangement for accessibility to the projectors for maintenance.		
Details and product catalogues of acoustic treatment of inner surface of concrete dome and acoustic panelling below the aluminium dome inside the theatre proposed and with relevant drawings, material specifications etc.		
Details and product catalogues of LED Cove light, exit signage and emergency exit signage.		
Details regarding source of content development for planetarium shows using datasets/ library of 3D models/cloud assets.		

1.3 Write ups related to design

Table 2.1

Detailed Description	Compliance (Yes/No)	Reason for deviation, if any, with complete justification
Document on design techniques highlighting how Fulldome Digital 2D immersive projection system will be met by the offered solution using the proposed sub-systems. Detailed write-up of functional role of each sub system solution shall be described.		

Training Topics on FULLDOME PROJECTION SYSTEM

Table 3.0

Sl. No.	Detailed Description	Compliance (Yes/No)	Reason for deviation, if any, with complete justification
1.	Architecture of FULLDOME PROJECTION SYSTEM		
2.	Hardware components of FULLDOME PROJECTION SYSTEM (Projectors, screen, controller, image servers, network elements, storage etc.)		
3.	FULLDOME PROJECTION SYSTEM Administration: Hardware and Software Installation, Configuration, Trouble-shooting and Maintenance procedure including preventive maintenance.		
4.	Alignment and Calibration with usage of instrument and tools		
5.	Field replaceable components and applicable procedures for field repalcement		
6.	Special features of the show control software		
7.	FAQs		

4.0 Delivery Schedule

Time Schedule	Compliance (Yes/No)	Reason for deviation, if any, with complete justification
Time entire work shall be completed within 12 (Twelve) months from the date of placement of order or opening of Letter of Credit.		

5.0 Warranty and AMC:

Time Schedule	Compliance (Yes/No)	Reason for deviation, if any, with complete justification
The Onsite comprehensive Warranty period is for five years from the date of issue of acceptance certificate by CMD		
The comprehensive annual maintenance contract will be for a period of two years, after expiry of the warranty period for all components of the system except chairs for which warranty will be 2 years from the date of issue of acceptance certificate by CMD.		

6.0 Operation of 2D Fulldome planetarium and film shows:

Time Schedule	Compliance (Yes/No)	Reason for deviation, if any, with complete justification
Operation of full dome shows from 10:30 a.m to 6:30 p.m for the visitors of Science City, Agartala, Tripura. This timing may vary during the peak season. The show shall remain operational for 270 days in a year (and 271 days in a leap year).		

Annexure-E

Past Experience in supply, installation, testing and commissioning for an integrated functional full dome digital 2D immersive projection system.

Agency Experience (Limited Company/Corporation/Agency/Consortium/JV Projects)

Sl. No.	Name of the project	Value of the order executed in INR (*)	Name of the Client	Phone no of Contact Person of Client	Starting Date of Project	Completion Date of Project	Details/Scope of work

Note: In case order is awarded in foreign currency then conversion rate on the date of placement of order may be taken for converting in INR value.

Annexure-F

FORMAT FOR ANNUAL TURNOVER AS PER THE AUDITED ACCOUNTS

TOWARDS THE QUALIFYING EXPERIENCE

Sl. No.	Financial Year	Turnover in Indian Rupees (INR)
1.	2020-21	
2.	2019-20	
3.	2018-19	
4.	2017-18	
5.	2016-17	

(In case of Consortium, the Turnover of only lead partner needs to be mentioned)

_____

(Signature of Authorised Signatory)

Signature, Address, Seal & Membership No. of Chartered Accountant.

Annexure-G

PROFORMA FOR ISSUING "UNDERTAKING BY ORIGINAL SYSTEM INTEGRATOR (To be submitted on OEM's Letterhead)

Dated:

To
Creative Museum Designers
33, Block-GN, Sector-V, Bidhannagar, Kolkata – 700 091

Dear Sir,

We,_____hereby state that the product offered vide this tender by our authorized agent, M/s._____ and to be supplied if found suitable and selected shall be our original equipment and is to be deemed as if the supply has been made by us directly.

Accordingly, we stand by all the terms, conditions and stipulations as defined in the **CMD 007.12.59(Works)/23-24/04 of** Creative Museum Designers.

We also undertake to directly make good of any shortcomings either in product quality and/or in services which my/our authorized agent may fail to fulfil as a part of his obligations under the terms & conditions of this tender.

Thanking you,

Yours faithfully,

(Authorised Signatory with Seal)

Annexure - H

PART A:

Sl. No.	Description	Quantity	Rate	Currency	Amount	Applicable Taxes (with break-up)	Total Amount
1.1	Supply of 12 meter aluminium Projection Dome	1					
1.2	Installation of projection dome including associated civil work/ structures and including cost of scaffolding, labour etc.						
2.1	Supply of Projectors (without lens)	2					
2.2	Supply of customised Projector lenses	2					
2.3	Installation, testing and commissioning of projectors with geometric correction and image blending for seamless projection						
3.1	Supply of Image Generator Server networked with Image generator workstations.						
3.2	Installation, testing and Commissioning of Image Generator Server networked with Image generator workstations.						
4.	SITC Interactive planetarium and Fulldome configurator and playback software						
5.	SITC of Show control system						
6.	SITC of Automatic Calibration and alignment system						

7.	**SITC of Integrated 5.1 surround sound system (to be quoted in INR only)**			**INR**			
8.	**SITC of 20 KVA U.P.S. system with 30 minute backup including electrical panel for distribution of power to the installed equipment (to be quoted in INR only)**			**INR**			
9.	**SITC of LED Cove light, staircase lighting, step lights, exit and emergency exit signage etc. (to be quoted in INR only)**			**INR**			
10.	**Training on FULL DOME PROJECTION SYSTEM and its operation & development of shows**						
11.	**Any other items of work/equipment etc. not covered above, under Sl. NO. 1 to 10 but required as per scope of work provided.** *(add additional rows as may be required)*						
12.	**Planetarium Full dome licenced Show in English and Bengali for 3 years (Film title : Voyager: The Never-Ending Journey)((to be quoted in INR only)**	**1**		**INR**			
13.	**a) Comprehensive AMC for 1st year after comprehensive warranty of 5 years. (rate only to be quoted in INR only)** **b) Comprehensive AMC for 2nd year after comprehensive**			**INR**			

	warranty of 5 years. (rate only to be quoted in INR only)						
14.	**Operation for 5 years** **(to be quoted in INR only)**	**1st Year**		**INR**			
		2nd Year		**INR**			
		3rd Year		**INR**			
		4th Year		**INR**			
		5th Year		**INR**			
15.	**Fabrication, Supply, Installation, Testing and Comissioning of Reclining chairs as per approved specifications provided in Section II of Annexure B. (to be quoted in INR only)**			**INR**			

PART B (To be quoted in INR only)							**Annexure-H**
Insulation Job							
1	Painting in the inner surface of the outer concrete dome with water proof paint.	400 sqm	Make:Asian/ Berger/ICI.				
2	Installation of 40 mm thick mineral wool fibre, 48 kg/cu-m density with aluminium vapour barrier in the inner surface of the outer concrete dome.	400 sqm	Make: UP Twiga				
3	Installation of 40 mm thick, 48 kg/cu-m rockwool resin bonded fibre on top of mineral wool in the inner surface of the outer concrete dome.	400 sqm	Make: UP Twiga				
4	Installation of acoustic non woven black tissue as	400 sqm	Make: UP Twiga				

	covering layer for insulations in the inner surface of the outer concrete dome.						
Special Steel Work – Gallery, Projector Stand etc. (The agency has to provide detailed drawings)							
5	Special steel work , using standard MS plates and Standard MS sections for dome chain fixing, studs and inserts to be fastened to concrete using high strength fasteners.	0.3T	Make of MS section: Tata. Make of fasteners: Hilti				
6	Special steel work for Seating Gallery , using standard tubular Steel Sections (Tata Structura) , Rectangular Hollow Sections (RHS) & Square Hollow Sections (SHS) in Stepped Gallery Structure including sockets, base plates, stiffeners, bolts and HS fastener bolts. All steel work to be welded as per instruction and design.(Butt weld, plug weld and chain weld etc.) The whole to be painted with two coats of red lead paint after due cleaning,	8T	Make : Tata Structura				

	grinding etc. as per design						
7	i) RHS 80x40x4 and SHS 40x40x4 for Gallery Sloped members, including plate sockets and bolts as per the schematic design attached.		Make : Tata Structura				
8	ii) RHS 80x40x4 for Stepped Gallery Upper members: Chords & Radials including plate sockets and bolts as per the schematic design attached.		Make : Tata Structura				
9	iii) RHS 80x40x4 & SHS 40x40x4 for Gallery Upper Main and Secondary members including plate sockets and bolts as as per the schematic design attached.		Make : Tata Structura				
10	ii) Stand alone Table Type Projector Stands using SHS sections 50x50x3.6 with MS sockets (6mm) and fixing plate , grouted/fixed to the floor with 8mm fastener anchor bolts (75 long), Hilti. Agency to provide with the detailed drawings.	0.2 T	Make : Tata Structura				

Flooring Work							
11	IPS flooring of required thickness for the entire planetarium theatre including technical corridor to achieve +0.00 using non metallic hardener matching existing finish in Hall.	180sqm					
12	Block board work in platforms and risers of 38 mm thick (Stepped Gallery) using 2 X 19 mm Block boards (Marine Grade BWP) and fixing with self threading fastener screws to steel members below (at places over IPS) .All complete with two coats of wood primer and anti termite treatment.	140sqm	Make: Century/ Green				
13	High grade Sal Wood / or similar hardwood nosing along gallery steps and stage edge , all complete with rounding etc.. The whole to be finished with two coats of wood primer and anti termite treatment..	0.23sqm					

14	Finishing Hall and stepped galleries with loop piled carpet at least 6mm thick, 590 GSM over an underlay of 8mm Kinny foam. The whole to be fixed as per manufacturers norms including anodised aluminium channels for edges.	140sqm	Colour: Deep Blue or Deep Grey.				
Panelling, Woodwork & False Ceiling							
15	Custom made Projector Enclosures using Plywood (19 MM, BWP marine grade) with insulation treatment in Walls & Ceiling using gypsum or modular insulation panels.	2 numbers	Make: Century/ Green				
16	Projection gallery wall finish with Perforated Coated aluminium Panels (of minimum 01 mm thickness) with acoustic insulation backing or modular wood panels (of minimum 25 mm thickness) achieving 0.6-0.8 NRC, having horizontal slits of varied	80sqm	Make of modular section : Hunter Douglas/ Armstrong				

	widths and gaps. The whole to be fixed snap fittings/ channels with necessary screws etc..The panels shall have resilient mountings. Use Kinney foam backing at fasteners. Alternatively use Rubberwood Slats with varied slit openings.						
17	Wooden flush Door Panel (with 20mm ply , 60mm thick door frame) in front of Projector opening and at Technical corridor using High grade Sal wood Frame and finishing front with Perforated Coated aluminium Panels (of minimum 01 mm thickness) with acoustic insulation backing or modular wood panels (of minimum 25 mm thickness) achieving 0.6-0.8 NRC, having horizontal slits of varied widths and gaps. The whole to be fixed snap fittings/	2 nos	Make of projector opening cover glass : Schott glasses (anti reflective glass) Make of modular section: Hunter Douglas/ Armstrong				

	channels with necessary screws etc.. The doors to have projector openings with special glass and finished with all hardware (locks etc) and staining. High grade Sal frame to be lined with foam. Door locations markings to be provided by the agency. Use Kinney foam backing at fasteners. Alternatively use Rubberwood Slats with varied slit openings.						
18	Supplying and fixing of Commercial Grade Flush doors 35mm thick for entry to Projection Gallery space , all finished with quality 1mm thick matt finished laminate of approved colour on both sides and TW lipping all round,13 Nos , size 1000x2100 . All complete with quality hardware.	13	Make: Century / Green				
19	Supplying and fixing of Gypsum board						

	False ceiling for Projector Enclosures, Theatre entries and Server Room over a standard GI framework, all complete with taping hanging fasteners etc.. All as per Design and detailed drawings. Drawings to be provided by the agency.	Approximate: 100 sqm	Make: Armstrong				
Server Room							
20	Server Room Wall and ceiling Acoustical insulation using 50 mm thick with polysynth insulation covered with plastic net of 1-2 mm openings and final cover with black tissue. Resilient fixing. Design to be provided by the agency.	Approximate: 10sqm	Make: Good quality brands				
21	Finishing of Server with Anti-static flooring	10sqm	Make: Good quality brands				
22	Laying of cable tray and connecting to Mains, Console & Projectors - all complete.	LOT					
23	3mm thick Vinyl Flooring in the entire technical corridor	70sqm	Make: Good quality brands				

Projector Room							
24	Gypsum false ceiling, and insulation using 12 mm modular Gypsum panels. Enclosure walls using 19 mm ply board (marine grade, BWP) with entrance and exit on both sides. All walls to be insulated with polysynth insulation.	Approximate 05sqm	Make of ply board: Century/ Green.				
25	Finishing Projection Room with Anti-static flooring	2sqm	Make: Good quality brands				
26	Wall and ceiling Acoustical insulation using 50 mm thick with polysynth insulation covered with plastic net of 1-2 mm openings and final cover with black tissue. Resilient fixing. Design to be provided by the agency	Approximate: 05sqm	Make: Good quality brands				
Electrical Works							
27	Total electrification work in Server Dome Room with conductors, conduits , switches, receptacles, DBs etc.. Detailed drawings to be provided by the agency.	LOT	Make of wire : Polycab/ Anchor/ Finolex Make of DB and receptacles: Legrand				

28	LED lighting and fixtures for all technical corridors, projector room, server room, annular space behind dome, and above catwalk level. .	LOT	Make: Philips				

IMPORTANT NOTES:

1. The bidders shall along with Annexure H (Part A) submit in their letterhead a detailed list of deliverables along with cost break-up of each item, break-up of taxes considered while arriving at the gross value of each item as per the following format:

S. No.	Description	Quantity/Unit cost as may be applicable	Rate	Amount	Applicable Taxes (with break-up)	Total

2. **For deciding the L1 bidder, the following costs only shall be considered:**
   a. **SITC of Planetarium system including projection dome,cove lights etc.**
   b. **SITC of UPS system**
   c. **Civil, Electrical, Acoustics and Interior including chairs etc.**
   d. **4K 2D Digital Licensce Film for three years (Voyager: The Never-Ending Journey)**
   e. **Operation of planetarium system for 5 years.**

3. **The order for operation of Planetarium systems for five years on year to year basis will be placed by Science City, Agartala separately after SITC of the complete planetarium system.**
4. **The order for Comprehensive AMC for 2 years after the warranty period of 5 years may be placed by Science City, Agartala separately based on the rate quoted.**

5. The bidders shall consider the prevailing tax rates while quoting the rates. However, in the event of any changes in the statutory taxes and duties, the rates applicable at the time of payment shall be made by CMD against submission of supporting documentary evidence.
6. The total cost provided in the cost breakup sheet should exactly match with total cost quoted in the financial bid.
7. In case there is discrepancy in the cost breakup sheet and the cost quoted in the financial bid, the cost quoted in the financial bid will prevail.

8. **Rate / information of the following items may also be provided (This will not be considered for evaluation the Financial Bid).**

S. No.	Item Description	Licence fee for one year's lease	Licence fee for five years lease	Licence fee for perpetual lease
1.	**List of available 2D Fulldome shows with time duration of each of topics related to science, technology, environment etc. suitable for screening after completion of this facility with charges for yearly/5 yearly/perpetual lease.**			
	a) 2D Fulldome Planetarium shows			
	b) 2D Fulldome shows			
2.	**Shelf-life time of the Digital immersive Fulldome 2D projection system (i.e. up to which period technical support as well as spare parts including consumables shall be available with the firm).**			
3.	**Bengali translation and voice over for the free Fulldome planetarium and astronomy shows (per show)**			

1.7 Complete Planetarium Full dome as well as Astronomy Sky Shows of 30 to 35 minutes duration in English and Bengali Language.

1. One Licensed digital 4K 2D fulldome film (**Film title : Voyager: The Never-Ending Journey**) show in English and Bengali of about 30 minutes duration is to be supplied, encoded and tested for satisfactory projection.

2. The above show should be provided with three year licence for projection.

3. At least 8 Free shows available from international producers like NASA/ESO/ESA etc. of which at least two shows should be in Bengali.

Note:

i. Necessary scripts and original sound tracks must be supplied.
ii. The shows should be of around 25-35 minutes duration.
iii. The selected vendors should provide list of all latest available shows in DVDs or other information storages from which CMD will select above shows.

Annexure – J

FORMAT FOR CONTRACT AGREEMENT

ARTICLES OF AGREEMENT made at …….this ……..day of …….

between the Creative Museum Designers, (a Company incorporated as Section 8 Company under Companies Act, 2013 erstwhile Section 25 Company of the Companies Act, 1956) and a wholly owned Company of National Council of Science Museums (a Society registered under the societies Registration Act of West Bengal 1961) hereinafter referred to as the CMD, which expression shall include its successors and assigns on the one part and ……
……..(Name of the successful e-tenderer) trading in the name and style of ……

(Name and complete address of the successful e-tenderer)

hereinafter referred to as the successful e-tenderer which expression shall include his/their respective heirs, executors, administrators and assigns on the other part.

WHEREAS the CMD is desirous of getting the work of
…….. therein done and has caused.

(Name of the work)

Notice Inviting Tender (Including appendix), drawings, schedule of quantities and specifications describing the work and conditions of contract.

AND WHEREAS the said NIT (including appendix), specifications, and the period schedule of quantities and conditions of contract have been signed by or on behalf of the parties hereto. AND whereas the Successful tenderer has deposited in Bank Draft/Pay Order/NEFT/RTGS

……

(Exact amount in words)

The amount being……. Of the ordered value of the tender) with Company as Security Deposit for the due performance of this Agreement as provided in the said conditions.

NOT IT IS HEREBY AGREED AND DECLARED BY AND BETWEEN THE PARTIES HERETO AS FOLLOWS:

1. In consideration of the payments to be made to him as hereinafter provided the successful tenderer shall upon and subject to the conditions herein contained execute and complete the work within ……. Months from the date of issue of letter of intent / Work Order (as defined in the scope of work of the NIT) as described in the said specifications and the said priced schedule of quantities along with the progress of the work.
2. The Company shall pay to the successful tenderer such sum as shall become payable hereunder at the time and in the manner specified in the said conditions.
3. Time is the essence of this agreement and the successful tenderer shall proceed with the work, throughout the stipulated period of this contract, strictly according to the Terms & Conditions of NIT. At any stage during execution, if any work legs behind the target as indicated in the BAR CHART for reasons directly attributable to the successful

tenderer, he shall pay or allow the Company to deduct the same from the Security Deposit or from any money due to him a liquidated damage as per Clause…….

4. This agreement comprises the work above and all subsidiary work connected therewith, even though such works may not be shown on the drawings, or described in the said specifications or the period Scheduled of Quantities.
5. The Company through the Engineer reserves to itself the right of altering the specifications and of adding to or omitting any item of work or of having portions of the same carried out departmentally or otherwise and such alterations or variations shall not vitiate this agreement.
6. After successfully completion of works in all respect, successful tenderer will hand over all the materials including equipment and machinery, brochures, drawings etc. to the end-user Science City, Agartala, Tripura in presence of CMD representative and shall also render all service such as operations & maintenance of the systems, provide warranty of the equipment, machinery etc. at the finalized rates, terms & conditions of the tender documents.
7. All disputes and differences of any kind whatever, arising out of or in connection with the contract on the carrying out of works (Whether during the progress of the wok or after their completion and whether before or after the determination, abandonment or breach of contract) shall be referred to arbitration as per Clause …… of Annexure- …. Of the said conditions of contract. In case of any legal dispute, other than the arbitration, the court of jurisdiction shall be at the place written in the first line of this agreement.

   The provisions of the Arbitration & Reconciliation Act, 1996 or any statutory modification or re-enactment thereof and of the rules made there under for the time being in force shall apply to arbitration proceedings under this clause.

   In witness whereof, the parties have set their respective hands the day and the year and the place herein above.

   Signed by for and on behalf of the Company ……..

   In presence of

   1. …….

   Seal

   2. …….

   Signed by the said Successful Tenderer ……

   In presence of

   1……

   Seal

   2……

Annexure – K

(To be typed on official letterhead duly signed with official stamp)

BID-SECURING DECLARATION

TENDER No. CMD 007.12.59(Works)/23-24/04

Date: _____

We, the undersigned, declare that:

We understand that, according to your conditions, bids must be supported by a Bid-Securing Declaration.

We accept that we will automatically be suspended from being eligible for bidding in any contract with the CMD or its units for the period of time of 3**years** starting on …….., 2023 if we are in breach of our obligation(s) under the bid conditions, because we:

(a) Have withdrawn our Bid during the period of bid validity specified in the Letter of Bid; or
(b) Having been notified of the acceptance of our Bid by the CMD during the period of bid validity, (i) fail or refuse to execute the Contract, if required, or (ii) fail or refuse to furnish the Performance Security, in accordance with Instructions to Bidders.

We understand this Bid-Security Declaration shall expire if we are not the successful Bidder, upon the earlier (i) our receipt of your notification to us of the name of the successful Bidder; or (ii) Twenty-eight days after the expiration of our Bid.

Signed: [Signature & Seal of the bidder]

Name: [Insert complete name of person signing the Bid-Securing Declaration] Duly authorized to sign the bid for an on behalf of: [Insert complete name of Bidder] Dated on _____day of _____[insert date and signing] Corporate Seal (where appropriate)

[Note: In case of Joint Venture, the Bid-Securing Declaration must be in the name of all partners to the Joint Venture that submits the bid.]

Scope of civil, electrical related works (for the interior of the dome theatre)

Sl. No.	Description of Job	Approximate Area/Qty	Remarks
Insulation Job			
1	Painting in the inner surface of the outer concrete dome with water proof paint.	400 sqm	Make:Asian/ Berger/ICI .
2	Installation of 40 mm thick mineral wool fibre, 48 kg/cu-m density with aluminium vapour barrier in the inner surface of the outer concrete dome.	400 sqm	Make: UP Twiga
3	Installation of 40 mm thick, 48 kg/cu-m rockwool resin bonded fibre on top of mineral wool in the inner surface of the outer concrete dome.	400 sqm	Make: UP Twiga
4	Installation of acoustic non woven black tissue as covering layer for insulations in the inner surface of the outer concrete dome.	400 sqm	Make: UP Twiga
Special Steel Work – Gallery, Projector Stand etc. (The agency has to provide detailed drawings)			
5	Special steel work , using standard MS plates and Standard MS sections for dome chain fixing, studs and inserts to be fastened to concrete using high strength fasteners.	0.3T	Make of MS section: Tata. Make of fasteners: Hilti
6	Special steel work for Seating Gallery , using standard tubular Steel Sections (Tata Structura) , Rectangular Hollow Sections (RHS) & Square Hollow Sections (SHS) in Stepped Gallery Structure including sockets, base plates, stiffeners, bolts and HS fastener bolts. All steel work to be welded as per instruction and design.(Butt weld, plug weld and chain weld etc.) The whole to be painted with two coats of red lead paint after due cleaning, grinding etc. as per design	8T	Make : Tata Structura
7	i) RHS 80x40x4 and SHS 40x40x4 for Gallery Sloped members, including plate sockets and bolts as per the schematic design attached.		Make : Tata Structura
8	ii) RHS 80x40x4 for Stepped Gallery Upper members: Chords & Radials including plate sockets and bolts as per the schematic design attached.		Make : Tata Structura

9	iii) RHS 80x40x4 & SHS 40x40x4 for Gallery Upper Main and Secondary members including plate sockets and bolts as as per the schematic design attached.		Make : Tata Structura
10	ii) Stand alone Table Type Projector Stands using SHS sections 50x50x3.6 with MS sockets (6mm) and fixing plate , grouted/fixed to the floor with 8mm fastener anchor bolts (75 long), Hilti. Agency to provide with the detailed drawings.	0.2 T	Make : Tata Structura
Flooring Work			
11	IPS flooring of required thickness for the entire planetarium theatre including technical corridor to achieve +0.00 using non metallic hardener matching existing finish in Hall.	180sqm	
12	Block board work in platforms and risers of 38 mm thick (Stepped Gallery) using 2 X 19 mm Block boards (Marine Grade BWP) and fixing with self threading fastener screws to steel members below (at places over IPS) .All complete with two coats of wood primer and anti termite treatment.	140sqm	Make: Century/ Green
13	High grade Sal Wood / or similar hardwood nosing along gallery steps and stage edge , all complete with rounding etc.. The whole to be finished with two coats of wood primer and anti termite treatment..	0.23sqm	
14	Finishing Hall and stepped galleries with loop piled carpet at least 6mm thick, 590 GSM over an underlay of 8mm Kinny foam. The whole to be fixed as per manufacturers norms including anodised aluminium channels for edges.	140sqm	Colour: Deep Blue or Deep Grey.
Panelling, Woodwork & False Ceiling			
15	Custom made Projector Enclosures using Plywood (19 MM, BWP marine grade) with insulation treatment in Walls & Ceiling using gypsum or modular insulation panels.	2 numbers	Make: Century/ Green
16	Projection gallery wall finish with Perforated Coated aluminium Panels (of minimum 01 mm thickness) with acoustic insulation backing or modular wood panels (of minimum 25 mm thickness) achieving 0.6-0.8 NRC, having horizontal slits of varied widths and gaps. The whole to be fixed snap	80sqm	Make of modular section : Hunter Douglas/ Armstrong

	fittings/ channels with necessary screws etc..The panels shall have resilient mountings. Use Kinney foam backing at fasteners. Alternatively use Rubberwood Slats with varied slit openings.		
17	Wooden flush Door Panel (with 20mm ply , 60mm thick door frame) in front of Projector opening and at Technical corridor using High grade Sal wood Frame and finishing front with Perforated Coated aluminium Panels (of minimum 01 mm thickness) with acoustic insulation backing or modular wood panels (of minimum 25 mm thickness) achieving 0.6-0.8 NRC, having horizontal slits of varied widths and gaps. The whole to be fixed snap fittings/ channels with necessary screws etc.. The doors to have projector openings with special glass and finished with all hardware (locks etc) and staining. High grade Sal frame to be lined with foam. Door locations markings to be provided by the agency. Use Kinney foam backing at fasteners. Alternatively use Rubberwood Slats with varied slit openings.	2 nos	Make of projector opening cover glass : Schott glasses (anti reflective glass) Make of modular section: Hunter Douglas/ Armstrong
18	Supplying and fixing of Commercial Grade Flush doors 35mm thick for entry to Projection Gallery space , all finished with quality 1mm thick matt finished laminate of approved colour on both sides and TW lipping all round,13 Nos , size 1000x2100 . All complete with quality hardware.	13	Make: Century / Green
19	Supplying and fixing of Gypsum board False ceiling for Projector Enclosures, Theatre entries and Server Room over a standard GI framework, all complete with taping hanging fasteners etc.. All as per Design and detailed drawings. Drawings to be provided by the agency.	Approximate: 100 sqm	Make: Armstrong
Server Room			
20	Server Room Wall and ceiling Acoustical insulation using 50 mm thick with polysynth insulation covered with plastic net of 1-2 mm openings and final cover with black tissue. Resilient fixing. Design to be provided by the agency.	Approximate: 10sqm	Make: Good quality brands
21	Finishing of Server with Anti-static flooring	10sqm	Make: Good quality brands

22	Laying of cable tray and connecting to Mains, Console & Projectors -all complete.	LOT	
23	3mm thick Vinyl Flooring in the entire technical corridor	70sqm	Make: Good quality brands
Projector Room			
24	Gypsum false ceiling, and insulation using 12 mm modular Gypsum panels. Enclosure walls using 19 mm ply board (marine grade, BWP) with entrance and exit on both sides. All walls to be insulated with polysynth insulation.	Approximate 05sqm	Make of ply board: Century/ Green.
25	Finishing Projection Room with Anti-static flooring	2sqm	Make: Good quality brands
26	Wall and ceiling Acoustical insulation using 50 mm thick with polysynth insulation covered with plastic net of 1-2 mm openings and final cover with black tissue. Resilient fixing. Design to be provided by the agency	Approximate: 05sqm	Make: Good quality brands
Electrical Works			
27	Total electrification work in Server Dome Room with conductors, conduits , switches, receptacles, DBs etc.. Detailed drawings to be provided by the agency.	LOT	Make of wire : Polycab/ Anchor/ Finolex Make of DB and receptacles: Legrand
28	LED lighting and fixtures for all technical corridors, projector room, server room, annular space behind dome, and above catwalk level. .	LOT	Make: Philips

Note:

a) ***Agency need to set out grid lines at + 0.0 dead level namely at raw concrete with piano wire on existing Hall floor with markers as per details to establish central point and the cardinals. Main Radials as per setting out drawing with coordinates and as per the theatre designs.***

b) ***Same as above for Main Arc lines on floor plane ± 0.0 level for fixing gallery supports.***

c) ***Agency need to set Dead level cement screed / IPS floor marker outlining circular back wall lines. Prepare perfect level for setting up the new vertical back wall structure.***

Annexure- C

Creative Museum Designers

(A Section 8 Company Guaranteed by National Council of Science Museums)
Govt. of India
33, Block – GN, Sector-V, Bidhannagar,
Kolkata-700 091

Tender No. CMD 007.12.59(Works)/23-24/04

OFFER FORM (FINANCIAL BID)

TENDER FOR SUPPLY, INSTALLATION, INTEGRATION, TESTING AND COMMISSIONING OF HARDWARE AND SOFTWARE PACKAGES, ALUMINIUM DOME SCREEN, INTERFACES, TOOLS AND / OR DRIVERS OF A COMPLETE AND FULLY INTEGRATED FUNCTIONAL FULLDOME DIGITAL 2D IMMERSIVE PLANETARIUM PROJECTION SYSTEM (12 MTR DIAMETER) INCLUDING ONSITE COMPREHENSIVE WARRANTY FOR FIVE YEARS, POST WARRANTY COMPREHENSIVE MAINTENANCE FOR TWO YEARS AND OPERATION FOR A PERIOD OF SEVEN YEARS.

We hereby offer our rates for the above tender as per following details: -

01. Name of the tenderer :

02. Mailing address of the tenderer :

including PIN/ZIP Code

03. Communication details like :

Telephone numbers(s) :

Fax number(s) :

E-mail address :

Website address :

04. Name and address of the Banker and their address with ABA Routine Number and Swift Code Number :

PRICE BID

Sl.	Description of Work	Units	Quantity	Name of the Currency	Quoted Rate in foreign currency	Quoted Rate in INR
1A	Supply, Installation, Integration, Testing and Commissioning of hardware and software packages, interfaces, tools and / or drivers of a complete and fully integrated functional Full dome digital 2D immersive Planetarium projection system (12 mtr. diameter) including onsite comprehensive warranty for five years and training on planetarium system, its operation & development of shows.		Whole JOB			
1B	Supply, Installation, Integration, Testing and Commissioning of 20 KVA UPS with battery bank. **(Must be quoted in INR)**		1 SET	INR		
1C	Supply and fixing of LED Cove light inside theatre as per Section II of NIT. **(Must be quoted in INR)**		1 SET	INR		
1D	Supply and installation of 5.1 audio system inside the theatre as per Section II of NIT. **(Must be quoted in INR)**		1 SET	INR		
2	Supply, Installation, Integration, Testing and Commissioning of 12 meter Aluminium Dome as per the approved specification provided in Section II of NIT.		1 SET			
3	All Civil and Electrical Works (Planetarium interior works)as per the Annexure- L (Separate price breakup in Annexure-H as per the BOQ to be provided, **Must be quoted in INR**)		Whole JOB	INR		
4	Fabrication, supply, Installation, Testing and Commissioning of Reclining chairs as per the approved specification provided in Section II of Annexure B of tender document (100+5 Spares). **(Must be quoted in INR)**		105	INR		
5	Supply of Licensed film for 3 year (**Film title : Voyager: The Never-Ending Journey** , **Must be quoted in INR**)		1 no	INR		
6	Operation of Planetarium for five Years after successful commissioning of the entire system. **(Must be quoted in INR)**		Whole JOB	INR		
7	Comprehensive AMC for 02 Years on Sl. No. 1A, 1B,1C. 1D and 2 after completion of 5 years comprehensive warranty **(Rate only, Must be quoted in INR) (Value will not be considered for selection of L1 bidder.)**		Whole JOB	INR		

Note: The final bid value will be arrived at by converting to INR based on the currency conversion rate on the date of opening of the financial bid.
Cost break up to be provided in Annexure-H

05.	Machine Self-life time (i.e. up to which period technical support as well as spare parts including consumables shall be available with the firm).	:	
06.	Payment terms(all payments shall be made only through bank against irrevocable Letter of Credit).	:	
07.	Delivery Schedule	:	
08.	Validity of the offer for acceptance (minimum 180 days from the date of financial bid opening may be offered for acceptance).	:	

The above rates quoted by us for supply of the tendered items are strictly in accordance with our specifications mentioned in the "Technical & Commercial Bid Document". Deviation, if any, will make the tender/offer liable to be considered invalid.

_____

Signature of the Tenderer/Constituted Attorney with Official Seal

Date: