NATIONAL COUNCIL OF SCIENCE MUSEUMS

SECTOR-V, BLOCK-GN, BIDHANNAGAR,

KOLKATA : 700 091.

NOTICE INVITING E-TENDER

TENDER NO. I-18012/7/16(75)

On-line Digitally signed e-tenders are invited in two Bids System from the manufacturers or their authorized registered Indian agents for Supply, Installation and Commissioning of Digital Planetarium System at site (Nagaland Science Centre, Dimapur, Nagaland, INDIA) and various other upcoming Centers in India for projection on 8 meter vertical (not tilted) dome. The integrated planetarium system includes full dome projection system, show control server computer, computer for operator’s interface, planetarium software with at least eight full dome shows, cove light and cove light control mechanism, 5.1 Dolby digital surround system etc. complete in all respects as per Council’s specification. The equipment supply shall also include training of personnel in operation and routine/preventive maintenance, Service Manual, full documentation etc. Only reputed manufacturers or their authorized registered Indian agents having proven experience and capability to render after Sales Service in India at site smoothly may download the tender documents from the Central Public Procurement Portal (CPPP): <http://eprocure.gov.in/eprocure/app> or from the Council’s website[www.ncsm.gov.in](http://www.ncsm.gov.in/) as per the following schedule :-

|  |  |
| --- | --- |
| Bid Document Published Date  | June 22, 2016 (As per portal time)  |
| Bid Document Download Start Date  | June 22, 2016 (As per portal time)  |
| Bid Document Download End Date | July 22, 2016 (As per portal time)  |
| Bid Submission Start Date  | June 23, 2016 (As per portal time.) |
| Bid Submission End Date  | July 22, 2016 (As per portal time) |
| Technical (Techno-Commercial) Bid Opening Date  | July 23, 2016 (at 11 a.m.) |
| Financial Bid opening date | July 29, 2016 (at 1 p.m.) |

The online bid both Technical (Techno-Commercial) Bid and Financial bid duly furnished in Cover –I and Cover-II respectively should be uploaded by the due date and time as per the above schedule. The responsibility to ensure the same lies with the Bidder. Off-line tenders shall not be accepted and no request in this regard will be entertained whatsoever. Online Technical (Techno-Commercial) Bid will be opened at the first instance in this office at 11 a.m. on July 23, 2016 for technical evaluation as well as selection of techno-commercially acceptable offers and at the second stage, the Financial Bids of only the selected and techno-commercially acceptable equipment/offers will be opened at 1 pm on July 29, 2016. Decision of the Council regarding selection of eligible and qualified vendors/firms and or equipment in particular for opening the Financial Bid shall be final and binding on the bidders. Bidders may be present during opening of tenders.

It is intended to purchase the above equipment directly from the manufacturer without involving any agent or payment of any agency commission. Authorized Registered Indian Agents of foreign manufacturers who are capable to render after Sales Service (in case foreign manufacturers do not quote any rate to the actual users), shall submit copy of Agency Agreement with foreign manufacturer along with the tender and in such case no agency commission shall be paid by the Council in foreign currency.

NCSM reserves the right to accept or reject any or all tenders in full or part without assigning any reason

 whatsoever. NCSM shall also not be bound to accept merely the lowest tender but the technical suitability,

capability and superiority of the equipment/system as well as after sales service including infrastructure to

render such service etc. shall be of prime consideration for selection of the equipment/system.

# General Information and Instructions

1. The instruction given herein will be strictly binding on the tenderers and deviation, if any will make the tender or tenders liable to be considered invalid. Tenders incorporating additional conditions by the tenderer are liable for rejection.
2. Bids shall be submitted online only at CPPP website: <https://eprocure.gov.in/eprocure/app> Manual bids shall not be accepted.
3. The instruction given in **“Annexure-A” for “Instruction for Online Bid Submission”** should be strictly followed during submission of the Bid.
4. Bid documents may be scanned with 100 dpi with black and white option which helps in reducing size of the scanned document.
5. An agent of foreign OEM, for submitting the offer on behalf of OEM, would be required to produce a copy of their legal agency agreement with their principal and a copy of registration/enlistment with DGS&D as an Indian agent, if registered/enlisted, failing which their bid would be disqualified.
6. **Validity of Bids**: The Bids should remain valid for 180 days from the date of Financial bid opening.
7. **Rejection of Bids:** Canvassing by the Bidder in any form, unsolicited letter and post-tender correction may invoke summary rejection. Conditional tenders will be rejected. Non-compliance of applicable General Information and Instruction will disqualify the Bid.
8. The tenderers should have Digital Signature Certificate (DSC) for filling up the Bids. The person signing the tender documents should be authorized for submitting the on line e-tender.
9. The Tenderers shall fill up the Prescribed Format for submission of **Technical (Techno- commercial) Bid as per “Annexure-B”** format duly signed by the authorized signatory. The person signing the tender document should be authorised for submitting the online e-tender.
10. The Financial Bid shall be filled in and signed by the authorized signatory online as per Proforma **“Annexure-C”** available at Central Public Procurement Portal e-tender system website <http://eprocure.gov.in/eprocure/app>. Off line Financial Bid shall not be accepted.
11. **Tender must be uploaded in two separates covers marked Cover-1 (Technical Bid) and Cover-2 (Financial Bid/BOQ).The contents of Cover-1 and Cover-2 shall be as follows:-**

**Cover-1**

**Technical Bid (as per Annexure-B format) shall be duly filled in and digitally signed and thereafter uploaded online by the bidder in Cover-1 along with the self attested and stamped scanned copies of the following documents:-**

1. **Prescribed Undertaking by the Original Planetarium Integrator (OPSI) as per “Annexure-D” format.**
2. **The Technical Brochures of each equipment with technical explanation for every features of**

 **the product offered by the tenderers.**

1. **All relevant documents related to Technical (Techno-commercial) Bid as per “Annexure-B”.**

**Cover-2**

**The Financial Bid (as per Annexure-C format) i.e. Schedule of Price Bid in the form of attached BOQ Proforma shall be duly filled in and uploaded online by the bidder in Cover-2 .**

**The Cover-1 i.e. Technical (Techno-commercial) Bid shall be opened by the Council at the first instance and evaluated by the competent authority of the Council. At the second stage the Cover-2 containing Financial**

**Bid of only techno-commercially acceptable offers shall be opened for further evaluation and ranking before awarding the contract.**

1. The authorities of National Council of Science Museums do not bind themselves to accept

 mere lowest tender and reserves the right to reject or accept any or all tenders wholly or

 partially without assigning any reason whatsoever

# ANNEXURE -A

**NATIONAL COUNCIL OF SCIENCE MUSEUMS**

**SECTOR-V, BLOCK-GN, BIDHANNAGAR,**

**KOLKATA – 700 091.**

 **TENDER No.: I-18012/7/16(75)**

# Instructions for Online Bid Submission

1. The bidders are required to submit soft copies of their bids electronically on the CPP Portal, using valid Digital Signature Certificates. The instructions given below are meant to assist the bidders in registering on the CPP Portal, prepare their bids in accordance with the requirements and submitting their bids online on the CPP Portal.
2. More information useful for submitting online bids on the CPP Portal may be obtained

at:<https://eprocure.gov.in/eprocure/app>

**REGISTRATION**

* 1. Bidders are required to enrol on the e-Procurement module of the Central Public Procurement Portal (URL:

https://eprocure.gov.in/eprocure/app) by clicking on the link “**Online bidder Enrolment**” on the CPP Portal which is free of charge.

* 1. As part of the enrolment process, the bidders will be required to choose a unique username and assign a password for their accounts.
	2. Bidders are advised to register their valid email address and mobile numbers as part of the registration process. These would be used for any communication from the CPP Portal.
	3. Upon enrolment, the bidders will be required to register their valid Digital Signature Certificate (Class II or Class III Certificates with signing key usage) issued by any Certifying Authority recognized by CCA India (e.g. Sify / nCode / eMudhra etc.), with their profile.
	4. Only one valid DSC should be registered by a bidder. Please note that the bidders are responsible to ensure that they do not lend their DSC’s to others which may lead to misuse.
	5. Bidder then logs in to the site through the secured log-in by entering their user ID / password and the password of the DSC / e-Token.

**SEARCHING FOR TENDER DOCUMENTS**

* 1. There are various search options built in the CPP Portal, to facilitate bidders to search active tenders by several parameters. These parameters could include Tender ID, Organization Name, Location, Date, Value, etc. There is also an option of advanced search for tenders, wherein the bidders may combine a number of search parameters such as Organization Name, Form of Contract, Location, Date, Other keywords etc. to search for a tender published on the CPP Portal.
	2. Once the bidders have selected the tenders they are interested in, they may download the required documents / tender schedules. These tenders can be moved to the respective ‘My Tenders’ folder. This would enable the CPP Portal to intimate the bidders through SMS / e-mail in case there is any corrigendum issued to the tender document.
	3. The bidder should make a note of the unique Tender ID assigned to each tender, in case they want to obtain any clarification / help from the Helpdesk.

**PREPARATION OF BIDS**

1. Bidder should take into account any corrigendum published on the tender document before submitting their bids.
2. 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, the number of documents - including the names and content of each of the document that need to be submitted. Any deviations from these may lead to rejection of the bid.
3. Bidder, in advance, should get ready the bid documents to be submitted as indicated in the tender document / schedule and generally, they can be in PDF / XLS / RAR / DWF/JPG formats. Bid documents may be scanned with 100 dpi with black and white option which helps in reducing size of the scanned document.
4. To avoid the time and effort required in uploading the same set of standard documents which are required to be submitted as a part of every bid, a provision of uploading such standard documents (e.g. PAN card copy, annual reports, auditor certificates etc.) has been provided to the bidders. Bidders can use “My Space” or ‘’Other Important Documents’’ area available to them to upload such documents. These documents may be directly submitted from the “My Space” area while submitting a bid, and need not be uploaded again and again. This will lead to a reduction in the time required for bid submission process.

**SUBMISSION OF BIDS**

1. Bidder should log into the site well in advance for bid submission so that they can upload the bid in time i.e. on or before the bid submission time. Bidder will be responsible for any delay due to other issues.
2. The bidder has to digitally sign and upload the required bid documents one by one as indicated in the tender document.
3. A standard Price Schedule format (BOQ) has been provided with the tender document to be filled by all the bidders. Bidders are requested to note that they should necessarily submit their financial bids in the format provided and no other format is acceptable. If the price bid has been given as a standard BOQ format with the tender document, then the same is to be downloaded and to be filled by all the bidders. Bidders are required to download the BOQ file, open it and complete the white coloured (unprotected) cells with their respective financial quotes and other details (such as name of the bidder). No other cells should be changed. Once the details have been completed, the bidder should save it and submit it online, without changing the filename. If the BOQ file is found to be modified by the bidder, the bid will be rejected.
4. The server time (which is displayed on the bidders’ dashboard) will be considered as the standard time for referencing the deadlines for submission of the bids by the bidders, opening of bids etc. The bidders should follow this time during bid submission.
5. All the documents being submitted by the bidders would be encrypted using PKI encryption techniques to ensure the secrecy of the data. The data entered cannot be viewed by unauthorized persons until the time of bid opening. The confidentiality of the bids is maintained using the secured Socket Layer 128 bit encryption technology. Data storage encryption of sensitive fields is done. Any bid document that is uploaded to the server is subjected to symmetric encryption using a system generated symmetric key. Further this key is subjected to asymmetric encryption using buyers/bid openers public keys. Overall, the uploaded tender documents become readable only after the tender opening by the authorized bid openers.
6. The uploaded tender documents become readable only after the tender opening by the authorized bid openers.
7. Upon the successful and timely submission of bids (i.e. after Clicking “Freeze Bid Submission” in the portal), the portal will give a successful bid submission message & a bid summary will be displayed with the bid no. and the date & time of submission of the bid with all other relevant details.
8. The bid summary has to be printed and kept as an acknowledgement of the submission of the bid. This acknowledgement may be used as an entry pass for any bid opening meetings.

**ANNEXURE-B**

**NATIONAL COUNCIL OF SCIENCE MUSEUMS**

**SECTOR-V, BLOCK-GN, BIDHANNAGAR,**

**KOLKATA – 700 091.**

 **TENDER No.: I-18012/7/15(230)**

#  TECHNICAL (Techno-Commercial) BID

Notes**: ALL PARTICULARS / INFORMATIONS SHOULD BE GIVEN IN THE FOLLOWING FORMAT WITH COMPLETE 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 number:

04 i) Back ground details of the firm :

 (State whether original manufacturer /

 authorised Registered Indian Agent

 of the manufacturer).

ii) Incase of authorised Registered Indian Agent, :

 submit notary certified copy of the Agency

 Agreement with the manufacturer.

 iii) In case of authorised Indian Agent, :

 state whether enlisted with Central Purchase

 Organization (i.e. DGS&D) as per

 Compulsory Enlistment Scheme of Govt. of

 India

 (State ‘YES or ‘NO’)

 iv) If the answer of (iii) is ‘YES’, submit :

 notary certified copy of enlistment Certificate duly

 issued by the CPO(i.e. DGS&D) of Govt. of

 India.

05. Following details should be submitted in case the :

 tenderer is the manufacturer of the equipment:

 a) Year of establishment :

 b) Number of Planetarium instrument supplied and installed :

 which are presently in operation (detail list of location,

 type of equipment and year of installation may be indicated).

**-: 2 :-**

06. Following details should be submitted in case the :

 tenderer is not the manufacturer of the equipment:

 a) Name of the manufacturer :

 b) Year of the establishment :

 c) Number of Planetarium instrument :

 Supplied which are presently in operation

 (detail list of location, type of equipment

 and year of installation may be indicated).

07. i) Whether capable to supply and install the Planetarium Equipment :

 as per minimum requirement/and Technical Specification given in

 Annexure-E) (Please mention “YES” or “NO”)

ii) If it is mentioned “NO” above, submit detailed deviation to :

 be made from the enclosed Technical Specification.

 Attached extra sheet, if required

 **iii**) If it is mentioned “YES” above, submit the details specifications :

 of the offered product including copies of **Product brochure.**

08. Mention recommended sitting arrangement for the theatre :

 where the equipment(s) offered shall be housed

 ( i.e. whether Circular or Unidirectional )

09. State detail address and setup link wherefrom :

 support for maintenance during Warranty Period

 shall be offered by the firm.

10. i) Whether agreed to accept AMC after the warranty period is over :

 (State ‘YES or ‘NO’)

 ii) If the answer above is ‘Yes’, state the detail address :

 and set up link where from support for maintenance

 during post warranty shall be offered by the firm.

 11. Minimum down time to handle breakdown :

 calls and/or any sort of emergencies.

1. Machine Self-life time of the product offered (i.e. up to :

 which period technical support as well as spare parts

 including consumables shall be available with the firm).

1. Payment terms :

 (all payments shall be made only through bank against

 irrevocable Letter of Credit)

**-: 3 :-**

14 a) Whether agreed to deliver the goods without any advance :

 Payment (State ‘YES or ‘NO’)

 b) If the answer above is ‘NO’, whether agreed to submit :

###  Bank Guarantee for the equivalent amount.

 c) Whether agreed to retain adequate Security in the form :

of Bank Guarantee etc. for strict observance of Warranty

 terms during the Warranty period.

**NCSM prefers to release 90% payment after delivery of the**

**Equipment at site and balance 10% payment after**

 **Installation and commissioning of the equipment at site.**

15. a) Minimum time required to deliver the :

 Planetarium equipment.

 b) Minimum time required to install the delivered equipment :

 at site after delivery.

16 Validity of the offer for acceptance:

 (minimum 180 days from the due date of opening

 of the may be offered for acceptance).

I/We hereby declare that the above statements are true. I/We also declare that the decision of National Council of Science

Museums regarding selection of eligible firm/models of Planetarium equipment for opening of Financial Bid shall be final

and binding on me/us.

**Dated Official Seal Signature of the Tenderer/Constituted Attorney**

**ANNEXURE-C**

**Price Bid (BOQ):** To be filled as per the following format and to be uploaded in **Cover-2**.

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**ANNEXURE-D**

**PROFORMA FOR ISSUING “UNDERTAKING BY ORIGINAL PLANETARIUM SYSTEM INTEGRATOR ” .**

**( To be submitted in OEM’s Letter head.)**

Dated:

**To**

**The National Council of Science Museums,**

**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

selected and suitable 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 tender

No.I-18012/7/16 (75) of National Council of Science Museums.

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-E**

**Supply, Installation,Testing and Commissioning of Digital Planetarium System –1 Set**

**The system includesFull Dome Digital Projector System, 5.1 surround sound system, Show control server computer, Computer for operator’s interface, planetarium software and at least eight full-dome shows, cove light and cove light control mechanism.**

**The system will be installed at Dimapur, Nagaland**

The system should be compatible with 8 meter diameter vertical (not tilted) dome.
The Digital Planetarium System must be a fully integrated system that comprisesa fully featured colour Planetarium System projected through a single centrally placed digital projector, pre-rendered all-dome video playback capability, new planetarium show development platform manageable through simple scripting language programming and real-time 3-D graphics rendering engine for high quality presentation on an eight meter dome. The pre-rendered video and real time generated graphics should be playable simultaneously and should not be mutually exclusive.

**Dimension restriction of the system:**Due to constraint of space of an 8 mtr. Dome planetarium, the components of the system should have the following restrictions for their dimensions:

1. **Central Projection System:**For clear view of the dome screen from all positions and to facilitate comfortable movement through the passage, the dimension of the central projection system should be within the following limits:
 Height: not more than 140 cm(@ 240 cm horizon height)
 Diameter of the projector mounting structure: not more than 120 Cm

The mounting structure should be sleek but sturdy and matching with the ambience.
2. **Operators console/Server Computer:**

Operators console is to be placed at the left side of the rear door of the dome. Overall size of the operators console with graphics/audio server computer system should be within the following limits:
Length: 130 Cm, Depth: 80Cm

**System components should be designed for placement of all equipment within the dome only.**

***Detailed Specification of System Components:***

1. **Full Dome Projector**Professional grade DLP projector having dual Lamp facility and high quality Distortion free fish eye lens firmly mounted for full dome projection athorizonheight from finished floor level (240 cm) keeping the projection system height not more than**140 cm (drawing attached for the planetarium)**
* DarkChip3 Technology
* Single chip, powered lens shift system
* Native Resolution: **2560 x 1600** pixels or higher
* Contrast ratio: 8000:1 or better
* Brightness: 7500 ANSI Lumen or higher.
* 30 Bit RGB Color
* Lamp Life: not less than 2000 Hrs in full brightness
* Capable of continuous running for at least 12 hours each day
* With proper zoom facility and border masking.
* Metal Stand for firm mount of the projector and lens with necessary adjustments, **two lamps must be installed** in the projector.
1. **Graphics and Audio Server with remote operator’s console**
* Professional quality graphic computer/cluster capable of handling planetarium shows and high resolution full dome video shows.
* Professional quality 5.1 Dolby Digital surround Sound card for surround sound output compatible with professional quality 5.1 amplifiers.
* Sufficient disk space (not less than 1 TB) for storing all necessary video and audio data.
* Space saving operator’s console having LCD display (preferably a Laptop Computer having i5 or better processor, minimum 3 GB RAM, Latest Windows OS) for show control. Complete synchronization with graphic computer/cluster.
* All accessories, drivers and cables must be supplied with the system.
* The computer system should have 3 years comprehensive warranty with the manufacturer compulsorily bearing the condition that it would be attended by a service engineer of the manufacturer onsite (at the site of installation i.e. Digha/Tirupati)on the next business day without any prolonged ritualistic troubleshooting session over phone demanding the user to attend to the machine and apply tweaks as suggested. The supplier must coordinate such service procedures for quick support.
1. **5.1 Surround Sound System comprises of Amplifier and speakers**Professional grade Dolby Digital 5.1 amplifier with compact surround speakers. Total power: around 500 Watts. With necessary connecting wires and mounting accessories.
One wireless microphone with necessary mixer for announcement through the sound system.
2. **Planetarium and show control Software with perpetual user license**
* Professional Grade Windows XP/Windows 8 (or latest version) based GUI Planetarium Software having most extensive three dimensional astronomy database and capable of full Dome video playback.
* Should have programming facility with free library of 2D, 3D, animated and video objects for development of planetarium shows with voice over in English, Hindi & local languages (The cost of whichare to be borne by the supplier and must be indicated separately).
* The software should be supplied with perpetual license.
* ***At least three ready planetarium shows (astronomical) of 10-12 mins.duration(having voiceover in English, Hindi and one local language)must be supplied with the system with perpetual license.***

Detailed features of astronomical software is described in **ANNEXURE-I**

1. **Full Dome video shows having perpetual show license**
* At least 8 (eight) attractive full dome video shows must be supplied having perpetual show license.
* Each show must be of 20/25 min duration. All shows must come in with 5.1 dolby digital surround sound format.
* A comprehensive list of available shows must be produced in the offer with separate prices. ***Clips of such shows may be provided in CD/DVD for review& selection***.
* All selected full dome shows must be supplied in English, Hindi and one local Language. Necessary Scripts and original sound tracks must be supplied for future language modification. [The vendor must bear the cost of translation, voice recording and mixing of the tracks]
1. **4 (four) additional spare lamps for the projector**
2. **Flexible RGB LED based cove lighting system with wireless remote control**

 ***Warranty: On-site comprehensive warranty for minimum three yearsfor the complete system from the date of successful commissioning. The system downtime should not be more than 48 hours.The supplier will be responsible for resolving any type of problem related to hardware or software either by sending technical personnel on site or over telephone/internet. The vendor must give an undertaking that the system will be supported at least for a period of 5 years beyond the warranty period.***

* The system components must be installed properly at the site i.e. Dimapur, Nagalandand integrated by the vendor for full functionality. Necessary training on operation/maintenance of the system and development of planetarium shows using the system must be imparted for staff members. The training should not be of duration less than a week. One set of printed literature on operation, maintenance and methods of show development must be provided with the system. A comprehensiveprinted literature on the show control script with complete annotated and documented listing of the three planetarium shows provided with the system must be submitted at the time of installation.
* Necessary installation CDs/DVDs/HDD for all original software, drivers and full dome shows with due license documents must be supplied with the system.
* The officials of the council should be trained by the supplier after successful installation of the system.
* Complete documentation for all system components must be supplied in hard and soft formats.
* The supplier should be responsible to resolve any licensing problem for running the software/show component having perpetual licenses beyond the basic warranty period of the system.
* Power capacity of the entire system should be furnished clearly for providing suitable power backup through UPS.
* Charges for Annual Maintenance Contract should be indicated separately after expiry of the initial warranty of three years.

**ANNEXURE-I**

 ***Features of Astronomy software:***

**Stars**

* The system offered should have all astronomical models derived from standard star catalogue e.g like Hipparcos star catalogue. The system should be able to generate over 100,000 stars in 3-dimentions. The system software and utility program should allow the user versatility in making star models so that the user can create larger or smaller star models by specifying the dimmest visual magnitude. The user also should be able to adjust the brightness and the size of the star while making the model. The System should be able to create Star field of various magnitude like 3 magnitudes for City Star Field, 12 magnitudes for Dense star field. The system should be able to create at least 20 Bright Stars.
* The system should have a conformance of star representation to Epoch 2000 placement regard to proper motion and precision.
* The system also should be able to display additional stars that appear at infinity beyond the age of standard star model to prevent the appearance of running of stars.
* The system should also be able to show non-visual skies in the following spectrums: radio, x-ray, infrared and gamma ray.

**Solar Systems**

* The system should be able to display and label the Sun, all 9 solar system planets, their classical moons, comets and asteroids .The comets can be displayed as dots moving along an orbit track or simulated as nebulous effect.
* The system should be able simulate meteor showers with specified radix point and simulate orbital motion in simulated time.
* The system should be able to display planets and moons with trails that show the apparent path of object in celestial sphere.
* The system should be able to view planets and their classical moons from any vantage point within or in the near vicinity of the solar system.
* The system should be able to display a 3-D image of an objects orbit centered on the object’s parent body and can be viewed from any vantage point or position.
* The system should be able to view a 3-D ornery, scale to any size from any vantage point or position.

**Eclipses and Transits**

* The system should be able to simulate partial, annular and total solar and lunar eclipses. The user should be able to program historical eclipses as desired.
* The system should be able to simulate the solar corona on total eclipses.
* The system should be able to simulate transit of Mercury and Venus.

**Constellations**

* All 88 IAU constellations should be available.
* The System should be able to display stick figures and IAU boundaries as lines.
* Lines can be drawn at the same apparent brightness regardless of the distance.
* The user should be able to add individual artistic renditions of constellations.
* The system should be able to demonstrate the 3-D aspect of constellation when the viewer’s location is changed.
* The system should have Flamsteed drawings of constellations (traditional illustration of each of the 88 constellation).

**Coordinate Grids**

* The following coordinate Grids should be available.
* Full-dome celestial sphere
* The ecliptic
* North and south precessional circles
* The galactic equator
* The meridian
* The cardinal points

**Nebulous Objects**

* The following nebulous objects should be available for display from the model collection.
* The Milky Way
* Andromeda
* All Messier objects (M1 – M110)
* Magellanic clouds

**Motion through time and Space**

* The system offered should provide smooth motion through “the universe” to simulate 3-D space travel.
* The scene should be able to view from any vantage point e.g. from a distant planet or a star, from a point above the Sun looking down on the solar system etc.
* The system should have standard planetarium motions, e.g. daily motion, annual motion, precessional motion, rotation in right ascension, declination.
* The system should have ability to control absolute time or rate at which time passes.
* The system should be capable of speeding up time passage rate to dramatize celestial movement.
* The system should display daily, annual and proper motion of stars and planets.
* The system should show precession of poles.
* The system should accurately calculate the historical locations of objects in the solar systems.
* The system should display proper motion of 2500 bright stars over a two million year period (+/- 1,000,000 years from Epoch 2000)
* Diurnal motion must be supported.

**DIMAPUR INNOVATIVE HUB & PLANETARIUM AT DIMAPUR 1st Floor**

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**DIMAPUR INNOVATIVE HUB & PLANETARIUM AT DIMAPUR Sec. Elevation**

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