# e-TENDER

## FOR

# Setting up Mathematics Gallery

## AT
## PUSHPA GUJRAL SCIENCE CITY
## KAPURTHALA (PUNJAB)

**TN/PGSC/2021/Exhibit/Mathematics Gallery**

*PushpaGujral Science City*
Jalandhar – Kapurthala Road,
Kapurthala, Punjab
Telephone: 01822-501963 / 64

**PushpaGujral Science City**

Jalandhar – Kapurthala Road, Kapurthala

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# INTRODUCTION

**Pushpa Gujral Science City, Jalandhar-Kapurthala Road,**
**Kapurthala**

Pushpa Gujral Science City offers a blend of education, curiosity and fun to ensure longer and repeated visits. The project is aimed at cultivating interest in science through open-ended exploration away from text books and black boards, with a scientific approach to problem solving. The project has something for everyone, regardless of age, education, profession or social strata and is intended to make science accessible to people who are not part of the formal education system. It is a joint project of the Government of India and Government of Punjab.

Its various facilities include Galleries on Evolution, Dinosaur park (with Robotic Dinosaurs), Renewable Energy Park, Climate Change Theatre, Earthquake Simulator and Flight Simulator, Amazing Living Machine, Gallery on Health, Biotechnology & HIV, Outer Space Gallery, Virtual Reality & Cyber Space Gallery and Galleries on Fun Science, Railways, Defence, etc., as well as, Planetarium, Large Format Film Theatre (I-Max), 3D and Laser Shows, Herbal & Cactus Garden, etc. These offer information on cross cutting and inter-curricular issues and help to explain scientific concepts and their relevance to society. An Innovation Hub at Science City motivates students for 'out-of-box' thinking, which could contribute towards societal development. More information about these facilities is available at website www.pgsciencecity.org.

# TENDER NOTICE

PUSHPA GUJRAL SCIENCE CITY
Jalandhar-Kapurthala Road, Kapurthala
Telephone: 01822 501963 / 64

Online tenders are invited from reputed Agencies/ Firms /Companies for Setting up Mathematics Gallery on turnkey basis involving Design, Fabrication, Supply and installation of exhibits, models, printing, fixing of panels, interiors, lighting & associated accessories including related civil, electrical and mechanical work required to setup Mathematics Gallery at Pushpa Gujral Science City, Jalandhar-Kapurthala Road, Kapurthala.

Interested tenderers can submit online bids through https://eproc.punjab.gov.in by **15.03.2021** (1500 Hrs). For further details, please visit website www.pgsciencecity.org

Note:

- Corrigendum and Addendum, if any will be published online at https://eproc.punjab.gov.in
- PGSC reserves the right to accept or reject any bid and to annul the process at any time, without any liability and assigning any reason thereof.

## PARTICULARS of TENDER

| | | |
|---|---|---|
| 1 | Description of Scope of Work | Online bids are invited for Setting up Mathematics Gallery on turnkey basis involving Design, Fabrication, Supply and installation of exhibits, models, printing, fixing of panels, interiors, lighting & associated accessories including related civil, electrical and mechanical work required to setup Mathematics Gallery at Pushpa Gujral Science City, Kapurthala. |
| 2 | Type of Tender | Two stage(Technical and Financial Bids to be opened separately) |
| | Estimated Cost | Rs. 1.05 Cr. |
| 3 | Delivery Period | Six Months |
| 4 | Tender Fee | Rs. 1000/- (Rs. One Thousand only) |
| 5 | Earnest Money Deposit | Rs. 4.00 Lakhs. (Rupees_Four Lakh only) |
| 6 | Validity of Tender | 4 (Four) Months from Last date of submission of Tender |
| 7 | Date of Pre-Bid Meeting | 06.03.2021 at 11:00 AM |
| 8 | Venue of Pre-Bid Meeting | Administrative Building, PGSC, Kapurthala |
| 9 | Date & Time of Closure of Tender | 15.03.2021 Upto 03:00 PM |
| 10 | Date & Time of Opening of Tender(Technical Bid) | 17.03.2021 at 11:00 AM |
| 11 | Date & Time for Presentation by technically qualified bidders | Will be intimated separately to technically qualified bidders. |
| 12 | Date & Time of Opening of Tender (Financial Bid) | Financial Bids will be opened on the same day after presentations have been made by technically qualified bidders. In case of any change in the date & time, the same will be intimated separately. |
| 13 | Place of Opening of Tender | Pushpa Gujral Science City, Jalandhar-Kapurthala Road,Kapurthala-144601. |
| 14 | Contact Persons at PGSC | Mr. Ritesh Pathak, Scientist 'D' |

**Note:**

1. Tender Document can only be downloaded from portal site: https://eproc.punjab.gov.in
2. Corrigendum and Addendum, if any will be published online at https://eproc.punjab.gov.in
3. PGSC will process the tender as per PGSC norms & procedures and PGSC would not be under any obligation to give any clarification to the agencies whose bids are rejected.
4. Tenderers are advised to visit Science City and see the location during office hours on any working day.
5. PGSC reserves the right to accept or reject any application and to annul the process at any time, without any liability and assigning any reason thereof.
6. PGSC reserves the right to reject / cancel any or all or part of the tender of the tenderer without assigning any reason and shall also not be bound to accept highest tenderer. The decision of the PGSC shall be final and binding.
7. If any of the above dates is declared holiday, the activity scheduled for that day will take place on the next working day.
8. Omission, neglect or failure on the part of tenderer to obtain requisite reliable and full information or any matter affecting his / her tender, shall not relieve the tenderer, from any liability in respect of the contract.

# Mathematics Gallery

Science is dynamic. New discoveries, inventions, concepts and their applications are changing human life every day. It is, therefore, important to keep our children and public updated. Further, it has been felt that besides science, mathematics education also needs to be improved through both formal and non-formal mechanisms. Hence, it is proposed to set up Mathematics Gallery at Science City.

**1. Main Message of Gallery:**

Understanding Mathematics in fun way

2. **Audience:**

School students: 65% other students: 15% and other 20 %( families and general public)

**3. Learning Objectives:**

- Appreciate the nature and purpose of mathematics in real life by identifying patterns, sequences and relationships.
- Experience excitement and pleasure in learning mathematics by creating simulations and imaginary situations.
- Apply the concepts and skills of measurement and geometry to everyday situations and in the process develop critical thinking skills, know the principles, structures and basic laws of mathematics appropriate to their level.
- Think creatively, so as to solve routine and non-routine problems.
- Link mathematics with other subjects across the curriculum.
- Develop skills in approaches to problem solving and inquiry at a level appropriate to their age.
- Develop positive attitudes by experiencing mathematics in a real life context through practical and experimental activities.

# SCOPE OF WORK

Setting up Mathematics Gallery on turnkey basis involving Design, Fabrication, Supply and installation of exhibits, models, printing, fixing of graphic & information panels, display monitors, screens, projectors and other equipment with best quality finishes, interiors, lighting & associated accessories including related civil, electrical and mechanical work required to setup Mathematics Gallery at Pushpa Gujral Science City, Jalandhar-Kapurthala Road, Kapurthala.

Gallery will be set up in the following areas:

**Exhibition Area A:** Area adjacent to Science of Sports Gallery (Ground Floor) in Science Explorium Building, PGSC. Area available is 1767 sq. feet. Drawing is enclosed at ***Appendix: 1***.

**Exhibition Area B:** Area adjacent to Virtual Reality Gallery (First Floor) in Science Explorium Building, PGSC. Area available is 2462 sq. feet. Drawing is enclosed at ***Appendix: 2***.

The following works are involved for setting up of the Mathematics Gallery:

1 **Conceptualizing and Designing** of the Gallery and exhibits displaying fundamental principles of Math as defined for each exhibit.

2 **Installation of Exhibits, Information panels, interiors & lighting etc.:**

2.1 The exhibits will be standalone exhibits (transportable from one place to another). The placement of exhibits and panels should be in such a way that flow of visitors is not hindered and at the same time exhibits should be attractive and panels legible.

2.2 Proper light effects and focused lights should be used so as to have immersive and captivating ambience in the area provided.

2.3 Any interior work and lighting required for making the interiors to merge with the exhibits and panels will be in the scope of work of the tenderer.

2.4 Panel Designing, Printing, Supply and Fixing:

- Each exhibit will have a panel in the background displaying information about the exhibit
- Content writing & Designing of Panels
- Panels may be of different sizes

- Panels should be more pictorial
- Each panel has to be got approved from PGSC before printing.

2.5 The exhibits or sections will be supplemented with information kiosks using touch screens. Minimum 8 Touch screen Kiosks will be provided.

2.6 List of exhibits:

| Sr. No: | Item of Work | Details at *Appendix 3* [Exhibits} |
|---|---|---|
| | **Location: EXHIBITION AREA: A (Ground Floor)**<br>**Number of Exhibits: 31** | |
| A-1. | **Genesis & History of Mathematics** | |
| A-1.1 | Indian Mathematicians | E-1 |
| A-1.2 | Story of Zero | E-2 |
| A-2 | **Number & Arithmetical Operators** | |
| A-2.1 | Decimal Number System | E-3 |
| A-2.2 | Binary Number System | E-4 |
| A-2.3 | Concept of Carry Forward | E-5 |
| A-2.4 | Adding Natural Numbers, Popular Identity, Identity & Equation | E-6 |
| A-2.5 | Multiplication | E-7 |
| A-2.6 | Visual pattern in Multiplication | E-8 |
| A-2.7 | Linear & Quadratic Function | E-9 |
| A-3 | **Geometry** | |
| A-3.1 | Dots in Shapes | E-10 |
| A-3.2 | Sum of Angles of a Triangle | E-11 |
| A-3.3 | Shapes & Projections | E-12 |
| A-3.4 | Ellipse | E-13 |
| A-3.5 | Pythagoras Theorem (Blocks) | E-14 |
| A-3.6 | Pythagoras Theorem (Fluid) | E-15 |

| | | |
|---|---|---|
| A-3.7 | Play with Polygons | E-16 |
| A-3.8 | Area of Polygons | E-17 |
| A-3.9 | Topology | E-18 |
| A-3.10 | Simple Harmonic Motion & Sine Wave | E-19 |
| A-3.11 | Volume of 3D Shapes | E-20 |
| A-3.12 | Platonic Solids | E-21 |
| A-3.13 | Cardoid & Epicycloid | E-22 |
| A-3.14 | Cycloid | E-23 |
| A-3.15 | Hypocycloid | E-24 |
| A-4 | **Trigonometry** | |
| A-4.1 | Height & Distance | E-25 |
| A-5 | **Puzzle / Activity Corner** | |
| A-5.1 | Bramha Tower | E-26 |
| A-5.2 | Musical Math | E-27 |
| A-5.3 | Hyperbola (Acrobatic Stick) | E-28 |
| A-5.4 | Jordan's Curve | E-29 |
| A-5.5 | Missing Square | E-30 |
| A-5.6 | A fair portion of Pizza | E-31 |
| | **Location: EXHIBITION AREA: B (First Floor)**<br>**Number of Exhibits: 15** | |
| B-6 | **Structures & Networks** | |
| B-6.1 | Shapes of Shape | E-32 |
| B-6.2 | Tessellations | E-33 |
| B-7 | **Maths in Nature** | |
| B-7.1 | Golden Ratio | E-34 |
| B-8 | **Play with Math** | |
| B-8.1 | Ride Cycle with Square Wheel | E-35 |
| B-8.2 | Count Monkeys | E-36 |
| B-8.3 | Roller Coaster Ride | E-37 |
| B-8.4 | Make your fastest Track | E-38 |
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| | | |
|---|---|---|
| B-8.6 | Fractal Tree | E-40 |
| B-8.7 | Draw your Song | E-41 |
| B-8.8 | Draw from your Song | E-42 |
| B-8.9 | Distribution Law (Quincunx) | E-43 |
| B-8.10 | Water Clock | E-44 |
| B-8.11 | Poly Paint | E-45 |
| B-8.12 | Bucky Ball | E-46 |

**Note:**

- Details of exhibits provided at Appendix 3 {Exhibits] are representative and not complete in all respects.
- The photographs / sketches given in the Annexure are only representative.

2.7 The placements of the exhibits mentioned section wise / floor wise are suggestive. Bidders will provide complete layout of the above mentioned exhibits during the Technical Evaluation presentation.

2.8 The exhibits having interaction with visitors through buttons / switches may be done through touch less mechanism preferably.

2.9 Bidders can suggest additional exhibits to the above mentioned exhibits within the quoted amount.

2.10 In order to align and accommodate the above mentioned exhibits in coherent and attractive & unhindered layout in the allotted areas, the dimensions of the exhibits can be slightly changed as mentioned in the tender document.

2.11 The interactive blocks / balls / discs / parts etc. which will be used by visitors to play / interact with exhibit should be so designed that visitors cannot take the interactive components away from the exhibits.

## 3 Shifting of Existing Exhibits in areas provided for Mathematics Gallery

The contractor will dismantle the existing exhibits in the designated area of the Mathematics Gallery and shift and install the exhibits to the area instructed by PGSC within the Science City premises. The major exhibits requiring shifting are listed at ***Appendix: 4***.

## 4 GENERAL MATERIAL DESCRIPTION:

The fabrication of models of the above cited exhibits would be made by the following materials/components maintaining the standard quality, as specified below:

### 4.1 Fibre Glass Models

Thickness of FRP: Minimum 2 layers (Minimum 1 mm thick each)
Mould: Minimum 450 GSM Mat Fiber Glass in resin
Painting: Minimum three Coats with resin based pigment colours
Colour shade would be such that the models look like original objects. Colour should withstand the seasonal variations over a period of at least 3 years
Fiber Glass Resin: ISI marked

**4.2** **Acrylic materials** – Clear transparent, various colours (ISI marked, BIS: IS 14753: 1999)

**4.3** **Polycarbonate materials –**Clear transparent, resistant to scratch (ISI marked BIS 14443: 1994))

**4.4** **Laminate Sheet** – Minimum 1mm thick, with high resistivity to abrasion both matt and glossy as per design requirement

**4.5** **Glass Sheet** – Toughened glass, stain and scratch resistant, Float glass, free from wave, straight in edge, 6mm, 9mm, 12mm, cut to size, edges nicely ground, bevelled wherever necessary, frosted designs in places. (BIS: IS 14900 II IS 2835)

**4.6** **Anodized Aluminium Sections** – All aluminium items used for external decorative or framing purposes to be anodized on scratch free aluminium as per required colour shade. The thickness of anodized coating will be 15 – 20 micron.

**4.7** **Extruded aluminium sections** for mounting temporary exhibitions, alloy HE 9WP (IS 733 1975 / IS 6063), with $\pm$ 0.25mm tolerance, twist less than 0.5mm per 300mm, deviation from straightness less than 1.5 mm per m, scratch free smooth finish, with 15-20 micron self colour anodized coating.

**4.8** **Teak Wood sections**– well-seasoned, without sap and knot, straight in edge timbers. Minimum 25 mm x 45 mm

**4.9** **Ply Board –** Treated for anti termiteBWR303 grade premium branded – Minimum 6 mm wherever required

**4.10** **Flexible Ply** -- Treated for anti termite MR grade premium branded – minimum 4 wherever required.

**4.11** **Painting –**

- Synthetic Enamel (preferably PU enamel paint) or Plastic Emulsion paints (Exterior grade) of renowned brands are to be used for indoor exhibits.

- Paints on wood/ply surface are to be applied after giving two coats of wood primer and thereafter smoothly finishing the surface.
- Painting in metal surface has to be done after applying two coats of anti-corrosive metal primer, and then anti corrosive epoxy paint

5 **Other Works**

5.1 PGSC will provide mains electric supply at one point in the building. Contractor will design, select, supply and install the lights for illuminating the gallery corresponding to the exhibits in an aesthetic manner.

5.2 Associated accessories required, if any, to complete the above work would be arranged by the Contractor at his own cost.

5.3 Contractor shall arrange for transportation, loading and unloading.

**5.4 TO GET THE CLEAR IDEA OF THE WORK, AGENCIES ARE REQUESTED TO VISIT THE SCIENCE CITY, KAPURTHALA TO SEE THE SITE.**

5.5 The work also includes free service and maintenance of Gallery, for Defect Liability Period as per clause # 23 of Terms & Conditions.

5.6 All Civil, electrical and mechanical work as required for the installation of the exhibit shall have to be done by the Contractor.

5.7 Such works, not listed in the scope of work but required for completion of the project is deemed to have been included in the scope of this bid.

5.8 Matters not covered by the specifications given in the contract, the relevant Indian Standard Codes and BIS shall prevail. If the Company is following any other International Standards, a copy of those standards along with the Tender Document should be submitted for the approval from the PGSC. If such codes on a particular subject have not been framed, the decision of the PGSC shall be final and binding.

5.9 The work shall be carried out under the direction and supervision of the PGSC, Kapurthala. On acceptance of the tender, the contractor shall intimate the name of his accredited representative who would be supervising the construction and would be responsible for taking instruction for carrying out the work.

5.10 PGSC decision with regard to the quality of the material and workmanship will be final. Any material rejected by the PGSC shall be immediately removed from the site of work by the contractor at his own cost and risk without any compensation within a maximum of two weeks of instruction issued by PGSC. If such rejected material are not removed

from the site within two weeks it will be disposed of by the PGSC and proceeds realized if any there of credited to the contractor.

5.11 The entire work shall be performed on turnkey basis. Any minor item(s) not included in the schedule of work shall have to be supplied by the contractor without any extra cost.

5.12 **The PGSC reserves to itself the right of omitting altogether any item of work required to complete the fabrication, installation and commissioning of exhibit at the time of award of the work or at later date and the contractor shall complete work without any additional compensation due to this omission.**

# INSTRUCTIONS

## 1. SUBMISSION OF TENDERS

1.1. All tendering process such as sale of tender documents/deposit of earnest money and submission of bid documents shall be carried out through web site https://eproc.punjab.gov.in

1.2. Any enquiry after submission of tender will not be entertained. Before submitting the tender, the tenderer must ensure that he/she satisfies all the eligibility conditions to avoid rejection of tender.

1.3. The Agency submitting the Tender would be presumed to have considered and accepted all the terms & conditions of the tender.

1.4. Financial bid should strictly be as in accordance with the enclosed format: Financial Bid.

1.5. In case of **tie in overall score** i.e. same Highest Marks scored as per the selection criteria by more than one tenderer, the following evaluation criteria in order of priority may be noted:

1.5.1. Tenderer who has scored higher / highest marks in the Presentation Score.

1.5.2. Tenderer with higher / highest experience.

1.5.3. Tenderer with Higher / highest Turnover in last 3 years.

The above parameters will be inferred from presentation score given by the committee during process of technical evaluation and the documents uploaded by tenderer.

1.6. No enquiry, whatsoever, verbal or written, shall be entertained in respect of acceptance and or rejection of tender.

1.7. In case of any technical problem, tenderers can contact on Telephone No.0172-2970263 / 0172-2970284 or 9988474433.

1.8. PGSC shall not provide any residential accommodation to any personnel employed by the agency. No cooking or lodging shall be allowed in the PGSC campus for the staff engaged by the agency.

1.9. PGSC shall not be responsible financially, for any injury resulting in partial / permanent disability or loss of life or otherwise to any person engaged by the agency

caused in the course of performing any duty / function under the contract. This liability shall solely be of the Agency who shall indemnify PGSC in this regard.

1.10. Prospective Contractors/Agencies are advised to register themselves with service provider at http://eproc.punjab.gov.in(GOI undertaking) well in advance to participate in the tender.

## 2. TENDER DOCUMENT

2.1. Tenderers shall fill in all required particulars in the blank spaces provided for this purpose in the tender documents and also **sign each and every page of the tender document** mandatorily including the drawings attached thereto before uploading their tender.

2.2. If tenderer find any discrepancies or omissions in the drawings attached to the tender document or in doubt as to their meanings, bidder should at once address to the authority inviting the tender for clarifications during or before the pre-bid meeting. Every endeavor is made to avoid any error which can materially affect the basis of the tender but the successful tenderer shall take upon himself to provide for the risk of any error which may be subsequently discovered and shall make no subsequent claim on account thereof.

2.3. Conditional and unsigned tenders, tenders containing absurd rates and amounts, tender which are incomplete or otherwise considered defective, tenders which are not in accordance with the tender conditions laid down by the Accepting Officer are liable to be rejected.

2.4. The tenderer shall specially note that it is tenderer's responsibility to provide any item which is not specifically mentioned in the specifications or drawings, but which may be necessary to complete the work.

## 3. EARENEST MONEY DEPOSIT (EMD)

3.1. EMD amounting to Rs. 4.00 Lakh to be deposited online along the submission of tender on e-portal **http://eproc.punjab.gov.in .**

3.2. In case of successful Tenderer, the Earnest Money will be retained as part of the Security Deposit/ Retention Money for satisfactory execution of the contract.

3.3. A tender once submitted shall not be withdrawn within a period of Four (4) months

from the last day of receipt of the tenders. In the event of a Tenderer withdrawing his tender before the expiry of four months from the date fixed for receiving the tender, his tender would be cancelled and the Earnest money deposited with the Pushpa Gujral Science City will be forfeited.

3.4. No interest can be claimed for the deposit of earnest or Retention money / security money, which will be lying with Pushpa Gujral Science City.

3.5. Tenderer or their authorized Representative, whose tender is accepted, shall within 15 days from the date of intimation to that effect shall execute formal contract in the prescribed format. Requisite stamp paper for execution of the contract shall have to be purchased by the successful tenderer at their cost.

3.6. Unless the Contractor whose tender is accepted signs contract agreement within 15 days of the date of the order directing him to do so, the amount of Earnest Money already deposited by him shall be forfeited and acceptance of his tender withdrawn.

3.7. If after opening the tenders, a Tenderer revokes his tender or increases his earlier quoted rate or after acceptance of his tender does not commence the work in accordance with the instructions of PGSC within 2 weeks of award of work, the Earnest Money deposited by him will be forfeited.

3.8. EMD would be forfeited if the successful Tenderer fails to commence and carry out the work as per terms & conditions of the Tender Document.

## 4. MINIMUM ELIGIBILITY CRITERIA

4.1. **Experience of having successfully completed similar work** (which means experience of fabrication / installation of permanent exhibits, models, dioramas, setting up of galleries, thematic shows [including fabrication and installation of models/ exhibits / artefacts] which are viewed by public) during last 10 years ending last day of the month previous to the one in which tenders are invited should be either of the following:

a. Three (3) similar completed works costing not less than the amount equal to 25% of the estimated cost i.e. Rs. 26.25 Lakh.
b. Two (2) similar completed works costing not less than the amount equal 40% of the estimated cost i.e. Rs. 42.00 Lakh.
c. One (1) similar completed work costing not less than the amount equal to 75% of the estimated cost i.e. Rs, 78.75 Lakhs.

4.2. **Average Financial Turnover** during the last 3 years ending 31st March of the previous

financial year, should be at least 30% of the estimated cost i.e. Rs. 31.50 Lakh.

## 5. TECHNICAL BID DOCUMENTS

5.1. Company / Contractor profile

*5.2.* Name and designation of the representative of the Agency to whom all references shall be made *(Attach Authorization Letter)*

*5.3.* The tenderer should not have been blacklisted by any Govt., Semi-Govt. Deptt. or any other organization. *(Affidavit / Self Declaration from the tenderer should be attached)*

5.4. Attach: Copy of GST Certificate

5.5. Attach: Copy of PAN / TAN Card

5.6. Experience Certificates of the similar and relevant work **(Relevant Experience / Similar Work means** fabrication / installation of permanent exhibits, models, artefacts, dioramas, setting up of galleries, permanent thematic shows [including fabrication and installation of models/ exhibits / artefacts] for museums, science centres, parks, public places)done by the Tenderer. The documents required for counting of experience are Award of work / work order / Agreement and Completion certificate.

5.7. **Agencies who had earlier done any job / work for Pushpa Gujral Science City in the past have to compulsorily submit a Certificate of Satisfactory Performance otherwise tender will be rejected.**

5.8. Photographic and video graphic reference of earlier works carried out by the Tenderer

5.9. Details of establishment, infrastructure, machines / equipment and human resources of the firm.

5.10. Copies of bio-data of persons constituting the Design Team and their profile and experience.

5.11. Copies of Balance Sheet for the last 3 years certified by the Chartered Accountant (CA) for the last 3 years (i.e. 01-4-2017 to 31-03-2020) to calculate the consolidated and average turnover for the last 3 years

5.12. **Details as per *Annexure-1*.**

5.13. **Specification Sheet as per *Annexure: 2*.**

5.14. Signed & Stamped copy of Tender Document

5.15. Any other Supporting Documents

**Note: Tenderer is required to make one (1) pdf file of the above mentioned technical bid**

**documents for uploading the same as 'Technical Bid' on the e-portal.**

## 6. FINANCIAL BID INSTRUCTIONS

6.1. Financial bid will be submitted online Turnkey Cost as per ***Annexure 3.***

6.2. The price quoted as lump sum for turnkey project will be considered in Financial Evaluation.

6.3. Bidder will also quote item wise rate online as per ***Annexure: 3***.

6.4. The rates quoted will be FOR, PGSC, Kapurthala

6.5. No taxes or duties other than the indicated above will be paid by the PGSC.

6.6. TDS / any other deductions will be deducted as applicable time to time.

6.7. Any other item required to complete the work shall be deemed to be included in the quoted amount. Nothing extra will be payable.

6.8. If a firm quotes NIL, the bid shall be treated as unresponsive and will not be considered.

## 7. PROCEDURE OF OPENING TENDER

7.1. The Technical Evaluation Committee (TEC) will evaluate the technical bid, based upon their profile like relevant experience of the Agencies, financial strength, key officials and their professional experience and TEC will qualify the bidders on the basis of Eligibility Criteria and will give scores / marks as detailed in Selection Criteria to the technically qualified bidders.

7.2. In the next phase, agencies qualifying the **Minimum Eligibility Criteria** will be called for presentation.

7.3. Technically qualified agencies would be asked to give a presentation before the Presentation Evaluation Committee (PEC) on a date to be intimated later. The presentation will be based on understanding scope of work, designs, layouts, proposed conceptual layout of gallery, methodology and work plan to execute the work and glimpses of previous similar work done. The PEC will give scores / marks for the presentation made by each Agency as detailed in Selection Criteria.

7.4. The Financial bids of the technically qualified agencies will be opened by Financial Bid Evaluation Committee (FEC). The financial bids will be opened and score / marks will be given by the FEC as detailed in Selection Criteria.

7.5. The overall scores will be calculated by adding Technical Score,

Presentation score and Financial Score of the technically qualified bidders.

7.6. The Agency achieving the highest overall score will be considered for award of work.

7.7. The details are given under Section: SELECTION CRITERIA.

## 8. SELECTION CRITERIA

The overall score of the Agencies (Technical, Presentation and Financial) will be calculated as under:

### 8.1. Technical Score ($S_t$): Maximum Marks: 30

The criterion for evaluation of Technical Bid submitted by the Agencies is as follows:

| | Evaluation Criteria | Maximum Marks 30 | Tenderer to submit following documents the Technical Bid. |
|---|---|---|---|
| 1. | Past Relevant Experience | 10 (1 mark for each year of relevant experience) | Satisfactory Completion Work / Experience Certificates. Attach copies preferably along with photographic reference of earlier relevant works such as fabrication / installation of permanent exhibits, models, artefacts, dioramas, setting up of galleries, permanent thematic shows [including fabrication and installation of models/ exhibits / artefacts] for museums, science centres, parks, public places) |
| 2. | Number and Profiles of Personnel constituting the Design team | 10 (2 marks for each person of designing team) | Copies of CV of persons Constituting the Design team and their profiles and experience. |
| 3. | Average Financial Annual turnover for the last 3 years | 10 (1 mark for Average Financial Annual turnover of Rs. 50 lakhs each) | Last 3 years balance sheets, attach copies |
| | **TOTAL** | **30** | |

Note: The bidders may please note that their offers will be evaluated as per the documents submitted along with their tenders. However, PGSC reserve the right to such clarifications / additional documents after opening at the bids.

8.2. **PRESENTATION SCORE ($S_P$): MAXIMUM MARKS: 40**

The presentation would include:

| | | |
|---|---|---|
| 1 | Understanding scope of work, Methodology and work plan for execution of work, Proposed Conceptual Layout of Gallery though 3D Video presentation<br>3D video presentation of both the Exhibit floor to be submitted on the date of presentation.<br>The 3D Video presentation will be property of PGSC and retained by PGSC. | 10 marks |
| 2 | Presentation of Each Exhibit mentioned in the tender document consisting of representative photograph or sketch, mode of display, working mechanism, dimensions, material etc. | 25 marks |
| 3 | Glimpses of previous similar work done through photographs or videos / Any Supporting information showcasing your work | 5 marks |

Agencies will make presentation before the Technical / Presentation Evaluation Committee as and when asked for.

Note: A soft / hard copy of the presentation would be submitted 2 days before the scheduled date of presentation.

8.3. **FINANCIAL SCORE MAXIMUM MARKS: 30**

The financial bid quoted for turnkey project will be considered in Financial Evaluation.

Financial Scores ($S_F$) will be calculated as under:

$$S_F = (F_m \times 30)/F$$

Fm – Lowest bid received.

F – Financial quoted by the bidder under consideration.

Rounded off to 2 decimal places

8.4. **OVERALL SCORE ($S_O$) MAXIMUM MARKS: 100**

The sum of Technical Score & Presentation Score and Financial Score.

$$S_O = S_T + S_p + S_F$$

8.5. **The agency having maximum overall score will considered for award of work.**

**9. OTHER INSTRUCTIONS**

9.1. Before submitting the tenders, the firms are advised to inspect the site of work and its environment and site conditions etc in carrying out the work in accordance with the specifications, conditions of contract, the actual working and other prevailing conditions, position of material and labour etc. If they feel any difficulty, it may be brought to the notice of PGSC immediately and before the Pre-bid Meeting. They should be well versed with the PGSC Kapurthala and General conditions of contract.

9.2. If the Tenderer deliberately gives wrong information in his tender, then PGSC Administration reserves the right to reject such tender at any stage.

9.3. If a Tenderer expires after the submission of his tender or after the acceptance of his tender, the PGSC may at their discretion cancel such tender. If a partner of the firm expires after the submission of the tender or after the acceptance of the tender PGSC Administration may cancel such tender at their discretion unless the firm retains its character/s.

9.4. The PGSC Administration will not be bound by any Power of Attorney granted by the tenderer or by changes in the composition of the firm made subsequent to the execution of the contract. They may however, recognize such power of Attorney and changes after obtaining proper legal advice, the cost of which will be chargeable to the contractor concerned.

9.5. The PGSC reserves the right to reject any or all the tenders received or accept any tender or part thereof without assigning any reason thereof. In the case of acceptance of a part of tender, the time for completion may also be reduced to the extent considered appropriate by the accepting authority.

# TERMS & CONDITIONS

## 1. WORKING CONDITIONS

1.1. The contractor has to work under the guidance / Supervision of the officer(s) authorized by the Director General, PGSC.

1.2. The standard quality of materials / components and ISI marked, wherever applicable, will only be allowed for use in the fabrication.

1.3. The contractor will have to maintain the time schedule of the work, as per the date of issues of intent.

1.4. The contractor shall abide by the labour laws.

1.5. The contractor shall also protect and fully indemnify the PGSC from any claims from successful bidder's workmen/employees, their heirs, dependents, representatives etc. or from any person(s) or bodies/ companies etc. for any act of commission or omission while executing the order

1.6. All light and heavy machinery required for the work shall have to be arranged by the contractor himself.

1.7. Contractor shall provide and employ sufficient number of qualified technical men for supervision of all aspects of the work.

1.8. Water and Electricity will be provided at one point in the building by the PGSC from where the successful tenderer has to set up the supply system and other required equipment and works.

1.9. The PGSC or its representative will have authority to change shape, size or orientation and colour of model. These changes will have to be carried out by the Contracting Agency at no extra cost.

1.10. The Contractor shall submit an undertaking stating that no part of the scope of work shall be sublet or outsourced to any third party without written consent of PGSC.

## 2. USE OF CONTRACT AND INFORMATION

2.1. The tenderer shall not, without the PGSC's prior written consent, disclose the contract, or any provision thereof, or any specification, plan, drawing, pattern, sample or

information furnished by or on behalf of the purchaser in connection therewith, to any person other than a person employed by the tenderer in the performance of the contract. Disclosure to any such employed person shall be made in confidence and to the extent only so far as may be necessary for purpose of such performance.

2.2. The tenderer shall not, without the PGSC's prior written consent, make use of any document or information except for purposes of performing the contract.

**3. PATENT RIGHTS AND ROYALTIES**

3.1. The tenderer shall indemnify the PGSC against all third party claims of infringement of patent, copyrights, royalties, trademarks or industrial design rights arising from use of the goods, drawing or any part thereof.

3.2. The Contractor/ Agency will declare and guarantees that all copyrights and author's rights etc. of all third parties shall be duly purchased and obtained and the royalties paid and by this agreement these rights of third parties, unencumbered in any respect, shall be transferred to PGSC. No such right would be only for one time use specifically for this job. If, however, any dispute of claim preferred by the third parties arises, Agency shall indemnify the PGSC against any such claim whatsoever.

3.3. The Contractor/ Agency hereby agrees that no claim whatsoever shall be made against the PGSC in respect of any proprietary rights on the part of any other party relating to the plans, designs, models, drawings, photographs, scripts or any other such items, which they have used in the display of the work. The Agency shall indemnify the PGSC of all costs and expenses, which may have called upon to do so against such claims.

**4. TECHNICAL SOUNDNESS OF WORKS**

4.1. The Contractor/ Agency shall be solely responsible for the technical and structural soundness at the time of handing over of all works executed by the Agency including that of sub-contractors, specialists or consultants, if any, employed by the Agency. The Contractor shall also ensure that all the works are carried out strictly in accordance with the approved Concept and agreed specifications. All structural and electrical jobs carried out as a part of the display shall be in accordance with the local relevant laws,

rules and safety regulations, etc. in force to avoid any mishap or accident or fire due to any defective workmanship.

## 5. APPROVALS, INSPECTIONS AND TESTS

5.1. The successful bidder will take the approval of overall concept, design and layout of interiors and Lighting Arrangement from PGSC before implementing.

5.2. The successful bidder will take the approval of concept and design of each exhibit from PGSC

5.3. The successful bidder will take the approval of concept and design of each panel before printing from PGSC

5.4. The PGSC or its representative shall have the right to inspect and / or to test the goods to confirm their conformity to the contract. The technical specifications shall specify what inspections and tests the purchaser requires and where they are to be conducted. The PGSC shall notify the supplier in writing about the identity of any representative retained for these purposes.

5.5. The inspection can be carried at any time of the contract but at following stages the contractor has to take the approvals from PGSC and if needed, modifications or alterations should be done as per recommendations of PGSC.

5.6. If any inspected or tested goods fail to conform to the specifications, the PGSC may reject them and the supplier shall either replace the rejected goods or make all alternations necessary to meet specifications requirements free of cost to the purchaser.

## 6. SUPERVISION

All the work shall be carried out under the direction and according to the satisfaction of PGSC or its representatives. The Supplier shall be responsible for the correctness of the positions, level dimensions of the work according to the drawing not withstanding that he may have been assisted by the PGSC in setting out the same.

## 7. PACKING & FORWARDING

7.1. Contractors, wherever applicable, shall pack and crate all equipment in such a manner as to protect them from deterioration and damage during rail and road transportation

to the site and storage at the site till the time of erection. The contractor shall be held responsible for all damages due to improper packing.

7.2. The contractor shall notify the PGSC of the date of each shipment, and the expected date of arrival at the site.

**8. DEMURRAGE, WHARF AGE ETC.**

All demurrage, wharf age and other expenses incurred due to delayed clearance of the material or any other reason shall be to the account of the contractor.

**9. TRANSPORTATION**

The tenderer is required under the contract to deliver the goods at the project site.

**10. TOOLS & TACKLES**

The contractor shall provide all reliable tools & tackles for proper execution of work. PGSC shall in no way, responsible for supply of any tools & tackles for implementation of the work.

**11. CHANGE ORDERS**

11.1. The PGSC may at any time, by a written order given to the tenderer make changes within the general scope of the contract in any one or more of the following:

11.1.1. Drawings, designs or specifications, where Goods to be furnished under the contract are to be specifically manufactured for the PGSC.

11.1.2. The method of transportation packing.

11.1.3. The services to be provided by the Tenderer.

11.2. If any such change causes an increase or decrease in the cost of or the time required of, the Tenderer's performance of any part of the work under the contract, whether changed or not changed by the order, an equitable adjustment shall be made in the contract price or commissioning schedule or both, and the Contract shall accordingly be amended. All claims by the Tenderer for adjustment under this clause must be asserted within thirty (30) days from the date of the tenderer's receipt of the PGSC's change order.

## 12. SUBCONTRACTS

The tenderer shall notify the PGSC in writing of all subcontracts awarded under the Contract if not already specified in his bid. Such notification, in his original bid or later, shall not relieve the tenderer from any liability or obligation under the Contract.

## 13. TIME SCHEDULE

13.1. Contract time: The time of completion of the work would be **6(Six) months** from the date of award of work which includes mobilization time and any preparation time.

13.2. Commencement of works: The Contractor shall immediately commence the work on award of letter of intent.

13.3. Time is the essence of the contract and contractor shall undertake to complete the work within stipulated time.

13.4. The contractor shall have complete control of the works and shall effectively direct and supervise the work so as to ensure conformity with the contract documents and completion of the work within the time stipulated. He shall be solely responsible for construction means, and methods, techniques sequences and procedures and for coordinating various parts of the work, whether performed by him or by any sub-contractor.

13.5. The contractor shall adhere closely to the approved schedule, closely monitor progress of work, promptly report the delays and submit catch up action plans to make good such delays to the Director, PGSC.

## 14. DELAYS

14.1. Within one fortnight of the occurrence of any of the following, which the contractor might regard as impediments in the progress of work, the contractor shall apply in writing to the Director General, PGSC for extension of time, setting out the reasons for delays sought to be condoned

14.1.1. Addition, alteration or substitution ordered in the work, which could have a significant time impact and issued to the contractor under an official change order only.

14.1.2. Act of god or Force Majeure, i.e. a situation arising out of any occurrence totally beyond the control of the contractor, and explicitly excluding consequences of actions of the contractor or his staff or agents.

14.1.3. Forced closure of the works by a general political strike and unrest not related to contractor's labour or personnel.

14.2. The contractor's application for extension of time in any of the above circumstances shall be considered by Director General, PGSC and his decision shall be final and binding.

14.3. The granting of any extension of time shall not entitle the contractor to claim any additional remuneration or consideration whatever for costs incurred as a result of such delays or due to cost escalation.

**15. COMPENSATION FOR DELAY**

15.1. The time allowed for carrying out the work as entered in the Tender shall be strictly observed by the Contractor and shall be reckoned from the date on which the order to commence work is given to the Contractor. The work shall throughout the stipulated period of the Contract be proceeded with all due diligence and the contractor shall pay an amount equal to one percent of accepted Tender for every week or part of a week that the work remains unfinished after the expiry of the completion date.

15.2. Provided always that the entire amount of compensation to be paid under the provisions of the clause shall not exceed ten percent of the value of the accepted Tender.

15.3. Director General, PGSC may on representation from the Contractor reduce the amount of compensation and his decision in writing shall be final.

**16. BREACH OF CONTRACT & LEAVY OF DAMAGES.**

16.1. The Director or any person authorized by Director General, PGSC may, without prejudice to other rights and remedies, under the provisions of the contract or otherwise after issuing a notice, in writing and getting the final bill prepared absolutely determine the contract after levying compensation for damages of ten percent of the amount of the contract or the amount available with PGSC ,whichever is less, if the contractor commits breach of the contract under any clause of the contract, or in any of the following cases:-

16.1.1. If the contractor suspends the execution of the work and in spite of having been given a notice in writing by the Director or any person authorized by Director General, PGSC fails to resume the work within ten days of the issue of the said notice.

16.1.2. If the contractor, having been given a notice in writing by the Director or any person authorized by Director General, PGSC, fails to rectify, reconstruct or replace any defective work or continues the execution of work in an insufficient, improper, un-workman-like manner or not in accordance with sound engineering practices or without complying with the directions and requirements within a period of 10 days of the issue of said notice.

16.2. In the event of the Agency winding up its business whether voluntarily or compulsorily or in case any proceedings under Insolvency Act is taken against them or a receiver of their business is appointed of failing to observe and perform any of the provisions of this agreement or is in opinion of PGSC not satisfactory proceeding with the work or unsatisfactorily completes the work, the PGSC shall have the right to terminate the work forthwith without prejudice to any other rights or remedies

16.3. After the termination of the contract under this clause, PGSC shall be at liberty to

16.3.1. Get the balance work executed through some other contractual agency or through departmental means.

16.3.2. Abandon the balance work altogether

16.3.3. Modify the design and scope of the work in any manner. The contractor shall have no claim against the PGSC for treating the work in any manner deemed fit.

## 17. COMPLETION OF WORK AND MEASUREMENT

17.1. On completion of the work, the Contractor must submit the following documents:

17.1.1. All technical details, circuit diagrams etc. of all exhibits.
17.1.2. Users Manual
17.1.3. Bills of Material.
17.1.4. List of Spare parts. If any
17.1.5. List of Suppliers / Vendors for the equipment such as lights.
17.1.6. Deviation Statement, if any.
17.1.7. Handing over- Taking Over memo
17.1.8. Work Completion Certificate

17.1.9. Guarantee Certificate

17.1.10. All the OEM guarantee / warrantee certificates / invoices of equipment procured in connection with this project

## 18. PAYMENT SCHEDULE

18.1. No Advance payment will be made at the time of release of the order

18.2. First instalment of running payment of **10%** of the contracted cost could be considered after 25% satisfactory completion of the total work at the site.

18.3. Second instalment of running payment of **20%** of the contracted cost could be considered after 50% satisfactory completion of the total work at the site.

18.4. Third instalment of running payment of **20%** of the contracted cost could be considered after 75% satisfactory completion of the total work at the site

18.5. Fourth instalment of running payment of **25%** of the contracted cost could be considered after 90% satisfactory completion of the total work at the site.

18.6. Fifth instalment of final payment of **25%** of the contracted cost will be considered after 100% satisfactory completion of the total work at the site.

18.7. **Three %** of each instalment of payment will be deducted and retained as Retention Money for Defect Liability Period for the payments made upto 31.12.2021(vide OM No. F.9/4/2020-PPD) and for the payment instalments (if any) made after 31.12.2021 Ten % amount will be deducted and retained as Retention Money for Defect Liability Period

18.8. TDS and / or any other tax will be deducted as per rules.

## 19. DUTIES AND TAXES

No Taxes and Duties other than indicated in the Financial Bid will be paid by the PGSC.

## 20. PRICE ESCALATION

The rates quoted for all the items must remain firm throughout the tenure of this contract and no escalation for whatever reason will be entertained at any stage. Nothing extra will be payable under whatever circumstances may be other than as agreed in the contract.

## 21. RETENTION MONEY

21.1. Retention Money shall be equivalent of 3% of the payments paid up to 31.12.2021 and 10% of payments paid after 31.12.2021 (if any) plus Earnest money deposited by the Agency.

21.2. This Retention Money will be released after expiry of Defect Liability Period or after receipt of Bank Guarantee of equivalent amount valid for Defect Liability Period. The Performa for Bank Guarantee is enclosed at ***Annexure-4.***

**22. REFUND OF RETENTION MONEY**

Retention Money will be refunded after the expiry of Defect Liability Period or after receipt of Bank Guarantee of equivalent amount valid for Defect Liability Period.

**23. DEFECT LIABILITY PERIOD**

23.1. Defect liability period shall be 12 months from the date of successful completion of the work duly accepted by PGSC. The contractor shall be responsible to repair all the defects noticed and pointed out / communicated by PGSC during this period. In case of breach, PGSC shall have the right to get the defect/s rectified by engaging outside agencies at the cost and risk of the contractor.

**24. WARRANTY**

24.1. Warranty Period: will be same as Defect Liability Period or more if as provided by the manufacturer of the equipment. Certificate of Warranty to be provided at the time of handing over the completed work by the tenderer as well as from the original manufacturers of the equipment wherever possible.

24.2. The Tenderer warrants that the Goods supplied under the contract are new, unused, of the most recent or current models and incorporate all recent improvements in design and materials unless provided otherwise in the contract. The tenderer further warrants that the goods erected under this contract shall have no defect arising from design, materials or workmanship or from any act or omission of the tenderer, which may develop under normal use of the supplied Goods in the conditions obtaining in the country of final destination.

24.3. This warranty shall remain valid as specified after the goods, or any portion thereof

as the case may be, have been erected and commissioned.

24.4. The PGSC shall promptly notify the Tenderer in writing of any claims arising under this warranty.

24.5. Upon receipt of such notice, the tenderer shall, with all reasonable repairs or replace the defective Goods or parts thereof, without cost to the PGSC.

24.6. If Tenderer fails to remedy the defect(s) within a reasonable period, the PGSC may proceed to take such remedial action as may be necessary, at the Tenderer's risk and expense and without prejudice to any other rights which the PGSC may have against the Tenderer under the contract.

**25. USE OF COMPLETED PORTIONS:**

25.1. Subject to "Contract Time" above the PGSC shall have the right to take possession of any use any completed or partially completed portion of the work not withstanding that the time for completing the entire work may not have expired. Possession and use shall not be deemed acceptance of any work completed in accordance with the terms of this contract.

25.2. Upon receipt of the takeover notice the contractor shall remove from site any equipment, plant tools, scaffolding, materials of installations of any kind, otherwise the same shall be used by PGSC as own property in completing the work directly or through any other agency or contractor. The contractor shall not in any manner prevent such takeover of the site and there on by PGSC nor shall he hinder or interrupt the work taken over in any manner.

25.3. After takeover of the site and works, PGSC shall be entitled to withhold further payments to the contractor until accounts are settled as provided herein after completion of the work on expiry of the defects liability period.

25.4. Upon completion of his work through an agency other than the contractor, PGSC shall through written notice inform the Contractor that it requires the contractor to remove from site any remaining material as also plant equipment etc. belonging to the contractor. If the contractor fails to remove his materials and equipment within fifteen days, PGSC shall be at liberty to auction or sell such materials and equipment and credit the proceeds of such sale to the account.

25.5. In the above circumstances the contractor shall neither claim compensation of the use of his property by PGSC nor other agency completing the work, nor shall he claim any losses on account of damage to or wear and tear to his property.

25.6. Taking possession of the site and removal of contractor shall not be construed as cancellation of the contract by PGSC and this event shall in no way absolve the contractor of his remaining contractual obligations and responsibilities.

25.7. Should it become necessary for PGSC to take over the work under the above circumstances the contractor shall be liable to make good all costs exceeding the agreed rates in the contract and also incidental expenditure of every nature incurred in completing the Work and duly certified by the Engineer-In-Charge, PGSC.

25.8. The total sum payable by the contractor to PGSC by way of costs incurred in completing the work, damages, and compensation shall be deducted from amounts payable to the contractor. If the amount payable to the contractor is not sufficient to cover the sum due to PGSC, the contractor is bound to pay the difference to PGSC.

**26. SUSPENSION OF WORK**

26.1. The PGSC reserves the right to suspend and reinstate execution of the whole or any part of the works without invalidating the provisions of the contract. The PGSC Administration will issue orders for suspension or reinstatement of the work to the Contractor in writing.. The time for completion of the works will be extended for a period equal to duration of the suspension.

26.2. Any necessary and demonstrable costs incurred by the contractor as a result of such suspension of the works will be paid by the PGSC provided such costs are sustained to the satisfaction of the PGSC. The PGSC shall not be responsible for any liabilities if suspension or delay is due to some default on the part of the Contractor or his sub-contractor.

**27. TERMINATION FOR INSOLVENCY**

PGSC may at any time terminate the contract by giving written notice to the contractor without compensation to the contractor, if it becomes bankrupt or otherwise insolvent,

provided that such termination will not prejudice or affect any right of action or remedy which has accrued or will occur thereafter to the PGSC.

**28. TERMINATION FOR CONVENIENCE**

In the event both the parties want to abandon the above said work at any stage due to reason beyond the control of either party with mutual consent. In such case of termination no further payments, except the payment or payments which has or have been already made or which may be payable for work already done plus balance Concept and design fees in accordance with provisions as per this contract, prior to the date of such abandonment or suspension, as the case may be, shall be made by the PGSC to Contractor/ Agency. The Contractor/ Agency will be, liable to transfer to PGSC all works at such stage of completion, inclusive of all materials procured for the purpose of the project at the time of such termination.

**29. INSURANCE IN RESPECT OF DAMAGE TO PERSONS AND PROPERTY**

29.1. The contractor shall be responsible for all injury to persons, animals or things, and for all structural and decorative damage to property which may arise from the operation or neglect of himself or of any nominated sub-contractor's employees, whether such injury or damage arises from carelessness, accident or any other cause whatever in any way connected with the carrying out of his contract. This clause shall be held to include inter-alia any damage to buildings, electrical work, whether immediately adjacent or otherwise, and any damage to roads, street, footpaths, bridges or ways as well as all damages caused to the buildings and works forming the subject of this contract by inclement weather.

29.2. The contractor shall indemnify the PGSC and hold it harmless in respect of all and any expenses arising from any such injury or damage to person or property as aforesaid and also in respect of any claim made in respect of injury or damage under any Act of Government or otherwise and also in respect of any award of compensation or damages consequent upon such claim.

29.3. The contractor shall reinstate all damages so as to deliver the whole of the contract work complete and perfect in every respect and so as to make good or otherwise satisfy all claims for damage to the property of third parties.

29.4. The contractor shall indemnify the PGSC against all claims which may be made against the PGSC by any member of the public or other third party or any employee of the contractor or subcontractor in respect of anything which may arise in respect of the work or in consequence thereof and shall at his own expense arrange to effect and maintain, until the completion of the contract, a Policy of Insurance against such risks may be purchased by Contractor for this contract.

29.5. The PGSC shall be at liberty and is hereby empowered to deduct the cost of any damage, compensation, costs, charges and expenses arising or accruing from or in respect of any such claim or damage from any sum or sums due to or become due to the contractor.

**30. EXPENSES FOR EXECUTION AGREEMENT**

30.1. The expenses for preparation and execution of Agreement for this contract shall be borne by the contractor

30.2. In case the Successful tenderer does not sign the agreement in stipulated time period given in the letter of Intent then the EMD will be forfeited

30.3. The format of Agreement is attached at ***Annexure:5*****.**

**31. ARBITRATION**

31.1. All questions and disputes of any kind whatsoever between PGSC and the contractor **arising out of this agreement** entered into or in relation thereto or regarding the interpretation of any clause, terms and conditions thereof shall be referred to the Director General, Pushpa Gujral Science City acting as such at the time of reference or any other person as may be nominated by the Director General, PGSC who will be the sole arbitrator and his/her decision will be final and binding. In case the nominated Arbitrator is unable to commence or continue with the Arbitral proceedings for any reason whatsoever, the DG shall nominate / appoint another officer of PGSC who shall commence the proceedings and decide the reference. The provision of Arbitration and Conciliation Act 1996 shall apply.

31.2. The place for arbitration will be Kapurthala.

**32. LEGAL JURISDICTION**

District Courts at Kapurthala, Punjab

## 33. SET OFF

33.1 Any sum of money due and payable to the Bidder/Supplier/Contractor (including security deposit refundable to him) under this contract may be appropriated by the Buyer (PGSC) to set off the same against any claim of the Buyer (PGSC) for payment of a sum of money arising out of this contract made by the Bidder/Supplier/Contractor with Buyer (PGSC)

# ANNEXURES

***Annexure: 1***

**PARTICULARS OF TENDERER**

**Use Additional Sheet if necessary**

| S. No | | |
|---|---|---|
| 1 | Name of Agency | |
| 2 | ➢ Postal Address<br>➢ E-mail address<br>➢ Telephone No.<br>➢ Fax No | |
| 3 | Name and designation of the representative of the Agency to whom all references shall be made<br>Mobile No.<br>Email id. | |
| 4 | Status of Organization (Whether Private/ Public Sector Undertaking / Sole Proprietor / Partnership/Cooperative Society etc.) | |
| 5. | PAN / TAN No.:<br>Self Attested copy | |
| 6. | GST No.:<br>Self Attested copy | |
| 7 | Experience of similar work in years<br>(Attach copy of Experience / Work order / Completion) Certificatesrequired for eligibility criteria and calculation of years of similar work experience. | |
| 8 | Average Turnover of last 3 years<br>Attach Copies of Balance Sheet for the last 3 years certified by the Chartered Accountant (CA) for the last 3 years (i.e. 01-4-2017 to 31-03-2020) | |
| 9 | Number and Profiles of Personnel constituting the Design team<br>(Attach CV / profiles) | |

(Name & Signature of Authorized Person) With seal

Date:
Place:

***Annexure: 2***

# SPECIFICATION SHEET
## (to be submitted along the Technical Bid)
**Use Additional Sheet if necessary**

| S No. | Name of The Exhibit | Mode of Display | Dimensions | Material Used | Any other remarks |
|---|---|---|---|---|---|
| | | | | | |
| **Location: EXHIBITION AREA: A (Ground Floor)** | | | | | |
| A-1. | **Genesis & History of Mathematics** | | | | |
| A-1.1 | Indian Mathematicians | | | | |
| A-1.2 | Story of Zero | | | | |
| A-2 | **Number & Arithmetical Operators** | | | | |
| A-2.1 | Decimal Number System | | | | |
| A-2.2 | Binary Number System | | | | |
| A-2.3 | Concept of Carry Forward | | | | |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |
| A-2.4 | Adding Natural Numbers, Popular Identity, Identity & Equation | | | | |
| A-2.5 | Multiplication | | | | |
| A-2.6 | Visual pattern in Multiplication | | | | |
| A-2.7 | Linear & Quadratic Function | | | | |
| A-3 | **Geometry** | | | | |
| A-3.1 | Dots in Shapes | | | | |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |
| A-3.2 | Sum of Angles of a Triangle | | | | |
| A-3.3 | Shapes & Projections | | | | |
| A-3.4 | Ellipse | | | | |
| A-3.5 | Pythagoras Theorem (Blocks) | | | | |
| A-3.6 | Pythagoras Theorem (Fluid) | | | | |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |
| A-3.7 | Play with Polygons | | | | |
| A-3.8 | Area of Polygons | | | | |
| A-3.9 | Topology | | | | |
| A-3.10 | Simple Harmonic Motion & Sine Wave | | | | |
| A-3.11 | Volume of 3D Shapes | | | | |
| A-3.12 | Platonic Solids | | | | |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |
| A-3.13 | Cardoid& Epicycloid | | | | |
| A-3.14 | Cycloid | | | | |
| A-3.15 | Hypocycloid | | | | |
| A-4 | **Trigonometry** | | | | |
| A-4.1 | Height & Distance | | | | |
| A-5 | **Puzzle / Activity Corner** | | | | |
| A-5.1 | Bramha Tower | | | | |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |
| A-5.2 | Musical Math | | | | |
| A-5.3 | Hyperbola (Acrobatic Stick) | | | | |
| A-5.4 | Jordan's Curve | | | | |
| A-5.5 | Missing Square | | | | |
| A-5.6 | A fair portion of Pizza | | | | |
| **Location: EXHIBITION AREA: B (First Floor)** | | | | | |
| B-6 | **Structures & Networks** | | | | |

| | | | | | |
|---|---|---|---|---|---|
| B-6.1 | Shapes of Shape | | | | |
| B-6.2 | Tessellations | | | | |
| B-7 | **Maths in Nature** | | | | |
| B-7.1 | Golden Ratio | | | | |
| B-8 | **Play with Math** | | | | |
| B-8.1 | Ride Cycle with Square Wheel | | | | |
| B-8.2 | Count Monkeys | | | | |
| B-8.3 | Roller Coaster Ride | | | | |

| | | | | | |
|---|---|---|---|---|---|
| B-8.4 | Make your fastest Track | | | | |
| B-8.5 | Hyper Hyperboloid | | | | |
| B-8.6 | Fractal Tree | | | | |
| B-8.7 | Draw your Song | | | | |
| B-8.8 | Draw from your Song | | | | |
| B-8.9 | Distribution Law (Quincunx) | | | | |
| B-8.10 | Water Clock | | | | |

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|---|---|---|---|---|---|
| | | | | | |
| B-8.11 | Poly Paint | | | | |
| B-8.12 | Bucky Ball | | | | |
| C | **Specifications of Touch Screen Kiosks** | | | | |

**Name, Signature & Seal of Tenderer**

*Annexure: 3*

**FINANCIAL BID**
**MATHEMATICS GALLERY**

| Item of work | Amount in Figures |
|---|---|
| **Work on Turnkey Basis:**<br>Setting up Mathematics Gallery on turnkey basis involving Design, Fabrication, Supply and installation of exhibits, models, printing, fixing of graphic & information panels, display monitors, screens, projectors and other equipment with best quality finishes, interiors, lighting & associated accessories including related civil, electrical and mechanical work required to setup Mathematics Gallery at Pushpa Gujral Science City, Jalandhar-Kapurthala Road, Kapurthala. | **AMOUNT TO BE QUOTED ONLINE** |
| **Amount quoted must include cost of Any item not specified above but required to complete the job in its totality, tools, tackles and accessories, taxes, GST, import duty, transportation and installation charges, FOR Kapurthala etc.** | |

The above quoted price will be NET PAYABLE. No taxes or duties other than indicated above will be charged.

**ITEM WISE FINANCIAL SCHEDULE OF WORKS**
**Mathematics Gallery**

| Sr. No: | Item of Work | Amount to be quoted on Line |
|---|---|---|
| I | **Concept & Design** | **Quote online** |
| II. | **Exhibits** | ---------- |
| A-1. | **Genesis & History of Mathematics** | ---------- |
| A-1.1 | Indian Mathematicians | **Quote online** |
| A-1.2 | Story of Zero | **Quote online** |
| A-2 | **Number & Arithmetical Operators** | ---------- |
| A-2.1 | Decimal Number System | **Quote online** |
| A-2.2 | Binary Number System | **Quote online** |
| A-2.3 | Concept of Carry Forward | **Quote online** |
| A-2.4 | Adding Natural Numbers, Popular Identity, Identity | **Quote online** |

| | | |
|---|---|---|
| | & Equation | |
| A-2.5 | Multiplication | **Quote online** |
| A-2.6 | Visual pattern in Multiplication | **Quote online** |
| A-2.7 | Linear & Quadratic Function | **Quote online** |
| A-3 | **Geometry** | ---------- |
| A-3.1 | Dots in Shapes | **Quote online** |
| A-3.2 | Sum of Angles of a Triangle | **Quote online** |
| A-3.3 | Shapes & Projections | **Quote online** |
| A-3.4 | Ellipse | **Quote online** |
| A-3.5 | Pythagoras Theorem (Blocks) | **Quote online** |
| A-3.6 | Pythagoras Theorem (Fluid) | **Quote online** |
| A-3.7 | Play with Polygons | **Quote online** |
| A-3.8 | Area of Polygons | **Quote online** |
| A-3.9 | Topology | **Quote online** |
| A-3.10 | Simple Harmonic Motion & Sine Wave | **Quote online** |
| A-3.11 | Volume of 3D Shapes | **Quote online** |
| A-3.12 | Platonic Solids | **Quote online** |
| A-3.13 | Cardoid& Epicycloid | **Quote online** |
| A-3.14 | Cycloid | **Quote online** |
| A-3.15 | Hypocycloid | **Quote online** |
| A-4 | **Trigonometry** | ---------- |
| A-4.1 | Height & Distance | **Quote online** |
| A-5 | **Puzzle / Activity Corner** | ---------- |
| A-5.1 | Bramha Tower | **Quote online** |
| A-5.2 | Musical Math | **Quote online** |
| A-5.3 | Hyperbola (Acrobatic Stick) | **Quote online** |
| A-5.4 | Jordan's Curve | **Quote online** |
| A-5.5 | Missing Square | **Quote online** |
| A-5.6 | A fair portion of Pizza | **Quote online** |
| B-6 | **Structures & Networks** | ---------- |
| B-6.1 | Shapes of Shape | **Quote online** |

| | | |
|---|---|---|
| B-6.2 | Tessellations | **Quote online** |
| B-7 | **Maths in Nature** | ---------- |
| B-7.1 | Golden Ratio | **Quote online** |
| B-8 | **Play with Math** | ---------- |
| B-8.1 | Ride Cycle with Square Wheel | **Quote online** |
| B-8.2 | Count Monkeys | **Quote online** |
| B-8.3 | Roller Coaster Ride | **Quote online** |
| B-8.4 | Make your fastest Track | **Quote online** |
| B-8.5 | Hyper Hyperboloid | **Quote online** |
| B-8.6 | Fractal Tree | **Quote online** |
| B-8.7 | Draw your Song | **Quote online** |
| B-8.8 | Draw from your Song | **Quote online** |
| B-8.9 | Distribution Law (Quincunx) | **Quote online** |
| B-8.10 | Water Clock | **Quote online** |
| B-8.11 | Poly Paint | **Quote online** |
| B-8.12 | Bucky Ball | **Quote online** |
| **III** | Touch screen Kiosks (minimum number 8) | **Quote online** |
| **IV.** | **Thematic Interiors & Lighting Arrangement** | **Quote online** |
| **V** | **Shifting of existing exhibits from the allocated Mathematics gallery** | **Quote online** |
| **VI** | **Any item not specified above but required to complete the job in its totality** | **Quote online** |
| **VII** | **Tax & Duties** | **Quote online** |
| | **GRAND TOTAL** | **Quote online** |

**Name, Signature & Seal of Tenderer**

***Note:***

- *No taxes or duties other than the indicated above will be paid by the PGSC.*
- *TDS / any other deductions will be deducted as applicable time to time.*
- *Any other item required to complete the work shall be deemed to be included in the quoted amount. Nothing extra will be payable.*
- The above financial bid quoted for turnkey project will be considered in Financial Evaluation.

**Annexure - 4**

**SPECIMEN**
**PERFORMANCE BANK GUARANTEE**

To
Name of Purchaser .....
Address of Purchaser.....

Whereas (Name and address of
contractor).....
Date..... To execute (Name of contract and Brief description of works).

AND WHEREAS it has been stipulated by you in the said contract that the contractor shall furnish you with a Bank Guarantee by recognized bank for the sum specified therein as security for compliance with his obligations in accordance with the contract.

AND WHEREAS we have agreed to give the contractor such a Bank Guarantee:

NOW THEREFORE we hereby affirm that we are the guarantor and responsible to you on behalf of the contractor, upto a total of amount of guarantee.....
(in words ..... We undertake to pay you upon your first written demand and without cavil or argument, any sum or sums within the limit of amount of guarantee.....as aforesaid without your needing to prove or to show ground or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the contractor before presenting us with the demand.

We further agree that no change or addition to or other modifications for the terms of the contract or of work to be performed there under or any of the contract documents which may be made between you and contractor shall in any release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modifications.

This guarantee is valid until the date..... after the issuing of the maintenance certificate.

**SIGNATURE AND SEAL OF THE GUARANTOR**.....

Name of Bank.....

Address.....

Date .....

***Annexure: 5***

**AGREEMENT**

**AGREEMENT FOR SETTING UP MATHEMATICS GALLERY ON TURNKEY BASIS INVOLVING DESIGN, FABRICATION, SUPPLY AND INSTALLATION OF EXHIBITS, MODELS, PRINTING, FIXING OF PANELS, INTERIORS, LIGHTING & ASSOCIATED ACCESSORIES INCLUDING RELATED CIVIL, ELECTRICAL AND MECHANICAL WORK REQUIRED TO SETUP MATHEMATICS GALLERY AT PUSHPA GUJRAL SCIENCE CITY, JALANDHAR-KAPURTHALA ROAD, KAPURTHALA**

This agreement is made on the_____between Pushpa Gujral Science City Society and its successors, assigns, executors etc. (hereafter referred to as the Society/ PGSC) and M/s_____ _____(Hereinafter referred to as the contractor) for **Setting up Mathematics Gallery on turnkey basis involving Design, Fabrication, Supply and installation of exhibits, models, printing, fixing of graphic & information panels, display monitors, screens, projectors and other equipment with best quality finishes, interiors, lighting & associated accessories including related civil, electrical and mechanical work required to setup Mathematics Gallery at PushpaGujral Science City, Jalandhar-Kapurthala Road, Kapurthala.** The terms and conditions of Tender Notice and minutes of pre bid meeting shall also form part of this contract.

----- Scope of Work-----
----Specifications---
----Instructions to Tenderers---
----- Terms and Conditions-----
----- Minutes of Pre-Bid Meeting---
----- Accepted rates ----
----- Tender Document----
----All correspondence, by which the contract is added or amended, varied or modified in any way, by mutual consent----

**For Contractor**
Designation
Contractor Address

**For PGSC, Kapurthala**
Administrative Officer
PushpaGujral
Science City
Kapurthala

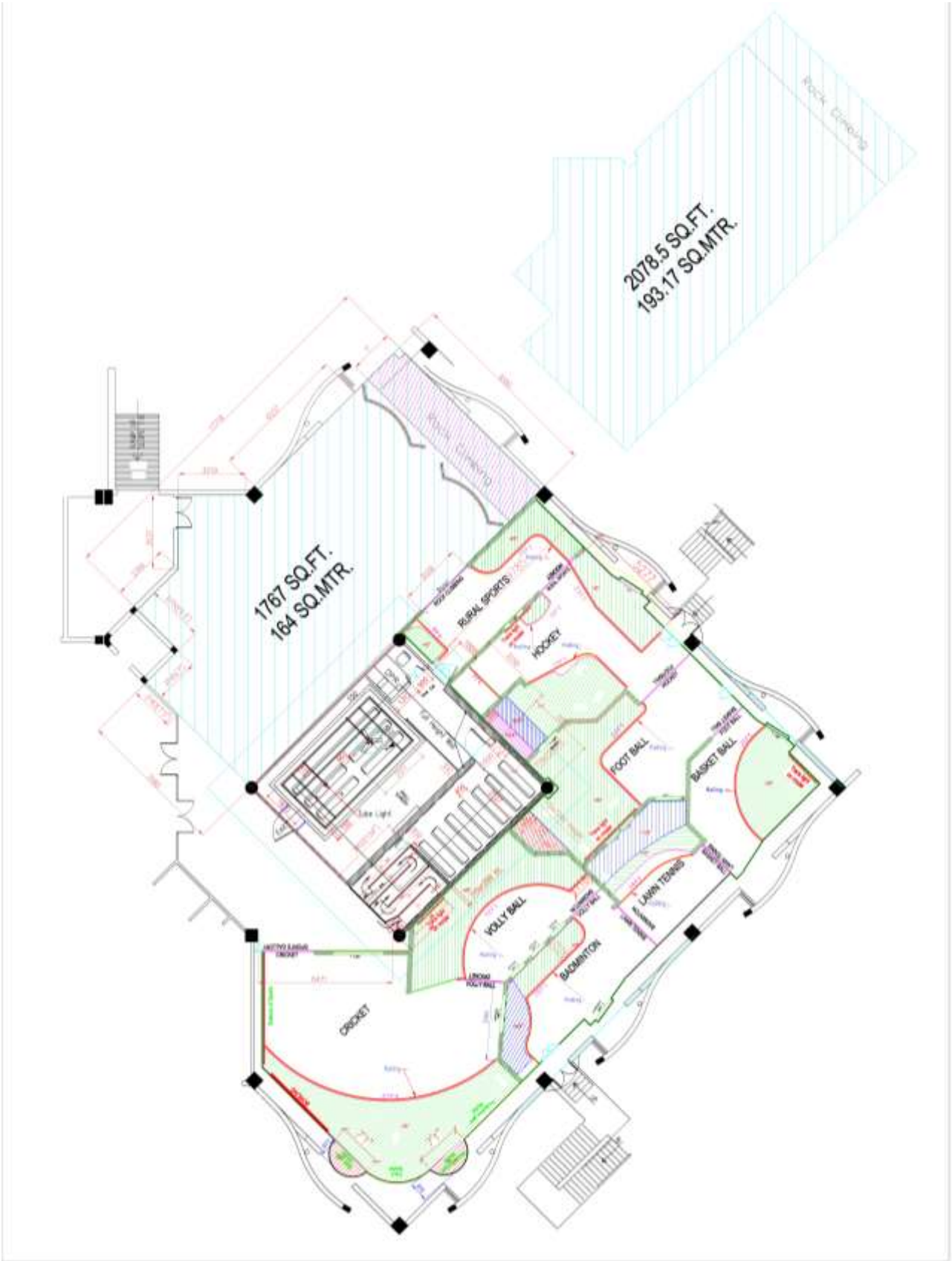
**Witness:**

**Witness:**

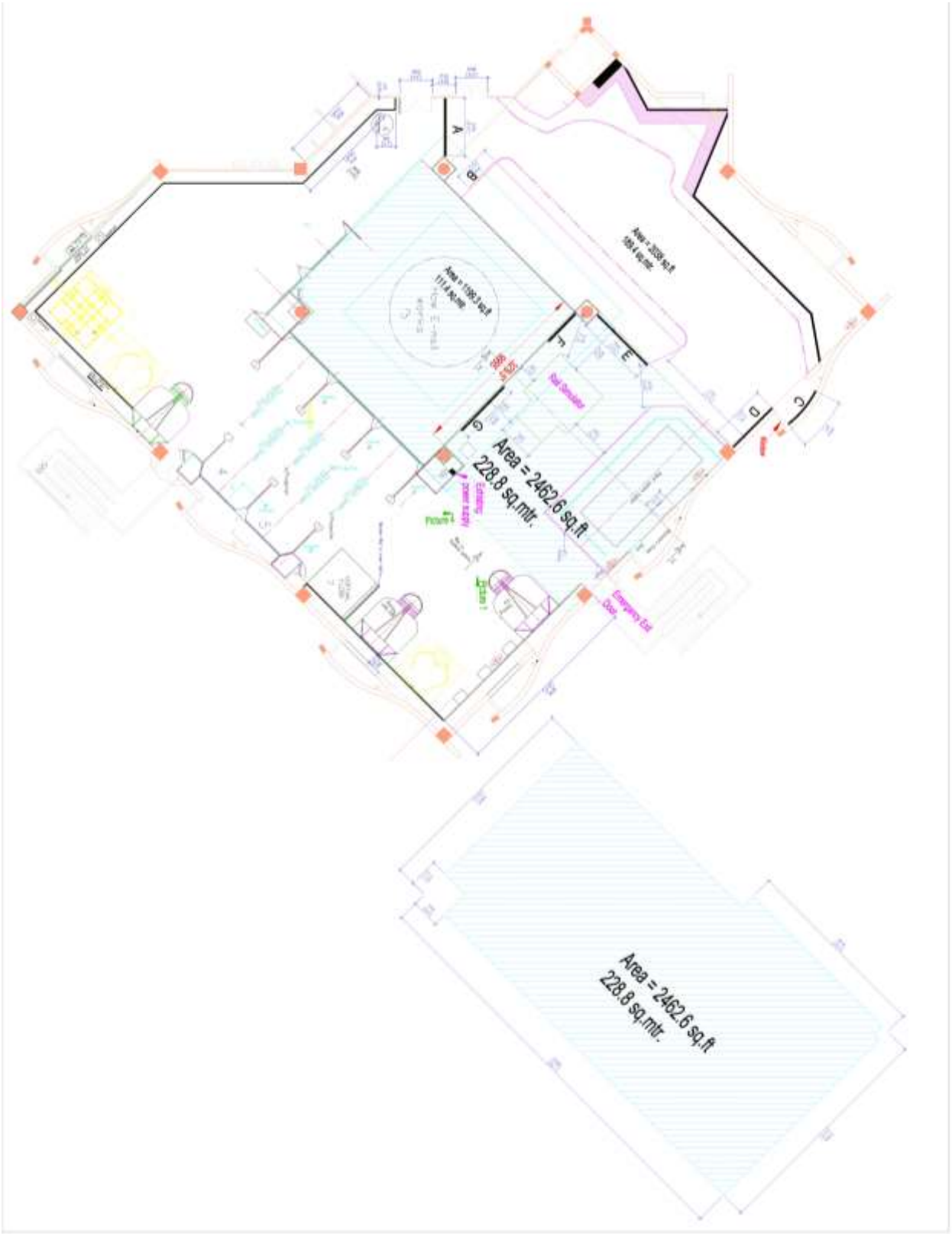
# APPENDIX: 1 & 2

# EXHIBITION AREA

## EXHIBITION AREA: A (Ground Floor) Adjacent to Science of Sports Gallery



## EXHIBITION AREA: B (First Floor) Adjacent to VR Gallery



# APPENDIX: 3

# EXHIBITS

**Exhibit: Indian Mathematicians (Exhibit No.: A-1.1)**

**Description:** Information on legendary Indian mathematicians (viz. Madhava, Srinivasa, Ramanujan, Harish Chandra, CS Seshadri) on TV Screen video presentation and half bust models of them on Decorated Table

**Mode of Display:** FRP half bust model on rotatable table top along with audio and video presentation

**Description:** Information on legendary Indian mathematicians in TV Screen video presentation and half bust models of them on Decorated Table

**Quantity :** 4 models of Indian mathematicians about 600mm height in proportion
LED TV animation

**Operation:** A continuous video presentation on the works of Indian mathematicians shall be running on loop. The same can be controlled to play, pause or start from the beginning

**Suggestive Dimensions**:

Height: 1800mm (approximately)

Width: 1200mm (approximately)

Length: 1200mm (approximately)

**Exhibit: Story of A Zero (Exhibit No.: A-1.2)**

**Description:** Story of ZERO is a historic journey of the number 0 and explanation of all the fascinating facts about its worth in mathematics.

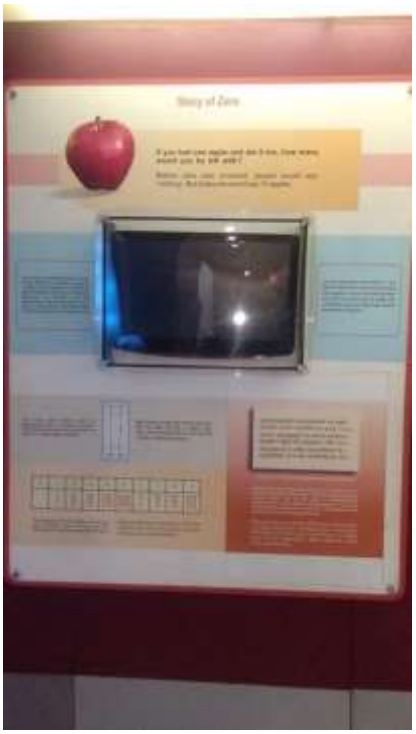
**Mode of Display:** Audio Visual Program on 43" Screen

**Materials:**

LED screen animation with A grade voice over artist narration.

**Operation:**

HD quality audio video playback on the invention of Zero and facts



**Suggestive Dimensions**:

Height: 2200mm(approximately)

Width: 1000mm(approximately)

Depth: 250mm (approximately)

**Exhibit: Decimal Number System (Exhibit No.: A-2.1)**

**Description:** An exhibit to describe how the position of any digit in a number affects is value by units, tens, hundreds and thousands, repositioning the digits will increase or decrease the value.

**Mode of Display:**

- Physical shapes of a few numbers
- Object detection microcontroller circuit Each numbers placed on the slots in table will show the number as Thousands-Hundreds-Tens-Ones.
- 7 Segment displays.
- Table Top Interactive Exhibit.


**Materials:**

7 Segment display (large and small)
Electronic programmed IC with object detection circuit
WPC board number cutout X 10
LED lights

**Operation:** Place the digits into the slots and observe its change in value by factors of units in decimal number system.

**Suggestive Dimensions**:

Height: 2200mm (approximately)

Width: 2000mm (approximately)

Depth: 600mm (approximately)

**Exhibit: Binary Number (Exhibit No.: A-2.2)**

**Description:** This exhibit shall describe the principle of Binary Number System in an interactive way. Visitors shall be able to learn how Decimal numbers are converted to Binary and vice versa, the fundamental of electronic calculation of numbers.

**Mode of Display:**

- Buttons input operation Programmed microcontroller operated circuit LED display and LED lighting for 0 and 1
- Flipping 8 switches will select 0 or 1 The value of 8 bits and its corresponding number value shall be displayed in the LED board.
- Kiosk based Interactive exhibit.

**Materials:**

Materials: Seven Segment Display - (3" X4 Main for decimal value, 2" x 8 Digit for binary).
Custom microcontroller circuit with complete wiring for operation.
Large electrical switches (3" or more) X 8 for 8 bit input.

**Operation:**

On toggling the state of 8 switches, the respective switch will change the value from 0 to 1 on each bit of a byte. Accordingly the value of decimal number of the corresponding byte shall be displayed in the LED display

**Suggestive Dimensions**:

Height: 2200mm (approximately)

Width: 1500mm (approximately)

Depth: 500mm (approximately)

**Exhibit: Concept of Carry Forward (Exhibit No.: A-2.3)**

**Description:** The visitor shall learn the concept of carry forward (for addition) with a custom software based operation on screen where some small fishes can be added, selected and observing them to convert in bigger fishes (in selection of 10s) which will allow to increase the digit in Ten's place. Similarly vice versa concept of subtraction will be also displayed through software.

**Mode of Display:**

- 43" LED Screen
- Gesture control operation / Digital pen interface
- Custom Software with dedicated Computer
- Selection of small fishes adds them in group of 10 to transform into a bigger fish

**Suggestive Dimensions**:

Height: 1800mm (approximately)

Width: 750mm (approximately)

Length: 250mm (approximately)

**Exhibit: Adding Natural Numbers (Exhibit No.: A-2.4 a)**

**Description:** An exhibit to demonstrate addition of natural numbers

**Mode of Display:**

- Segment regular shapes of on table top to simply the multiplying factors and relationship.
- Table Top Interactive Exhibit


**Materials:**

Various sizes of Wooden / WPC blocks with unit measurements X 6

**Operation:**

The visitor shall place the shapes according to the instructions in the panel.

**Suggestive Dimensions**:

Height: 1800mm (approximately)

Width: 600mm (approximately)

Length: 600mm (approximately)

**Exhibit: Popular Identity (Exhibit No.: A-2.4 b)**

**Description:** An exhibit to demonstrate practical value of the most common mathematical formula a2 - b2 = (a+b) (a-b)

**Mode of Display:**

- Segment regular shapes of on table top to simply the multiplying factors and relationship
- Table Top Interactive Exhibit

**Materials:**

WPC cutout shape with engraved letters.


**Operation:** Positioning of the shapes according to thementioned formula.

**Suggestive Dimensions**:

Height: 1200mm (approximately)

Width: 450mm (approximately)

Length: 750mm (approximately)

**Exhibit: Identity & Equation (Exhibit No.: A-2.4 c)**

**Description:** Identity and Equation exhibit have four mathematical equations which have been explained using shapes that determines area of two variables.

**Mode of Display:**

- Segment regular shapes of on table top to simply the multiplying factors and relationship.
- Table Top Interactive Exhibit

**Materials:** WPC board cutout pieces, FRP blocks.

**Operation:** Arranging the pieces on the puzzle board table and blocks which can be fitted with each other.

**Suggestive Dimensions**:

Height: 1800mm (approximately)

Width: 1800mm (approximately)

Length: 750mm (approximately)

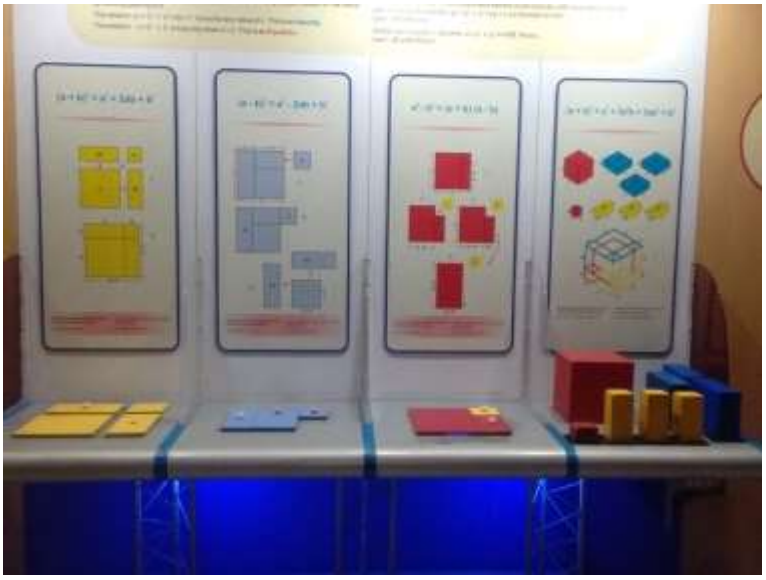


**Exhibit: Multiplication (Exhibit No. 2.5)**

**Description:** A simple and intuitive explanation of multiplication of two values (a+x) and (a+y). The visitor shall learn by comparing the sizes of each rectangle.

**Mode of Display:**

- Segment regular shapes of on table top to simply the multiplying factors and relationship
- Table Top Interactive Exhibit


**Materials:** WPC cutout shape with engraved letters.

**Operation:** Positioning of the shapes according to the mentioned formula.

**Suggestive Dimensions**:

Height: 1200mm (approximately)

Width: 450mm (approximately)

Length: 450mm (approximately)

## Exhibit: Visual Pattern in Multiplication (Exhibit No.: A-2.6)

**Description:** This exhibit comprises of White Acrylic individually backlit 10X10 matrix and 10 buttons from numbers 1 to 10. On pressing any of the button, the multiplication table upto 100 shall illuminate. The user can select upto 4 numbers, any more button will stop the first selection and continue with other three as well the new selection. Each selection will be differentiated with colours and hence the pattern of multiplication will be generated. Overlapping selections will have nice rainbow and dimming effect to make it visually attractive.

**Mode of Display:**

- LED backlit board 10X10 grid
- Programmed microcontroller operated circuit
- 10 button input
- Microcontroller operated individual LED light for each block
- Panel mount exhibit

**Suggestive Dimensions**:

Height: 1800mm (approximately)

Width: 700mm (approximately)

Depth: 250mm (approximately)

**Exhibit: Linear & Quadratic Function (Exhibit No. 2.7)**

**Description:** A wonderful exhibit to describe the basic diff erence between linear and quadratic functions. Three diff erent transparent containers will be filled by colored fluid at same rate, yet the shape of the containers will produce the change in rate of rise in water level. The function and its path will be described in the LED monitors. The visitor has to press the button to observe the process.

**Mode of Display:**

- 43"" Screen with custom software and dedicated computer Function generator.
- Custom keys to select function and value of its variables.
- Accordingly the graph is plotted on screen with scalable units.
- Kiosk based interactive exhibit

**Materials:** LED monitors, transparent containers, pump, software for onscreen information, push buttons.

**Operation:** Pressing the corresponding buttons will start the water flow and show the function on screen at which the water level is increased.

**Suggestive Dimensions**:

Height: 2200mm (approximately)

Width: 2400mm (approximately)

Depth: 450mm (approximately)

**Exhibit: Dots in shapes (Exhibit No.: A-3.1)**

**Description:** This exhibit demonstrates the shapes that can be formed with specific number of spheres (soft balls). The table is specially designed in a way that the visitor can arrange the balls in a rectangular, triangular and hexagonal pattern.

**Mode of Display:**

- Physical pieces of soft balls
- Specially designed table where the balls can be arranged

**Suggestive Dimensions**:

Height: 1800mm (approximately)

Width: 1200mm (approximately)

Length: 1200mm (approximately)

**Exhibit: Sum of Angles of a Triangle (Exhibit No.: A-3.2)**

**Description:** This exhibit will explain visitors the mathematical logic that sum of all angles of a triangle equals to 180 degrees. According to the triangle and square example in the panel, the pieces can be ordered to understand the phenomenon

**Mode of Display:**

- Hands-on objects operation - Table Top Interactive Exhibit

**Materials:** WPC cutout shape with engraved letters.

**Operation:** Positioning of the shapes according to the mentioned formula.


**Suggestive Dimensions**:

Height: 1200mm (approximately)

Width: 600mm (approximately)

Length: 600mm (approximately)

**Exhibit: Shapes and Projections (Exhibit No.: A-3.3)**

**Description:** Shapes and projections is an exhibit to understand how a three-dimensional object will intersect a plane to form its two dimensional shape in which it can easily passed if it object is not rotated in its own axis.

**Mode of Display:**

- Different 3d shaped objects (Cuboid / Shpere / Pyramid etc) and there XZ plane projection of a clear acrylic frame.
- Tray to support the shapes behind the acrylic frame.
- Visitors can take the objects and place on the tray through the acrylic frame
- Kiosk based exhibit.

**Materials:** Various 3d objects made of WPC / FRP moulded, 2d shape cutouts on clear acrylic, tray on wall panel, mechanical fittings.

**Operation:** User can rotate the objects placed on board and position to its accurate orientation so that it pass through the cut out shape.

**Suggestive Dimensions**:

Height: 1800mm (approximately)

Width: 1000mm (approximately)

Length: 600mm (approximately)

**Exhibit: Ellipse (Exhibit No.: A-3.4)**

**Description:** Ellipse and its properties is explained in this exhibit. The minor and major axis, along with the procedure on how to draw an ellipse can be easily explained here, as well as differences between an ellipse and a circle.

**Mode of Display:**

- Shape of Ellipse.
- String movement connecting to focii and tracing ellipse.
- Table top Interactive Exhibit.

**Materials:** Ellipse and a circle cut out pieces in acrylic, a belted mechanism to trace the shape of ellipse and the circle from its focii, a roller wheel around the ellipse and circle.

**Operation:** The visitor shall understand the major axis, minor axis and focii of ellipse by rotating a roller around the periphery of the acrylic shape.

**Suggestive Dimensions**:

Height: 1200mm (approximately)

Width: 750mm (approximately)

Length: 750mm (approximately)

**Exhibit: Pythagoras Theorem (Block) (Exhibit No. A-3. 5)**

**Description:** This simple exhibit is intended to explain the Pythagoras theorem by block pieces of three squares with sides a, b and c. The pieces of a and b squares can be arranged inside c square frame, which practically proves c^2 = a^2 + b^2

**Mode of Display:**

- Segment regular shapes of triangles on table top to simply the formula
- Table Top Interactive Exhibit

**Materials:** WPC board cutout shapes, Acrylic frame.

**Operation:** Pieces of triangles and squares has to be fit inside the frame that are true to geometric ratio of Pythagoras Theorem.

**Suggestive Dimensions**:

Height: 1200mm (approximately)

Width: 600mm (approximately)

Length: 600mm (approximately)

**Exhibit: Pythagoras Theorem (Fluid) (Exhibit No.: A-3.6)**

**Description:** This exhibit shall be displayed with a turntable, on which a clear acrylic setup of 3 squares arranged according to Pythagorean Theorem. Colourful viscous fluid shall be filled in square a and b which can pass through every square. The volume of the fluid in both squares shall fill up the third square, hence proving the theorem.

**Mode of Display:**

- Triangle and square shaped acrylic frame with fluid inside on a rotating disc on front panel
- Wall Mounted Interactive Exhibit

**Materials:** Acrylic laser cut discs, coloured fluid in transparent chamber of the discs, bearing fitted base plate.

**Operation:** Rotation of discs to observe fluid from C square completely fills A and B squares.

**Suggestive Dimensions**:

Height: 1200mm (approximately)

Width: 600mm (approximately)

Depth: 250mm (approximately)

**Exhibit: Play with Polygons (Exhibit No.: A-3.7)**

**Description:** This exhibit is a puzzle type exhibit where students can learn about polygons and how smaller polygons can be arranged together to form larger polygons. This exhibit will have 3 different puzzles for different shapes of polygons like triangles, trapeziums, hexagons etc in 3 levels: Easy, Normal, Difficult.

**Mode of Display:**

- Segment regular shapes of polygons on table top to simply the calculation of area
- Table Top Interactive Exhibit

**Materials:** WPC cutout shapes.

**Operation:** Positioning of the shapes according to the display panel information.


**Suggestive Dimensions**:

Height: 1200mm (approximately)

Width: 750mm (approximately)

Length: 750mm (approximately)

## Exhibit: Area of Polygons (Exhibit No.: A-3.8)

**Description:** This exhibit is intended to practically demonstrate the area of polygons. Wall mounting vertical turntables with clear acrylic polygons are filled with colour fluid, segments of polygons gets filled while rotating to different angles helping to understand how to find the area of polygons. On the table, there shall be segments of triangles which can explain the area of triangles.

**Mode of Display:**

- Polygons shaped acrylic frame with fluid inside on a rotating disc on front panel X 2
- Segment regular shapes of polygons on table top to simply the calculation of area
- Table Top Interactive Exhibit

**Suggestive Dimensions:**

Height: 1800mm (approximately)

Width: 1500mm (approximately)

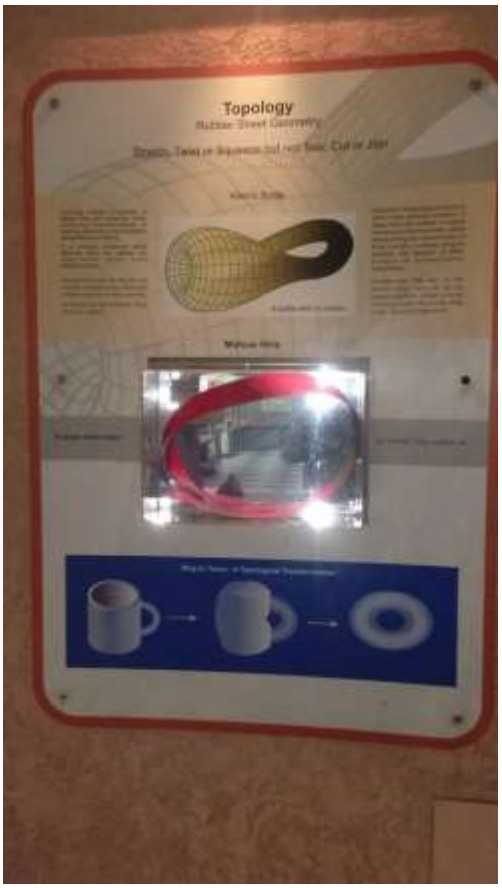
Length: 750mm (approximately)

**Exhibit: Topology (Exhibit No.: A-3.9)**

**Description:** An exhibit to display topological shapes, mainly mobius strip and toroid. The shapes shall rotate on a table and the visitor can see and observe the shapes.

**Mode of Display:**

- 3D printed / FRP made shape of topology
- Movement of the shape with special motorized setup




**Suggestive Dimensions**:

Height: 1800mm (approximately)

Width: 900mm (approximately)

Length: 900mm (approximately)

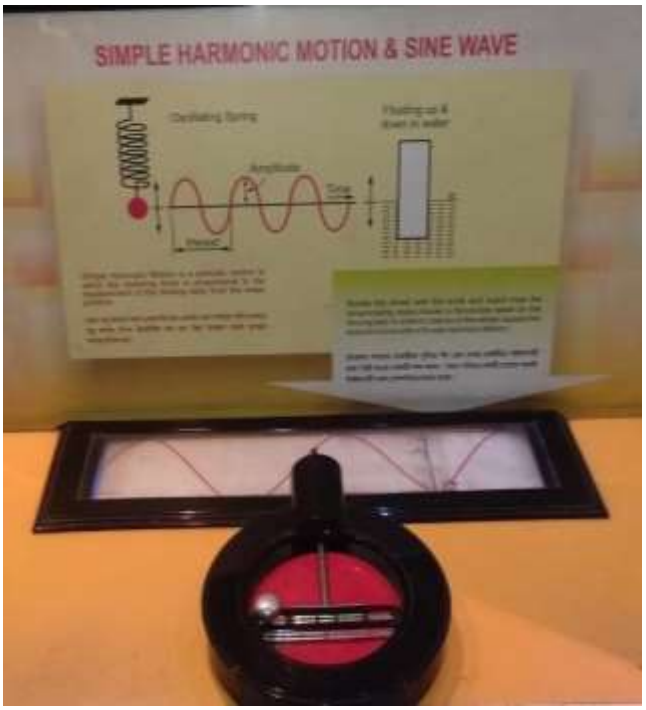
**Exhibit: Simple Harmonic Motion & Sine Wave (Exhibit No.: A-3.10)**

**Description:** A mechanical exhibit to describe a sinusoidal waveform by movement of a dial on which a shaft moves in and out synchronized with the scroller on the table that displays a graph of sinusoidal wave. The visitor has to rotate the dial and observe the effect.

**Mode of Display:**

- Mechanical rotation of handle to move a special mechanism which will in turn rotate a sinusoidal pattern in scroller
- Table top Interactive Exhibit

**Materials:** Acrylic frame, scroller, specially designed mechanical setup under the table connecting the movement of dial with the scroller, a dial with SS shaft and cam.




**Suggestive Dimensions**:

Height: 1200mm (approximately)

Width: 750mm (approximately)

Length: 500mm (approximately)

**Exhibit: Volume of 3D Shapes (Exhibit No.: A-3.11)**

**Description:** Volume of geometrical shapes are compared in this exhibit. Its relationship to another is mentioned in the display panel and the same can be observed physically. There shall be two swinging clear acrylic structures which can be inverted to see the relationship of volume between two 3d shapes.

**Mode of Display:**

- Grain filled clear acrylic cylinders and other 3d shapes
- Relation to its formula with factors
- Racks with various 3D printed / FRP model solids
- Kiosk based exhibit

**Materials:** Arcylic pieces of cylinders, hemispheres and triangles, coloured fluid. volume level markings, SS stands to support the components, bushes and accessories.

**Operation:** Inverting the structure will cause the fluid to shift from one shape to another, the difference in volume is clearly identified on the scale printed on the body of components.

**Suggestive Dimensions**:

Height: 1800mm (approximately)

Width: 1650mm (approximately)

Length: 900mm (approximately)

**Exhibit: Platonic Solids (Exhibit No.: A-3.12)**

**Description:** Platonic solids exhibits gives the user a clear understanding about how identical faces can join together to form a three dimensional polyhedron

**Mode of Display:**

- Multiple models of Platonic Solid objects (3d printed / FRP moulded) on racks
- Visitors can touch and observe the shapes
- Table top Interactive exhibit

**Materials:** Multi-wood / 3d printed / FRP moulded / WPC cutouts in four sets

**Operation:** The shapes can be interlocked to form a three dimensional shape which is a platonic solid.


**Suggestive Dimensions**:

Height: 1800mm (approximately)

Width: 1500mm (approximately)

Length: 900mm (approximately)

**Exhibit: Cardoid& Epicycloid (Exhibit No.: A-3.13)**

**Description:** This exhibit will explain visitors the geometrical pattern Cardoid and Epicycloid. On the table, there shall be 2 Acrylic cylindrical structures, on which there shall be a mechanical fitting of planetary gear system with a rotational handle which shall be interacting with the visitor.

**Mode of Display:**

- Mechanical rotation of handle to move planetary gears
- Dot on gear will trace the path of the curve
- Table top Interactive Exhibit

**Materials:** Acrylic, metal gears, shafts and knobs.

**Operation:** Rotation of knobs will trace the path of curve which forms the geometrical patterns.


**Suggestive Dimensions**:

Height: 1200mm (approximately)

Width: 750mm (approximately)

Length: 600mm (approximately)

**Exhibit: Cycloid (Exhibit No.: A-3.14)**

**Description:** This exhibit will explain visitors the geometrical pattern Cycloid. On the table, there shall be one Acrylic cylindrical structure, on which there shall be a mechanical fitting of planetary gear system with a rotational handle which shall be interacting with the visitor.

**Mode of Display:**

- Mechanical rotation of handle to move planetary gears
- Dot on gear will trace the path of the curve
- Table top Interactive Exhibit

**Materials:** Acrylic, metal gears, shafts and knobs.

**Operation:** Rotation of knobs will trace the path of curve which forms the geometrical patterns.

**Suggestive Dimensions**:

Height: 1200mm (approximately)

Width: 600mm (approximately)

Length: 600mm (approximately)

**Exhibit: Hypocycloid (Exhibit No.: A-3.15)**

**Description:** This exhibit will explain visitors the geometrical pattern Hypocycloid. On the table, there shall be 3 Acrylic cylindrical structures, on which there shall be a mechanical fitting of planetary gear system with a rotational handle which shall be interacting with the visitor.

**Mode of Display:**

- Mechanical rotation of handle to move planetary gears
- Dot on gear will trace the path of the curve
- Table top Interactive Exhibit


**Materials:** Acrylic, metal gears, shafts and knobs.

**Operation:** Rotation of knobs will trace the path of curve which will form the geometrical patterns.

**Suggestive Dimensions**:

Height: 1200mm (approximately)

Width: 750mm (approximately)

Length: 600mm (approximately)

**Exhibit: Height and Distance (Exhibit No.: A-4.1)**

**Description:** In this exhibit the visitor shall be understanding the concept of calculation of height from the distance and the angle. Use of sextant can also be described in this exhibit. There shall be a fixed cutout of a tall tower and a movable human model, on which a protractor is fixed and a recoiling thread is connected with the top of the tower and the eye of the human model. Rotating the handle will move the human close or away from the tower. There shall also be a custom scale in ratio, which the visitor can take value and calculate the height of the building.

**Mode of Display:**

- Mechanical sliding movement of object in exhibit
- String and protractor to determine the angle
- Handle rotation to observe movement and determine the distance
- Kiosk type exhibit

**Materials:** Modelling board cutout designs, height and angle variance using stepper motors.

**Operation:** Observing how trigonometry stands correct with its formulas to identify height and distance.

**Suggestive Dimensions**:

Height: 1800mm (approximately)

Width: 1500mm (approximately)

Depth: 250mm (approximately)

**Exhibit: Bramha Tower (Exhibit No.: A-5.1)**

**Description:** This exhibit is an insight to recursive permutation of arranging discs from one tower to another following a set of rules. The solution with the least number of moves is also displayed in the front panel. The visitor has to obey the rules and move the discs from one tower to another. The amazing insight is also present that had the tower been built with 64 discs, the process of achieving the solution would take 3 times longer time than the birth of the universe.

**Mode of Display:**

- 3 discs of different radius
- 3 SS rods to put the discs in columns
- Rules of game in information panel

**Materials:** Multiwood discs, SS pipe tower.

**Operation:** A visitor will place one disc over another restricting to a condition that any larger disc cannot be placed over a smaller one.

**Suggestive Dimensions**:

Height: 1800mm (approximately)

Width: 750mm (approximately)

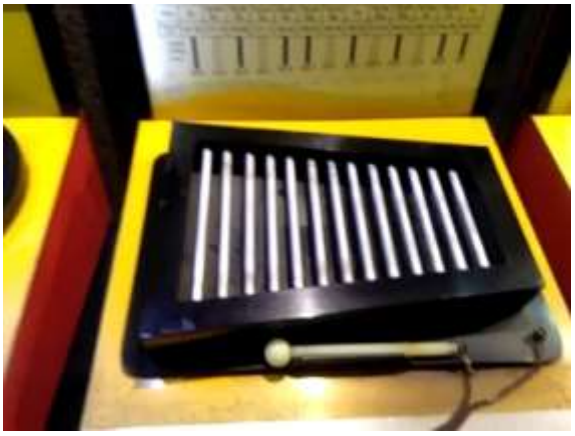
Length: 750mm (approximately)

**Exhibit: Musical Math (Exhibit No.: A-5.2)**

**Description:** An exhibit to determine each musical note is of different frequency and hence the different pitch of each note. The visitor shall be clearly able to have fun playing the xylophone as well as learn about the notes and their frequency.

**Mode of Display:**

- Table Top Interactive Exhibit
- Xylophone on table
- Frequency / Note display circuit
- Hands-on operation



**Materials:** Metal rods with scientific accuracy to generate all 12 tones of an Octave in A key, a frequency detector.

**Operation:** Using the tool to click metal rods and generate tones.

**Suggestive Dimensions**:

Height: 1200mm (approximately)

Width: 600mm (approximately)

Length: 450mm (approximately)

**Exhibit: Hyperbola (Acrobatic Stick) Exhibit No.: A-5.3**

**Description:** An exhibit to explain the formation of hyperbolic curve by rotation of a straight line in 3D geometry intersecting on a vertical plane. The visitor shall press the button to observe the rotation of uniquely positioned metal rod (straight line) that intersects a vertical plane to plot the shape of hyperbola.

**Mode of Display:**

- Center exhibit
- Rotating SS rod
- XZ plane acrylic with hyperbola intersection of SS Rod
- Electromechanical operation
- Geared motors and programmed microcontroller circuit
- Button press operation

**Materials:** Metal structure, Motorized movement, Acrylic cutout of hyperbola.

**Operation:** Press of a button / motion sensor activated movement of metal rod to pass through the hyperbolic curve.

**Suggestive Dimensions**:

Height: 1800mm (approximately)

Width: 1200mm (approximately)

Length: 1200mm (approximately)

**Exhibit: Jordan's Curve (Exhibit No.: A-5.4)**

**Description:** This exhibit is meant to explain the visitors the concept of space filling curve. There shall be shapes of 3 different animals on printed media, which is drawn with one single curve. Jordan’s curve theorem explaining interior and exterior region and how by simple calculation one can identify the region.

**Mode of Display:**

- Table Top Exhibit
- Printed plot of Jordan's curve into 3 different animal shaped illustration (space filling curve example)

**Materials:** Vinyl printed graphic


**Operation:** Identification of points mentioned in the graphic and simple calculations mentioned in the info panel.

**Suggestive Dimensions**:

Height: 1200mm (approximately)

Width: 600mm (approximately)

Length: 600mm (approximately)

**Exhibit: Missing Square (Exhibit No.: A-5.5)**

**Description:** This exhibit shall create the illusion of a missing piece in a given puzzle. It describes a mathematical process of using fractional values to create the illusion. The visitor has to arrange the pieces of puzzle on the table according to the two states and observe the illusion comparing with the graph.

**Mode of Display:**

- WPC cut piece for puzzle
- Two states of puzzles with same pieces on the front panel
- Graph plotted table
- Hands on operation exhibit

**Suggestive Dimensions**:

Height: 1800mm (approximately)

Width: 450mm (approximately)

Depth: 250mm (approximately)

**Exhibit: A Fair portion of Pizza (Exhibit No.: A-5.6)**

**Description:** This exhibit demonstrates the principle that any circle can be intersected with many chords and every alternative portion when separated in two groups shall be equal in area. This activity shall be very interesting, where the visitor makes dough from modeling clay, puts it under a roller to flatten, then takes a circular dye to cut it into a circle. Using the blunt knife, the visitor shall cut the circular dough into many pieces and place alternative portions together on to two separate weighing machines. The weight of each group shall be equal, since the thickness is same for each portion, hence the summation of their area is also equal.

**Mode of Display:**

- Modelling clay
- Motorized roller to flatten to clay
- Circular cut dye and large blunt knife (child-safe)
- Two digital weighing machine
- Hands on activity exhibit

**Suggestive Dimensions**:

Height: 2200mm (approximately)

Width: 1650mm (approximately)

Depth: 750mm (approximately)

**Exhibit: Shapes of Space (Exhibit No.: B-6.1)**

**Description:** Two poles with ferromagnetic property shall be the core of this exhibit. Various shapes of flexible magnetic sheet cutout pieces shall be provided. On placing the pieces on the pole, the visitor shall learn on how curved surfaces are mathematically different from a plane.

**Mode of Display:**

- Magnetic core 3d shapes X 2
- Colorful magnetic shapes of various sizes


**Operation:** Fit together shapes on differently curved surfaces and observe the differences among them.

**Suggestive Dimensions**:

Height: 1200mm (approximately)

Width: 1500mm (approximately)

Length: 1200mm (approximately)

**Exhibit: Tessellations (Exhibit No.: B-6.2)**

**Description:** Similar to the previous exhibit, shapes of space, the visitor shall place magnetic cutout pieces on a magnetic white board in different positions which combine with one another and form a solid shape

**Mode of Display:**

- Magnetic white board
- Colourful magnetic shapes of various sizes

**Operation:** Create tiling patterns called tessellations using unusual magnetic shapes.

**Suggestive Dimensions**:

Height: 1800mm (approximately)

Width: 1500mm (approximately)

Depth: 150mm (approximately)

**Exhibit: Golden Ratio (Exhibit No.: B-7.1)**

**Description:** Golden ratio is a mathematic theory which match certain interesting facts. Many great historic architectures have been found having this ratio, including Taj Mahal. The visitor has to check the formation of golden ratio according the curved marking on clear arcylic pieces and count the graph units.

**Mode of Display:**

- Graphs plotted in Golden Ratio
- Table Top Interactive Exhibit


**Materials:** Acrylic, graph board.

**Operation:** Using pieces of acrylic which are in golden ratio to form a wonderful pattern.

**Suggestive Dimensions**:

Height: 1200mm (approximately)

Width: 750mm (approximately)

Length: 750mm (approximately)

**Exhibit: Ride Cycle with Square Wheel (Exhibit No.: B-8.1)**

**Description: T**he visitor will ride on the most unique tricycle – with square wheels, yet be able to comfortably follow the track. There shall be a straight track of the FRP made curve shape, customized tricycle with square wheels and two turntables at two ends of the tracks, guarded with hand-railings on both sides.

**Mode of Display:**

- FRP made track
- Custom tricycle and wheels
- Two turntables at ends
- Physical activity exhibit

**Suggestive Dimensions**:

Height: 900mm (approximately)

Width: 1000mm (approximately)

Length: 9000mm (approximately)

**Exhibit: Count the Monkeys (Exhibit No.: B- 8.2)**

**Description:** An exhibit to create mathematical illusion of vanishing a part of image simply by rotating the outer concentrated disc. The principle of this exhibit is to use fractional numbers in obtaining the effect.

**Mode of Display:**

- Illusion Disc X 2 Concentric setup
- Panel mounted exhibit
- Hands on operation exhibit

**Details:**

- Count the monkeys, turn the handle, and count again — what happened?
  Seeing Monkey Around in action might leave you wondering how the numbers of red and blue monkeys change just by moving the handle. You can see that the picture doesn't actually change; its parts are just rearranged.

  This is an example of a geometric vanish – a clever way of shifting pieces of a picture around to create the impression that something is gained or lost, but really only the positions have changed.

**Suggestive Dimensions**:

Height: 1800mm (approximately)

Width: 600mm (approximately)

Depth: 150 (approximately)

**Exhibit: Roller Coaster Ride (Exhibit No.: B-8.3)**

**Description:** Roll over the unusually shaped acorns and have a smooth ride due to their constant diameter. Kids will love using their body weight to pull themselves in the transperant acrylic coaster over a sea of unusually shaped oversized acorns. The constant diameter of the acorns assures smooth sailing. Partition panel built track on the floor with the uneven shaped objects. The visitor has to sit on the transperant roller coaster and pull the hand rails to proceed the track.

**Mode of Display:** Irregular shaped FRP objects
Clear acrylic carriage
SS railing and Plywood panel track

**Suggestive Dimensions**:

Height: 750mm (approximately)

Width: 1000mm (approximately)

Length: 5000mm (approximately)

**Exhibit: Make your fastest Track (Exhibit No.: B-8.4)**

**Description:** Beautifully developed mechanical exhibit at the center of the gallery intends to explain the paths of travel for three identical metal balls, in which the center path is a fixed curve brachistochrone (It is the curve on which a massive point without initial speed must slide without friction in an uniform gravitational field in such manner that the travel time is minimal among all the curves joining two fixed points) which will always be the first. The user can modify other two paths' vertical positions change the shape of paths and compare. Once the balls reach the final point, it can be manually rolled to the loading bay, a mechanical fitting shall hold them in place and moving a lever shall drop all three balls at the same time.

**Mode of Display:**

- Center display exhibit
- MS Frame
- Vertical Slide mechanism of 2 paths
- One fixed path (brachistochrone)
- Tunnel path of 3 balls
- Mechanical release system

**Suggestive Dimensions**:

Height: 2000mm (approximately)

Width: 2200m (approximately)

Depth: 200mm (approximately)

**Exhibit: Hyper Hyerboloid (Exhibit No.: B-8.5)**

**Description:** Formation of hyperboloid by physical interaction of the visitor is the principle demonstration of this exhibit. The visitor shall enter the cylindrical chamber and spin in the handle, connected with a recoiling spring tension and a geared mechanism with the top circular frame which will rotate, creating a curved surface made entirely out of straight lines.

**Mode of Display:**

- Center display exhibit
- Multi colour vertical straight ropes from top circular frame as cage
- Visitor is inside the cage
- Rotation of handle will change the shape of ropes to a Hyperboloid

**Suggestive Dimensions**:

Height: 3000mm (approximately)

Width: 1500mm (approximately)

Length: 1500mm (approximately)

## Exhibit: Fractal Tree (Human Tree) (Exhibit No. B-8.6)

**Description:** See successively smaller copies of yourself combined to make a dynamic fractal tree that sways in response to your motion. This exhibit transforms your body into a tree, sprouting scaled down versions of yourself from your arms as you stand in front of a digital screen. It's a way to explain how fractal trees work.

To explore quotients and ratios, In this activity, we will verify the similarity of branches of a tree to the whole object. To do this, we compare the lengths of connected branches and see that as they get smaller, the ratio of the lengths of branches stays the same. The visitor has to stand on the platform and movement of their arms will display this exhibit.

**Mode of Display:**

- Augmented Reality Program
- Gesture control operation
- Projector on front screen
- Diorama based interactive exhibit
- Physical movement displays various fractal pattern using visitor image

**Suggestive Dimensions**:
Height: 2400mm (approximately)

Width: 3600mm (approximately)

Length: 1800mm (approximately)

**Exhibit: Draw your Song (Exhibit No.: B-8.7)**

**Description:** The visitor will sing or make sound in front of the microphone and the wave shall undergo FFT and display various waveforms of volume, pitch frequency etc.so that image is drawn on the screen. The area where visitor will sing into microphone will be displayed in the ambience of recording room.

**Mode of Display:**

- 43" LED Screen
- Custom Software with dedicated Computer
- FFT graph plot in real-time
- Audio input from microphone
- Audio speakers

**Suggestive Dimensions**:

Height: 1800mm (approximately)

Width: 1500mm (approximately)

Length: 1500mm (approximately)

**Exhibit: Draw from your Song (Exhibit No.: B-8.8)**

**Description:** The visitor will draw patterns on the touch screen and song or music will be played according to the patterns drawn on the screen with various modulations of volume and pitch etc. The touch screen will be displayed in the form of canvas on stand. The visitor will observe the effect on the audio by their action. Visitor can also select different types of audio playback like guitar, saxophone, instruments, vocals etc.

**Mode of Display:**

- 43" LED Screen
- Custom Software with dedicated Computer
- FFT graph plot in real-time
- Audio speakers

**Suggestive Dimensions**:

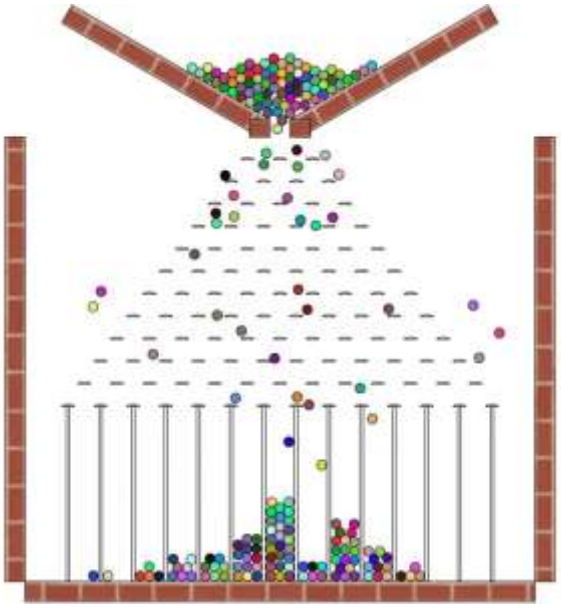
Height: 1800mm (approximately)

Width: 1500mm (approximately)

Length: 1500mm (approximately)

**Exhibit: Quincunx (Binomial Distribution) (Exhibit No.: B-8.9)**

**Description:** This amazing exhibit will describe the principle of Binomial Distribution with a practical example as seen in Dalton board. This center piece exhibit will have clear acrylic case which allows seeing through. Motorized bucket on one side shall be lifting hundreds of soft balls from the bottom container and drop the same from the top of the exhibit. The top shall be inverted triangular shape and metal cylindrical obstacles shall be arranged in a staggered pattern. All the falling balls shall be striking the obstacles and fall on the equal spaced columns on the lower part of the exhibit. The system shall have auto operation including emptying of the soft balls from the column to the container at the bottom.



**Mode of Display:**

- Center display exhibit
- MS Frame
- Clear acrylic body on both sides
- Motorized chain bucket movement
- Automatic mechanical tray empty system
- Soft balls for noise-free operation
- Colourful LED lights on columns

**Suggestive Dimensions**:

Height: 1800mm (approximately)

Width: 2100mm (approximately)

Depth: 150mm (approximately)

**Exhibit: Water Clock (Exhibit No.: B-8.10)**

**Description:** This exhibit is an automatic water clock controlled with custom programmable electronic circuit that accurately calculates the flow of water and calibrates and resets automatically. The water is observed to drop in the beaker which will run from 9AM to 7PM, the beaker shall be filled by water as per actual time which matches the markings.

**Mode of Display:**

- Glass beaker with equal markings in minutes and hours
- Custom electronic circuit with mechanical flow control system and Real Time clock for calibration
- Drain pump to reset the system

**Suggestive Dimensions**:

Height: 1800mm (approximately)

Width: 900mm (approximately)

Length: 900mm (approximately)

**Exhibit: Poly Paint (Exhibit No. B-8.11)**

**Description:** This exhibit shall generate different patterns, classify them according to their types. The visitor needs to draw or scribble anything on digital input device and the same image shall be projected on screen with a variety of patterns, selected at first.

**Mode of Display:**

- Projector and screen
- Digital pen drawing as input device
- Custom Software with dedicated Computer
- Pattern selection panel on bottom of screen


**Suggestive Dimensions**:

Height: 1800mm (approximately)

Width: 1500mm (approximately)

Length: 250mm (approximately)

**Exhibit: Bucky Ball (Exhibit No.: B-8.12)**

**Description:** This activity exhibit shall demonstrate the shape of a sphere into a plane and how it can be reconstructed in a fun way. The combination of hexagons and pentagons form this shape, which are locked with each other through a hinge or a ring. Size of the ball shall be about 600mm dia.

**Mode of Display:**

- FRP made penta and hexagonal sizes
- Semi developed ball from bucky ball design
- Hands on activity exhibit

**Suggestive Dimensions**:

Height: 1800mm (approximately)

Width: 900mm (approximately)

Length: 900mm (approximately)

**Appendix: 4**

## List of Exhibits to be removed from Virtual reality gallery (First Floor)

| Sr. No. | Exhibits |
|---|---|
| 1. | How E-mail works |
| 2. | ATM Station |
| 3. | Train Simulator and kiosk station |
| 4. | Railway Signalling System including iron railing |
| | **Panels on the walls** |
| 1 | How internet works? |
| 2. | E-mail panels |
| 3. | How computers works? |
| 4. | Locomotive panels |
| 5 | Railway panels |
| | **Wooden Partition wall (1 No.)** |

## List of Exhibits to be removed from Science of Sports Gallery (Ground Floor)

| Sr. No. | Exhibit |
|---|---|
| 1 | Measure your Height with panels |
| 2 | Balancing Beam with panels |
| 3 | Check your Strength with panels |
| 4 | Reaction Test with panels |
| 5 | Science Behind hurdles (Laser Cut Sport Pictograms) |
| 6 | Physics Behind Boxing (Laser Cut Sport Pictograms) |
| 7 | Science Behind Cycling(Laser Cut Sport Pictograms) |
| 8 | Physics Behind Long Jump(Laser Cut Sport Pictograms) |
| 9 | Science Behind Weight Lifting(Laser Cut Sport Pictograms) |
| 10 | Science Behind Pole Vaulting(Laser Cut Sport Pictograms) |
| 11 | Physics Behind Artistic Gymnastic(Laser Cut Sport Pictograms) |
| 12 | Equestrian(Laser Cut Sport Pictograms) |
| 13 | Physics Behind sailing(Laser Cut Sport Pictograms) |
| 14 | Physics Behind discuss Throw(Laser Cut Sport Pictograms) |
| 15 | Shooting(Laser Cut Sport Pictograms) |
| 16 | Science Behind Hammer throw(Laser Cut Sport Pictograms) |
| 17 | Science Behind Shot put(Laser Cut Sport Pictograms) |
| 18 | Physics Behind Archery(Laser Cut Sport Pictograms) |
| 19 | Physics Behind Racing(Laser Cut Sport Pictograms) |
| 20 | Science Behind Parallel Bar Gymnastic(Laser Cut Sport Pictograms) |
| 21 | Physics Behind Swimming(Laser Cut Sport Pictograms) |
| 22 | Physics Behind Fencing(Laser Cut Sport Pictograms) |
| 23 | Physics Behind Javelin Throw(Laser Cut Sport Pictograms) |

| CHECK LIST | | |
|---|---|---|
| S. No. | **Items** | **(To be filled in by the Tenderer) Documents attached at which page number** |
| | **TECHNICAL BID** | |
| 1. | Particulars of Tenderer as per Annexure: 1 | |
| 2. | Company Profile | |
| 3. | Authorization Letter | |
| 4. | Affidavit / Self Declaration- Agency is not blacklisted by any Govt., Semi-Govt. Deptt. or any other organization | |
| 5. | Copy of complete GST registration certificate [all pages] | |
| 6. | Copy of PAN / TAN | |
| 7. | Copies of Testimonials/Certificates etc. regarding past experience and completion of the similar work done required for eligibility criteria and calculation of years of similar work experience. | |
| 8. | Agencies who had earlier done any job / work for Pushpa Gujral Science City in the past have to compulsorily submit a Certificate of Satisfactory Performance otherwise tender will be rejected. | |
| 9. | Photographic reference of earlier works carried out by the Tenderer | |
| 10 | Copies of bio-data of persons constituting the Design Team and heir profile and experience | |
| 11. | Details of establishment, infrastructure, machines / equipment and human resources of the firm. | |
| 12. | Copies of Contractor's Balance Sheets certified by the Chartered Accountant (CA) for the last 3 years (i.e. 01-4-2017 to 31-03-2020) to calculate the consolidated turnover for the last 3 years | |
| 13. | Specification Sheet as per Annexure: 2 | |
| 14. | Signed Tender Document | |
| 15. | Any other supporting document / information | |
| | **FINANCIAL BID** | |
| 16. | Financial Bid **online** | **ONLINE** |

(Name & Signature of Authorized Person) With seal

Date:

Place:

**Note: Tenderer is required to make one (1) pdf file of the above mentioned technical bid documents for uploading the same as 'Technical Bid' on the e-portal.**

***(Please see all the documents are uploaded as per Tender Document (Checklists for ready reference for mandatory documents)***