

**Public Sector Development Program (PSDP)
“Launching of STEM in Pakistan, Phase-I (Revised)”**

**REQUEST FOR PROPOSAL (RFP) FOR FABRICATION OF STEM ACTIVITY
KITS**

Nov, 2025

**Pakistan Science Foundation
(Ministry of Science & Technology)
Islamabad**

Note: This document contains 46 pages, it is the responsibility of the bidder to check and confirm the complete RFP document at the time of procurement.

**Pakistan Science Foundation
(Ministry of Science & Technology)
Islamabad

**REQUEST FOR PROPOSAL (RFP) FOR OF FIRMS FOR THE “FABRICATION OF
STEM ACTIVITY KITS”**

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i. Tender Notice

**Pakistan Science Foundation
(Ministry of Science & Technology)
Islamabad**

Request for Proposal (RFP) for the “Fabrication of STEM Activity Kits”

Pakistan Science Foundation (PSF), the executing agency for STEM project invites to submit proposals/bids documents on EPADS portal of PPRA from well reputed firms, suppliers, companies, and manufacturers registered with the Security Exchange Commission of Pakistan (SECP)/other registration authorities, having NTN, registration in General Sales Tax (GST) and having name in Active Taxpayers List (ATL) for **“Fabrication of STEM activity Kits”** of international standards for STEM based education of students for 50 Higher Secondary Schools/Cadet Colleges, 5 Universities across the country, Pakistan Museum of Natural History, PSF Science Center Faisalabad, STEM academy under PSF and other institutions making a minimum of 11,250 (increase or decrease in quantity with respect to cost element & experimental requirements) STEM activity Kits consist of 75 sets of each 150 modules/activities/experiments (list file available in the form of Annex-I on PSF website) being developed by PSF (In hard as well as soft forms with all rights reserved for procuring agency, i.e. PSF).

2. RFP documents carefully prepared shall only be applied/submitted on EPADS as per provided instructions on or before the closing date (i.e. after 15 days of this advertisement/ publication) by 9:30 am. The proposals will be opened on the same day at 10:00 am in PSF Committee Room, in the presence (online or physical) of the applied bidders.

3. Only EPADS-registered bidders can apply for the tender. Applications other than EPADS will not be considered and entertained.

4. This tender notice may be downloaded from the PPRA website www.ppra.org.pk and PSF website www.psf.gov.pk and EPADS.

**Project Director (STEM)
Pakistan Science Foundation,
1-Constitution Avenue, G-5/2, Islamabad
Phone: - (051) 9202519**

ii. Introduction

**Pakistan Science Foundation
(Ministry of Science & Technology)
Islamabad

**PSDP “Launching of STEM in Pakistan, Phase-I (Revised)
Request for Proposal (RFP) for of Firms for the “Fabrication of STEM Activity Kits””**

1. Pakistan Science Foundation (PSF), is an autonomous body under the administrative control of federal Ministry of Science and Technology (MoST) and the executing agency for the Public Service Development Program “Launching of STEM in Pakistan, Phase-I, (Revised)”, approved by the Departmental Working Party of MoST, Govt of Pakistan, Islamabad.

Main objective of the PSF are;

- Promotion and funding of scientific research and related activities having bearing on socio-economic needs of the country.
- Establishment of Science Centers, Museums, Herbaria & Planetaria.
- Promotion and Popularization of science through Mobile Science Exhibition, Science Fairs, Science Essay, Poster & Quiz competitions, Inquiry Based Science Education (IBSE), Popular Science Lectures and Establishment of Science Clubs in High Schools.

2. Launching of STEM in Pakistan, Phase-I (Revised): Primarily, the project is designed to achieve knowledge based economy by enhancing capacity of Government sector schools across the country. Major objectives of the STEM project are;

- To officially launch STEM, the modern tool for promotion of science and technology for Science, Technology, Engineering and Mathematics Education in Pakistan. In the 1st phase, the project shall be launched initially in 50 Higher Secondary Schools/Cadet Colleges, 5 Universities across the country, and 1 at Pakistan Museum of Natural History and PSF Science Center Faisalabad (each) making a total of 50 Mini STEM FABLABs and 7 Hi STEM FABLABs and 1 at PSF under STEM PSF Academy.
- To prepare a critical mass of science teachers as STEM-Mentors and Innovation Handlers, capable of harnessing the disruptive innovation coming out of FABLABS and transforming this phenomenon into socio-economic wellbeing.
- To introduce active learning methods that includes communication, collaboration, problem solving, leadership, creativity.
- To prepare the youth for meeting the incumbent technological needs and challenges facing the country by preparing 21st century workforce through STEM.

iii. Instructions

- 1. Procedure for Proposal:** Interested and well reputed firms, suppliers, companies, and manufacturers, registered with Securities and Exchange Commission of Pakistan (SECP)/ other registration authorities, having NTN/IT, GST name in Active Taxpayers List (ATL) for **“Fabrication of STEM Activity Kits”** (In hard as well as soft forms with all copyrights reserved for procuring agency) of international standards for STEM based education of students for 50 Higher Secondary Schools/Cadet Colleges, 5 Universities across the country, Pakistan Museum of Natural History, PSF Science Center Faisalabad, and at STEM Academy under PSF making a minimum of 11,250 (increase or decrease in quantity with respect to cost element & experimental requirements). STEM activity Kits consist of 75 sets of each 150 modules/activities/experiments (list file available in the form of Annex-I on PSF website) being developed by PSF. The STEM activity kits include hands-on, sophisticated/one of its kind, software-based and collaborative STEM activity kits related to Biology, Physics, Chemistry, Computer Sciences, Mathematics, & other science subjects of 9th, 10th, 11th, 12th grades. PSF will hand over the modules/list to the bidder upon which STEM activity Kits will be developed. The Firm/bidder shall complete and carefully prepare the proposal documents and apply/submit online on the EPADS portal of PPRA in accordance with instructions in RFP documents in all respects along-with relevant documents as per PPRA rules.
- 2. Selection Process:** Single Stage Two Envelope procedure will be adopted for selection of the firm/bidder for “Fabrication of STEM activity Kits” of international standards. Bidders shall submit the tender documents online on the EPADS portal of PPRA (**hard copies are also be sent till closing date, to the Project Director STEM at “Pakistan Science Foundation, 1-Constitution Avenue, G-5/2, Islamabad” along with an undertaking that the same copy has been uploaded to EPADS, as only the EPADS submission will be considered in the evaluation**). The proposal will be opened at the date and time mentioned in the tender notice. All the received proposals will be evaluated and no amendments or changes will be allowed in the proposals after opening.
- 3. Mode of submission of documents:** The proposals should be submitted online on EPADS portal of PPRA within its stipulated closing date and time on or before the 15 days of the advertisement of this tender. It should be addressed to the “Project Director (STEM), Pakistan Science Foundation, 1-Constitution Avenue, G-5/2, Islamabad, Phone:- (051) 9202519”.
- 4. Opening of online submitted proposals:** Initially technical proposals received through EPADS will be opened by the authorized committee on the same day in the PSF Committee Room, in the presence (online or physical) of the bidders who have applied. Representatives present at the proposal opening meeting shall sign the online attendance sheet to evidence their presence. Financial proposals of technically qualified bidders will be opened later, and applicants will be informed in due course of time regarding the opening date of the financial proposals. If any holiday is announced by the Govt. of “Force Majure Situation”, the proposals will be opened on the next working day or as intimated by

the PSF.

5. PSF may request to any one or all firms for clarification of the contents, prototype or sample of kits provided by the firms. Response of that clarification should be in writing and should be sent within 24 hours, any delay in providing clarification of such information will not be considered.
6. **Evaluation Criteria:** The bidder/firm fulfilling all mandatory requirements and obtaining minimum 65 marks in the technical evaluation will be considered as technically qualified. The financial proposal of only technically qualified firms would be opened. Financial bids will be evaluated on an aggregate basis, with the lowest price quoted without compromising on quality. Bidders will be informed, in due course of the evaluation result.
7. If a proposal is not substantially aligned to the terms & conditions/particulars of this document, it will be rejected by PSF and may not subsequently be made responsive by the firm by correction of the non-conformity. A proposal once opened in accordance with the prescribed procedure shall be subject to only those rules, regulation and polices that are in force at the time of issue of notice for invitation of proposals.
8. **Bid Validity:** The offer is to be valid for at least 90 days from the date of tender opening.

iv. **COVERING LETTER FOR SUBMISSION OF PROPOSALS**

To:

Project Director (STEM)
Pakistan Science Foundation
Islamabad.

Dear Sir,

We, the undersigned, offer to provide the services of our company/firm to Pakistan Science Foundation for **“Fabrication of STEM Activity Kits”** as per details in the attached in accordance with your RFP documents.

Yours sincerely,

Authorized Signature [*In full and initials*]:

Name and Title of Signatory:

Name of Firm:

Address:

Date:

v. Mandatory documents (To be attached with the Proposal)

(Please attach and submit copy of this page with the Proposal after duly completing the “Response” Column along-with all the required documents)

#	Particulars	Remarks	Response Yes/No
1.	Covering Letter	Mandatory	
2.	Having nationwide presence/offices (with office in Islamabad/Rwp, mandatory) with complete address & active landline and fax numbers	Mandatory	
3.	Complete Profile / Introduction of bidder’s company/firm (including name of Chief Executive, Partners, Director, Professionals)	Mandatory	
4.	Copy of CNIC of CEO/Authorized person	Mandatory	
5.	Copy of Certificate of Incorporation from SECP, PEC or Registration from Registrar of Firms or undertaking of establishment in case of sole proprietor /partnership deed	Mandatory	
6.	Proof of the Age of the Firm (minimum 2 years)	Mandatory	
7.	Proof of names in ATL of Income Tax & GST	Mandatory	
8.	Bank Account Statement (for last One years (i.e., 2023-24) with minimum annual transaction of PKR 10 million).	Mandatory	
9.	Affidavit declaring that the Bidder is not blacklisted by any Government department/agency and no inquiry is ongoing against the bidder in NAB (on Stamp paper worth Rs.50)	Mandatory	
10.	List of similar completed and ongoing projects. Copies of Work orders/Job Completion certificate.	Mandatory	
11.	Detail of all staff members	Mandatory	

I / we hereby confirm that required documents are provided with the Proposal and information contained in this proposal is correct and true.

Company’s Stamp

Signature with date

vi **Format for Brief Introduction of the Bidder**

#	Particulars	Response
1	Name of the Bidder/Firm	
2	Date of Establishment	-
4	Owner / CEO /Director Name	
5	NTN No.	
6	Mailing Address:	
7	Contact (Landline & Cell NO.)	
8	Fax No(s).	
9	Email Address	
10	GST No.	
11	Bank Name & Account No. along with title of Account.	
12	Corporate Status	
13	Attachments :	List of all documents attached with the proposals
14.	Any other relevant documents	Please attach

Company's Stamp

Signature with date

vii. TECHNICAL EVALIATION CRITERIA:

The firm should submit copy of this page of RFP duly signed and stamped along with the Proposal, otherwise the proposal is liable to be rejected

#	Particulars		Maximum Marks	Marks Obtained (for official use only)
1.	Location of Offices with complete address & active landline and fax numbers	Islamabad/Rwp H/O= 03 marks 1 st Sub-Office in ISB/RWP = 2 2 nd or other Sub-offices =2 (Max 05)	05	
2.	Age of the firm (not less than 02 years)	Minimum two years of age 2 points for each year after minimum age of firm and maximum 10 points for 5 years or above	10	
3.	Bank Statement for last one year (i.e. 2024-25)	Transaction during last one year is Minimum Rs.10 million = 5 marks Between 10-15 million = 7 marks Above 15 million = 10 Marks (Max)	10	
4.	Proof/Receipts of Income Tax Returns for last two years (i.e. 2022-23, 2023-24)	One year = 5 Two years = 10 (Maximum) (5 marks for each year)	10	
5.	Audited Accounts Statement for last 2 years (i.e. 2022-23, 2023-24)	One year = 5 Two years = 10 (10 marks Maximum)	10	
6.	Detail of similar projects and services undertaken (Attach brief of the projects with proof of Job order/completion certificates)	Marks for each project; Up-to 4 million = 3 Up-to 7 million = 5 Up-to 10 million = 8 Above 12 million = 9	25	
7.	Presentation	Project Understanding (7) Fabrication Facility (8) Project Execution (8) Project Deliverables (7)	30	
Total			100	

Note: The firm / bidder fulfilling all mandatory requirements and obtaining minimum 65 marks in the above technical evaluation will be considered as qualified, provided that all other terms and conditions prescribed in this document are fulfilled. Only technically qualified firms would be asked to submit the Financial Proposal.

Company's Stamp

Signature with date

viii. Scope of Work (Fabrication of STEM Activity Kits)

The firm should prepare a work plan for the following assignment and submit with the proposal, otherwise the proposal is liable to be rejected. (Keeping in view that all STEM activity Kits will be delivered all over Pakistan)

#	Particulars	Qty/Remarks
1.	Standard of STEM Activity Kits-	International
2.	Language (for Brochure Stickers)	English and Urdu
3.	Number of STEM activity Kits	Minimum 11,250 (increase or decrease in quantity with respect to cost element & experimental requirements) STEM activity kits consist of 75 sets of each 150 modules / activities / experiments being developed by PSF (For 9 th , 10 th , 11 th , 12 th grades).
4.	Areas/disciplines to be covered by STEM activity kits	Physics, Chemistry, Biology, Computer Science, Mathematics and other Science & Technology disciplines.
5.	Brochure/sticker and Instruction manual	Brochure/sticker MoST/PSF and STEM logos watermarks will be embossed/ engraved on STEM Kit Box and instruction manual will be placed inside the STEM kit box. (as per sample provided by PSF in Annex-I)),
6.	Packaging of STEM activity kits	Portable and durable packaging as per international standards embossed/engraved with MoST/PSF and STEM logos.
7.	Software based STEM activity kits	Software based STEM kits (with Most/PSF and STEM logos watermarks) will be provided in USB drive with brochure and instruction manual. Also to provide codes and circuit diagram of hardware-based STEM activities in USB.
8.	Provision of STEM activity kits to the hiring agency	In soft form, in hard form and in combined form (where applicable). Copy rights will be reserved by the procuring agency i.e. PSF
9.	STEM activity Kits durability	Durable for long time, repeatable\multi-time useable.
10.	Approach for each kit	Integrated approach as universally acclaimed STEM activities/requirements
11.	Learning Outcomes	Specific Learning Outcomes General Learning Outcomes and Additional Learning Outcomes
12.	Provision of trainings	Provision of training at PSF, PMNH, provisional Headquarters and any other venue decided by PSF on STEM activity kits to ensure the working and

		performance results of STEM kits after the delivery of STEM activity Kits.
13.	At least five (05) Sample kits (hardware based) and five (05) Sample kits (software-based) of different subject should be attached with the proposal bid.	

(Important Note:

1. Specifications/working of the STEM activity kits should be according to the modules / hands-on activities of STEM developed by PSF and keeping in view the PC-I allocation.
2. The quoted rate lump-sum and cost including all direct or indirect cost, technical support of other resources must be included.
3. All the applicable govt. taxes would be deducted at the time of making payment.

Company's Stamp

Signature with date

DRAFT OF KITS

ix. Financial Proposal: (Separate Envelop)

Bidders / Firms are invited to submit their financial proposal for the specified fabrication of STEM Activity Kits ensuring compliance with all codal formalities, rules and regulations of PPRA/EPADS

List of STEM Activity Kits										
DIY/Working Model of Arduino/IoT/ELECTRONICS Based STEM KITS										
Sr #	Title	Materials / Suggestions / Reference links	Any Remarks	Quantity	Rate per unit (Excl. Sales Tax)	Sales Tax Rate	Rate per unit (Incl. Sales Tax)		Value in Rs. Per unit	
1	Up Down Counter	Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.		1						
2	Wind Turbine DIY Kit	Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.		1						
3	Melody Bell	Basic Electronics (IC Based)		1						
		Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.								
4	Water Level Indicator	Basic Electronics (IC Based)		1						
		Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.								
5	Series and parallel circuit	Basic Electronics (IC Based)		1						
		Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.								
6	Home Solar Energy	Basic Electronics		1						
		Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.								
7	Chair Swing Ride	Basic Electronics (IC Based)		1						
		Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.								
8		Basic Electronics		1						

	Hand Powered Generator	Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.						
9	Introduction to 4x4x4 LED Cube with Arduino Nano	Basic Electronics +(Arduino Nano Based) Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.	1					
10	Hydraulic Crane	Basic Electronics (IC Based) Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.	1					
11	Oilfield Pump Jack	Basic Electronics Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.	1					
12	Lucky Circle	Basic Electronics (IC Based) Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.	1					
13	Rain Alarm	Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly. Basic Electronics (IC Based)	1					
14	Laser Alarm	Basic Electronics (IC Based) Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.	1					
15	Automatic water spray	Basic Electronics (IC Based) Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly. DIY KIT	1					
16	Astronomical Telescope	DIY KIT Basic Electronics Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.	1					
17	Door Theft Alarm	Basic Electronics (IC Based) Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.	1					

18	Sound Operated Switch	Basic Electronics (IC Based)	1				
		Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.					
19	Prayer Time Alarm System Using Arduino Uno	Arduino Based	1				
		Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.					
20	Electronic Tas	Basic Electronics (IC Based)	1				
		Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.					
21	Anti-Gravity Structure Floating Table Model	DIY KIT	1				
		Basic Electronics (IC Based)					
		Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.					
22	Introduction To Running LED Tower Using Arduino.	Arduino Based	1				
		Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.					
23	Pneumatic Jack	DIY KIT	1				
		Basic Electronics (IC Based)					
		Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.					
24	Variable Power Supply	Basic Electronics (IC Based)	1				
		Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.					
25	Smart Glasses For Blind Peoples Using Arduino.	Arduino Based	1				
		Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.					
26	Touch Switch	Arduino Based	1				
		Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.					
27	Traffic Signal Lights Using NE 555 Timer	IC NE 555 Timmer Based	1				
		Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.					

28	Arduino-Based Traffic Signal Lights	Arduino Based		1				
		Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.						
29	Arduino-Based Digital Voting Machine	Arduino Based		1				
		Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.						
30	Hydraulic Robotic Arm	Basic Electronics (IC Based)		1				
		Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.						
31	Arduino Based LED Distance Indicator	Arduino Based		1				
		Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.						
		DIY KIT						
32	Snake Game Using Arduino	Arduino Based		1				
		Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.						
33	Introduction To Arduino Based Calculator	Arduino Based		1				
		Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.						
34	Introduction to Smart Irrigation System using Arduino	Arduino Based		1				
		Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.						
35	Introduction To IoT Based Weather Station Using Arduino	Arduino Based		1				
		Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.						
36	Introduction To Wireless LED Control With Arduino	Arduino Based		1				
		Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.						
37	Introduction to Logic Gates Learning Kit Using Arduino	Arduino Based		1				
		Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.						
38		Arduino Based		1				

	Introduction To Line Following Robot Using Arduino	Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.						
39	Biometric Attendance System Using Arduino	Arduino Based	1					
		Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.						
		DIY KIT						
40	Arduino Based Trash-Bot (Auto-Open/Close Trash Bin)	Arduino UN/ NANO Based	1					
		Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.						
41	Introduction to Weight Machine Using Arduino	Arduino UN/ NANO Based	1					
		Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.						
42	Arduino Speed Detector Circuit Kit	Arduino UN/ NANO Based	1					
		Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.						
43	Introduction to Appliances Control Using IR TV Remote.	RFID / Arduino UN/ NANO Based	1					
		Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.						
44	Introduction to School Bell Automation System using Arduino	Arduino UN/ NANO Based	1					
		Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.						
45	Introduction to Tic Tac Game Using Arduino	Arduino UN/ NANO Based	1					
		Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.						
46	Scrolling Text Using 8x32 Led	Arduino UN/ NANO Based	1					
		Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.						
47	Solar Tracking System Using Arduino	Arduino UN/ NANO Based	1					
		Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.						
48		Arduino UN/ NANO Based	1					

	Arduino-Based Digital Clock with 16x2 LCD Display Circuit Kit	Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.						
49	Introduction to Smart Car Parking System Using Arduino	Arduino UN/ NANO Based Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.		1				
50	Gesture Control Wheelchair for Disabled People	Arduino UN/ NANO Based		1				
	:- robot not wheelchair	Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.						
DIY/Working Model of BIOLOGY STEM KITS								
Sr #	Title	Materials / Suggestions / Reference links	Any Remarks	Quantity	Rate per unit (Excl. Sales Tax)	Sales Tax Rate	Rate per unit (Incl. Sales Tax)	Value in Rs. Per unit
51	Investigate the effect of concentration of sugar/salt solution on the mass of the plant tissue.	<ul style="list-style-type: none"> • 1 L Distilled water • Measuring cylinder 1000ml • Several potatoes • Apple corer • Sucrose/Glucose • Scale with gram measurements, • 6 Boiling tubes/beakers 100ml • 3 Spoons, Ruler, • Erasable white board, Pen/Pencil, Timer • Paper towels, 6 Graph paper, 3 Wax pencil • Potato peelers • knife 	All the material should be durable. Instead of paper sheet for writing measurements, please provide A4 size erasable white board in kit.	1				
52	Investigate how limiting factors affect the rate of photosynthesis and how they are controlled in a greenhouse to give a	<ul style="list-style-type: none"> • Aquatic plant • Light source (lamp) • NaHCO₃ 100g • Water bath • Syringe • Meter ruler • Medical Thermometer • Beaker 	Made this project kit using the potometer	1				

	maximum yield?	<ul style="list-style-type: none"> Boiling tube Stopper Pipe, rubber tube Stopwatch Distilled water Potometer 						
53	How can you as Botanists demonstrate that temperature, wind, humidity, and light intensity affect the rate of transpiration in plants?	<ul style="list-style-type: none"> Potometer Lamp Ruler, Plant shoot Scalpel, Beaker 100 ml Capillary tube Stopwatch Vaseline 	The kit must contain a potometer along with all other items mentioned in materials.	1				
54	Distinguish between stages of mitosis and meiosis and illustrate and interpret with correct description.	<ul style="list-style-type: none"> Make a kit containing multiple shaped chromatids which can be joined to form a chromosome, different cells, attachable and detachable nuclear membranes, thread-like structure for spindle formation etc. Make a kit which a student can use to describe and learn all the stages of mitosis and meiosis. The components of kit shall be attachable and detachable. The material used for making kit shall be durable i.e plastic. 	The video links are for reference. Mitosis & meiosis models are not required but all the components which a student can assemble to describe different stages of mitosis and meiosis.	1				
55	Design a seeding machine to counteract deforestation.	<ul style="list-style-type: none"> Materials used: Acrylic sheet for making platform of robot. Arduino based project. Make the simplest seed sowing Robot which incur the least cost. 		1				
56	How to aid in recovery of strained bicep by engineering a biomedical device?	<ul style="list-style-type: none"> 6 rubber bands (a few different sizes) thin rope, 2.5 m string, .5 m scissors paper, 1 sheet springs one 20-Newton spring scale ruler 12-inch 	Provide durable and good quality material that can last for long time in the kit.	1				
57	Identify the conditions needed for seed germination and demonstrate by planning an investigation on how they affect germination?	<ul style="list-style-type: none"> 12 Petri dishes Viable Seeds (6 different types) 1 roll of Cotton wool/ 1L Sterile water 0.5 L Oil Arduino Clinostat based Microgravity project for plants. Note: Also make a kit on video 3. Build an Arduino Clinostat to Simulate Microgravity for Plants 	Made a kit by which student can investigate conditions needed for seed germination as given in the video links 1 & 2	1				

58	Yeast cells respire too. But not like me and you.	• 1 large test tubes, about 15 cm long and 20 mm in diameter	Make a kit which students can use to quantify the amount of respiration occurring in yeast-molasses cultures. Provide plastic made test tubes, beakers, flask cylinders instead of glass-made.	1			
		• 1 small test tube, about 10 cm long and 8 mm in diameter					
		• squares cut from plastic wrap, about 8 cm on a side					
		• 12 rubber or cork stoppers, size 2					
		• 1 test tube racks to hold large test tubes					
		• 12 dropping pipettes					
		• five 300-ml beakers					
		• 1-liter flask					
		• 1-liter graduated cylinder					
		• 1 lab thermometer					
		• 1 kg (package) dry baking yeast					
		• 12-ounce bottle molasses (unsulphured)					
• Graph paper							
59	Model how traits are passed from parents to offspring by creating baby aliens.	• Printout of Physical Traits Images	Provide all the material required to perform this experiment in this kit as shown in the video.	1			
		• Printout of Sibling Images					
		• Printout of the Alien Genotype and Phenotype Table					
		• Construction paper, different colors (orange and green must be included)					
		• Scissors					
		• Tape					
		• Glue					
		• Markers, crayons, and coloring pens					
• Pencils							
• Two coins							
60	Investigate the role of salivary amylase in the digestion of starch, and explore whether smoking has any effect on the production of salivary amylase.	• Safety goggles		1			
		• Starch solution in a beaker (can prepare your own with cornstarch)					
		• Test tubes - 4					
		• Test tube rack					
		• Benedict's solution					
		• 400 ml beaker					
		• Iodine solution					
		• Bunsen burner					
		• Tripod stand and guaze					
		• Syringe/graduated dropper					
• Amylase solution							
61	Investigate effect of substrate concentration on enzyme-controlled reactions.	• Test tubes, at least 1.5 cm ID and 10 cm long (6)	Design this kit in a way that students can investigate effects of substrate concentration, enzyme concentration, temperature and Ph on enzyme activity.	1			
		• 1 Test tube rack					
		• Graduated Pipettes, 3-ml (3)					
		• Access to sink					
		• Dishwashing liquid (detergent) (1/2 cup)					
		• 3% hydrogen peroxide					
		• Dried yeast (1 package)					
• Cups (5)							

		<ul style="list-style-type: none"> • 6 Measuring spoons (teaspoon and tablespoon) • Spoons or spatula for mixing • Metric ruler • Timer • Calculator • Graph paper • Paper • Pen • Paper towels 					
62	Can genetic or environmental factors increase the chances of an autoimmune disease?	<ul style="list-style-type: none"> • Bowls (8) • M&M's candies (24 of each color: red, green, yellow, blue) • Six-sided dice (6) • Pencil or pen • Clear tape 	This is a link to the site where complete procedure for doing this activity along with materials is given.	1			
63	Dissection of sheep's heart to understand the structure of human heart.	<ul style="list-style-type: none"> • 1 sheep heart • Dissection kit (scalpel, pins, probe, scissors) • Dissection tray • Protective gear • Aprons, • Disposable gloves, • Lab goggles, • Vinyl tablecloth • Small kitchen trash bag • Paper towels • 1-2 50-gallon lawn and leaf/trash bags 		1			
64	RESPIRATORY DISORDERS	<ul style="list-style-type: none"> • two-liter plastic bottle with cap, • 2 plastic drinking straws or 6 inches (15 cm) of tubing (clear flexible tubing works well, 0.5-1.0 cm in diameter) • 3 balloons (1 large enough to stretch over bottom of two-liter bottle; 2 smaller ones, representing lungs) • 2 rubber bands • 2-inch (5-cm) cube of soft modeling clay • scissors • drill • 1 model lung • A variety of materials from which students may select to make a face mask filter, such as white paper, cotton balls, coffee filters, cloth, felt, gauze, foam, cotton batting, string, rubber bands, tape • Scissors • spray bottle of water • timing device 	You may also add the designing of pollution filter in face mask.	1			
65	LATEST TECHNIQUE APPLIED TO ENHANCE	<ul style="list-style-type: none"> • Hydroponic Solution 5L • Clean And Dried Plastic Food Containers • Colanders • Duct Tape and Masking Tape 	The link given at 2, 3 is an alternate activity kit. Our priority is to	1			

	CROP AND FRUIT YIELDS	<ul style="list-style-type: none"> • Pipe Cleaners • Plastic Containers of Different Shapes and Sizes • Tubing • Wooden Sticks • Zip Ties 	develop kit on the first link					
66	HUMAN IMPACTS ON ENVIRONMENT	<ul style="list-style-type: none"> • Foam core board or heavy cardboard (for creating two model buildings), ~15 x 20-inch [38 x 51-cm] sheet (which is half of the 30 x 40-in [~76 x 102-cm] size foam core board sheets • 1-2 pieces of black tar paper, ~ 6 x 6-inch [15 x 15-cm] or use black sandpaper, or black construction paper to represent the black tar surface typically found on city building roofs • 1-2 pieces of sod (turf) and/or other sod or moss-like plants, ~ 6 x 6-inch [15 x 15-cm] piece • 1 piece of plastic sheeting (for roof deck insulation and waterproofing layer), 30 x 30-cm • duct tape and hot glue gun • X-ACTO knife, utility knife and scissors • 2 thermometers (at least one long thermometer so you can access the interior of the model structures) • 1 heat lamp • 1 electric fan • timer or stop watch • 10 paper sheets • pencils • 4 sheets of graph paper • soil • Two foam core board (or heavy cardboard), ~ • Two black tar paper • Two pre-cut sod pieces (15 x 15cm), ~ • Plastic wrap for more waterproofing membrane material • Duct tape • Hot glue gun sticks 		1				
67	THERMOREGULATION	<ul style="list-style-type: none"> • Link 2 & 3 are alternate links for reference. You can also develop your own thermoregulation kit using sensors and Arduino. • Breadboard • Arduino TM Uno Development Board • 10 wires to connect components, such as 6- or 7-inch jumper wires for Arduino boards • 3 LEDs • TMP36 temperature sensor • (3) 220 ohm (Ω) resistors; • (1)-megaohm ($M\Omega$) resistor • IRF510 n-channel MOSFET (metal-oxide-semiconductor field-effect transistor) • 12V computer cooling fan 	<p>Please develop the kit on the link given at 1.</p> <p>Acrylic based</p> <p>Arduino Nano/UNO based</p> <p>Electronic based</p>	1				

		<ul style="list-style-type: none"> 12V AC adapter, to power the fan Circuit Building Instructions Sheet, one per student USB cable, for powering Arduino/uploading code 						
68	How tobacco smoke can affect and change the cells	<ul style="list-style-type: none"> Electronic based 		1				
69	IOT Smart Plant Monitoring System Smart Irrigation	<p>Link 1 & 2. IOT based smart plant monitoring system that can monitor irrigation, humidity and temperature.</p> <p>Link3. Simple Sensor based automatic irrigation system for agriculture.</p> <p>Link 4. Arduino based irrigation system</p>		1				
DIY/Working Model of MATH STEM KITs								
Sr #	Title	Materials / Suggestions / Reference links	Any Remarks	Quantity	Rate per unit (Excl. Sales Tax)	Sales Tax Rate	Rate per unit	Value in Rs.
70	BASIC PROPOR TIONALITY THEOREM	<p>Design a STEM activity using an acrylic base, preferably as a modular kit with featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.</p> <p>· https://www.youtube.com/watch?v=uLapPjh-m64</p>		1				
71	How to Make a Working Model of Pythagoras Theorem / Math working Model	<p>Design a STEM activity using an acrylic base, preferably as a modular kit with featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly. With some modification to avoid copy right.</p> <p>· https://www.youtube.com/watch?v=OjXN9bnVyPU</p> <p>· https://www.youtube.com/watch?v=A7Kz3Sybzgw</p> <p>· https://www.youtube.com/watch?v=878Ar_oglbQ</p>		1				
72	CIRCLE THEOREMS	<p>Design a STEM activity using an acrylic base, preferably as a modular kit with featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly. With some modification to avoid copy right.</p> <p>· https://www.youtube.com/watch?v=bbQxPp9EMs8</p> <p>· https://www.youtube.com/watch?v=-E6PDaWvZnc</p>		1				
73	SETS AND FUNCTIONS	<p>Design a STEM activity using an acrylic base, preferably as a modular kit with featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly. With some modification to avoid copy right.</p> <p>· https://www.youtube.com/watch?v=APVdBJ9o2_8</p> <p>· https://www.youtube.com/watch?v=Jr3lJ41IwGU</p> <p>· https://www.youtube.com/watch?v=tCbdrKdObw</p> <p>· https://www.youtube.com/watch?v=vCFGbDoFaHc</p>		1				

74	32 Soldiers Game	Design a STEM activity using an acrylic base, preferably as a modular kit with featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly. With some modification to avoid copy right.	1				
		· https://www.youtube.com/watch?v=Q184AaSkNyQ					
75	Basic Statistics	Design a STEM activity using an acrylic base, preferably as a modular kit with featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly. With some modification to avoid copy right.	1				
		· https://www.youtube.com/watch?v=3u_p_Fnolic					
76	PROBABILITY	Design a STEM activity using an acrylic base, preferably as a modular kit with featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly. With some modification to avoid copy right.	1				
		https://www.youtube.com/watch?v=tyAwxrUadtw					
		https://www.youtube.com/watch?v=e057rkWZcqc&t=206s					
77	Matrices and Determinants	Design a STEM activity using an acrylic base, preferably as a modular kit with featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly. With some modification to avoid copy right.	1				
		https://www.youtube.com/watch?v=o7W2O6UoQ4I					
78	Algebraic Expressions	Design a STEM activity using an acrylic base, preferably as a modular kit with featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly. With some modification to avoid copy right.	1				
		https://www.youtube.com/watch?v=YlsPmFnh0Xc					
		https://www.youtube.com/watch?v=f2o8EI0iOYg&list=PLDm_bXnksd4IKXyYY6cF5rVIqoC2wt_jL					
		· https://www.youtube.com/watch?v=AN4MGUP4VXQ&list=PLo5zCPkGpmfq5nJPCN1YLLxFpiH9Tkh12					
79	Sum Should be "26" Puzzle	Design a STEM activity using an acrylic base, preferably as a modular kit with featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly. With some modification to avoid copy right.	1				
		· https://www.youtube.com/watch?v=ZBsIEIG42vo					
80	Distance Formula	Design a STEM activity using an acrylic base, preferably as a modular kit with featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly. With some modification to avoid copy right.	1				
		· https://www.youtube.com/watch?v=xjzPmzyXkGU					
81	Proof of Area of Circle	Design a STEM activity using an acrylic base, preferably as a modular kit with featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly. With some modification to avoid copy right.	1				
		· https://www.youtube.com/watch?v=zvyVHYGWelo					
82	Diagonal Move @ Math Game Puzzle	Design a STEM activity using an acrylic base, preferably as a modular kit with featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly. With some modification to avoid copy right.	1				
		· https://www.youtube.com/watch?v=vB0_7ekvd1w					

83	Cartesian co-ordinate math working model.	Design a STEM activity using an acrylic base, preferably as a modular kit with featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly. With some modification to avoid copy right. · https://www.youtube.com/watch?v=ofdtTqm9QcY		1				
84	Exterior angle property - theorem working model	Design a STEM activity using an acrylic base, preferably as a modular kit with featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly. With some modification to avoid copy right. · https://www.youtube.com/watch?v=y0FQF9MMdW8		1				
85	HCF and LCM	Design a STEM activity using an acrylic base, preferably as a modular kit with featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly. With some modification to avoid copy right. https://www.youtube.com/watch?v=fltotXaFaUc https://www.youtube.com/watch?v=VOEFVG8Ixyg		1				
86	Complementary angles working model	Design a STEM activity using an acrylic base, preferably as a modular kit with featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly. With some modification to avoid copy right. · https://www.youtube.com/watch?v=EsYw_gxTows		1				
87	Sum should be 34	Design a STEM activity using an acrylic base, preferably as a modular kit with featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly. With some modification to avoid copy right. · https://www.youtube.com/watch?v=CrlxrLLtBUQ		1				
88	Venn Diagram Through Activity	Design a STEM activity using an acrylic base, preferably as a modular kit with featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly. With some modification to avoid copy right. · https://www.youtube.com/watch?v=CFVUJrVUJa0		1				
DIY/Working Model of PHYSICS KITS								
Sr #	Title	Materials / Suggestions / Reference links	Any Remarks	Quantity	Rate per unit (Excl. Sales Tax)	Rate per unit (Incl. Sales Tax)	Rate per unit (Net)	Value in Rs.
89	PRESSURE IN LIQUIDS / Pascal Law/ HYDRAULIC BRIDGE	Can be build up with light weight plywood, acrylic sheet and cardboard. · https://www.youtube.com/watch?v=Luqw0kBIx-s		1				
90	Archimedes principle	Share with us if you have any better idea · https://www.youtube.com/watch?v=iEVSqbGfx4k		1				
91	DIY Bi-Metallic Strip: Exploring Thermal Expansion	Do it with multiple types of metallic strips Use Acrylic base · https://www.youtube.com/watch?v=LI0kBYZgtdY		1				
92		Any suggestion to improve is welcomed		1				

	PHYSICAL OPTICS	· https://www.youtube.com/watch?v=NAstJ0s2XE						
93	FLUID DYNAMICS	Any suggestion to improve is welcomed · https://www.youtube.com/watch?v=q-RdRZVXd9c		1				
94	Polarization	Any suggestion to improve is welcomed · https://www.youtube.com/watch?v=oulJg0kiiWA		1				
95	Projectile motion	Any suggestion to improve is welcomed · https://www.youtube.com/watch?v=wMI5JaTy0Mg		1				
96	Simulate Ohm's Law	Suggest if you've better idea · https://www.youtube.com/watch?v=9o20jRLOP2E&t=336s · https://www.youtube.com/watch?v=9WB82CvGIa8		1				
97	Changing Fields	Any improved idea is welcomed · https://www.youtube.com/watch?v=GwKm_8CxY-M · https://www.youtube.com/watch?v=JwuO9XrH_al		1				
98	Sound Science	Any advanced suggestion is welcomed · https://www.youtube.com/watch?v=xCnxsoXtlmY		1				
99	Momentum	Any advanced suggestion is welcomed · https://www.youtube.com/watch?v=MMu9rxW_Ztw		1				
100	Ohm's Law	Any advanced suggestion is welcomed · https://www.youtube.com/watch?v=2G_3oeC2QGY		1				
101	Gravity	Any advanced suggestion is welcomed · https://www.youtube.com/watch?v=pStqoFxtYu8		1				
102	Solar Eclipse	Any advanced suggestion is welcomed · https://www.youtube.com/watch?v=sfVcQ5kE4pE		1				
103	Solar System	Any advanced suggestion is welcomed · https://www.youtube.com/watch?v=8As6zghN038		1				
104	Ruby Laser	Any advanced suggestion is welcomed · https://www.youtube.com/watch?v=IzjH7oNV_9s		1				
105	Full Wave Rectifier	Any advanced suggestion is welcomed · https://www.youtube.com/watch?v=muEP8CXthP8		1				
106	Pulley System	Any advanced suggestion is welcomed · https://www.youtube.com/watch?v=SCt4Mai1Cic&list=PL92qRR5E27jvxCagCCrZt2bhE7T30k00N		1				
107	Laser Fencing	Any advanced suggestion is welcomed · https://www.youtube.com/watch?v=LeXdsz6Jm58		1				
108	Neodymium Magic	Any advanced suggestion is welcomed · https://www.youtube.com/watch?v=ZPtcSXk2efU		1				

DIY/Working Model of Chemistry KITs								
Sr #	Title	Materials / Suggestions / Reference links	Any Remarks	Quantity	Rate per unit (Excl. Sales Tax)	Sales Tax Rate	Rate per unit (Incl. Sales Tax)	Value in Rs.
109	Boyles Law	• Syringe 60mL (2)		1				
		• Balloons						
		• Water bottle						
		• Food Color						
110	Atomic Model	• Atomic Model 3D		1				
		• A model with increasing the proton and neutron in the form of game						
111	Periodic Table	• Periodic Table in the form of play cards		1				
		• Periodic table made up of acrylic boxes for elements						
		• Periodic Table with Velcro						
112	Hydrocarbons In Our Daily Lives	• <i>Tooth pick</i>		1				
		• <i>Clay dough</i>						
113	Magical liquid	• Flask with cork		1				
		• Dropper						
		• Cork (bottle cap)						
		• Water						
		• <u>Sodium hydroxide 500mg</u>						
		• <u>Glucose 500mg</u>						
		• <u>Methylene blue 500mL</u>						
		• Measuring Cylinder 25ml						
		• Beakers 250ml						
• Volumetric flask 250ml								
114	Crystallization	• Hot Water		1				
		• Phenyl 2-hydroxybenzoate/phenyl salicylate						
		• Copper Sulphate						
		• Beakers						
		• Crystal seed						
		• Tweezer						
		• Watch glass						
		• Eye protection						
		• Alum						
		• Food Color						
		• Sugar						
		• Aluminum sulphate						
115	Design a cell	• Dilute Sulfuric +Acid Sodium Chloride		1				
		• Sodium Sulphate 1L						

		<ul style="list-style-type: none"> • Small Fan, 2 • Voltmeter, 1 • Ammeter, 1 • Several Wires, 1 • Glass Tube, 1 • Graphite Electrode, 2 • Power Supply (1) 					
116	Green house	<ul style="list-style-type: none"> • 6 acrylic squares, approximately 10 to 12 inches (25 to 30-cm) per side • Hot glue gun and glue sticks 1 • Soil and plant • Thermometer digital 2 • Clear, wide strapping tape 1 • Saws, to cut acrylic or Plexiglas 1 	1				
117	Water Filtration	<ul style="list-style-type: none"> • activated charcoal • gravel, • sand (coarse and / or fine), • cotton balls • Filter papers pore size 190 • Filter papers pore size 150 • Disposable box with lid and 250ML 4 • Scissors • Measuring cup • Spoon • Stopwatch or clock with a second hand • Pencil and paper • Coffee Filter 	1				
118	Nomenclature For Functional Groups	Ball and Stick Mode	1				
119	Pesticide	<ul style="list-style-type: none"> • 6 pots or cups with drainage holes, such as seed-starting plastic pots • container or tray to catch draining water from the seed starting pots • 60 seeds, such as lettuce or other plant that sprouts within a week • 1 graduated container, to measure the volume of the seed starting pots • bucket for mixing soil and “organic waste,” big enough to hold enough soil and organic waste to fill 3 of the seed-starting pots • thermometer • potting soil or compost, • “Organic waste,” such as a solid food source that is easy to mix with soil, like oatmeal, flour or cornstarch. • Transparent plastic wrap 	1				

120	Galvanization/ Corrosion Resistance	• Safety Wear		1				
		• Metal Object to Be Plated (Must be Steel)						
		• A Power Supply (3v-6v)						
		• Zinc Sulfate						
		• Water						
		• A Beaker (Glass or Plastic Object Can Be Used Instead)						
		• Zinc Metal						
		• Sand Paper (120)						
		• A Tissue Paper						
		• Wires						
121	Turn Milk into Plastic	• Measuring cup glass (500ml) (1)		1				
		• Milk powder 1000mg						
		• Stovetop/ heating mantle (1)						
		• Thermos (1)						
		• White vinegar 1L						
		• Work surface that is safe to get damp Asbestos 1(2*2ft)						
		• Styrofoam or other heat-resistant cup 6						
		• White or distilled vinegar 1L						
		• Paper towels 1roll						
		• Spoon (2)						
		• Food coloring, 1 packet						
		• Glitter, or markers 1 packet						
122	Paper Chromatograp hy	• Beaker 3 100mL		1				
		• Ink red and blue						
		• Filter paper strips/ Rectangular						
		• Filter paper round						
		• Plant						
• Ethanol 500ml								
123	Invisible Inks	• Safety wear		1				
		• Beakers 6 small,						
		• Cotton swabs						
		• Pipette (2)						
		• Spatula (1)						
		• Glass rods (2)						
		• Index card, one packet						
		• Pencil, one packet						
		• Lemon juice 1L						
		• Ammonia-based glass/window cleaner 1L						
		• Vinegar 1L						
		• Baking soda 500mg						
• Red cabbage juice 1L								
124	Lead Acid Battery	• Lead Acid battery		1				
		• Electric fan						
		• Crocodile clamps						

125	Glucose Concentration	• Manual polarimeter		1				
		• Color filter						
		• Sample tank						
		• Grid value dial						
		• Polarizer						
		• A group of glucose standard concentration solutions with equal gradient						
		• Glucose solution to be tested						
		• Sodium lamp						
		• Other parts						
		• paper towels						
		• waste container						
126	UV detection	• Light source (tungsten lamp, deuterium lamp or other ultraviolet visible light source)		1				
		• Monochromatic						
		• Prism						
		• Grating						
		• Absorption tank						
		• Detector						
		• Display, etc.						
		• A group of glucose standard concentration solution						
• Glucose solution to be tested								
127	Air Quality Control	• Temperature sensor		1				
		• Humidity sensor						
		• Laser dust sensor						
		• SO2 sensor						
		• NO2 sensor						
		• LCD Display						
		• DuPont Line						
		• SCM Development Boards						
		• Breadboard						
128	Galvanic Cell	• ZnSO4		1				
		• CuSO4						
		• Zn Electrode						
		• Cu Electrode						
		• WATER						
		• Beakers						
		• Salt Bridge						
		• VOLTMETER						
		• Bulb						
		• Wires						
129	Calorimetry Kit	• tin with lid		1				
		• Wooden box for cover						

		<ul style="list-style-type: none"> thermometer 							
		<ul style="list-style-type: none"> Copper wires 							
130	Food Preservation Kit	<ul style="list-style-type: none"> Includes (1) canister Natural Preserve, acidic and basic as well 		1					
		<ul style="list-style-type: none"> 2 Zip-N-Zap Bag 							
		<ul style="list-style-type: none"> 2 Snap-N-Zap Caps, 2 Snap-N-Grip Clips 							
DIY/Working Model of COMPUTER SCIENCE KITS									
Sr #	Title	Materials / Suggestions / Reference links	Any Remarks	Quantity	Rate per unit (Excl. Sales Tax)	Rate per unit	Value in Rs.		
131	Water Level Detector using Arduino	<ul style="list-style-type: none"> https://www.youtube.com/watch?v=-HCZY4UoFiA 		1					
		<ul style="list-style-type: none"> Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly. 							
132	Structure of Computer Model	<ul style="list-style-type: none"> Acrylic Sheet 		1					
		<ul style="list-style-type: none"> Color Chart 							
		<ul style="list-style-type: none"> Color marker 							
		<ul style="list-style-type: none"> White chart 							
		<ul style="list-style-type: none"> Cutter 							
		<ul style="list-style-type: none"> Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly. 							
133	Voice Controlled LEDs	<ul style="list-style-type: none"> 1 x Arduino Uno Board 		1					
		<ul style="list-style-type: none"> 1 x USB cable 							
		<ul style="list-style-type: none"> 1 x Bread Board 							
		<ul style="list-style-type: none"> 1 x Bluetooth Module 							
		<ul style="list-style-type: none"> 3 x LED (Red, Green, Blue) 							
		<ul style="list-style-type: none"> 4 x Jumper wire (Male to Male) 							
		<ul style="list-style-type: none"> 4 x Jumper wire (Male to Female) 							
		<ul style="list-style-type: none"> Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly. 							
134	Computer Network Topology	<ul style="list-style-type: none"> Italic sheet 		1					
		<ul style="list-style-type: none"> Color chart 							
		<ul style="list-style-type: none"> Glue gun 							
		<ul style="list-style-type: none"> Favi cole 							
		<ul style="list-style-type: none"> Color marker 							
		<ul style="list-style-type: none"> Scissor 							
		<ul style="list-style-type: none"> Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug- 							

		and-play components for hands-on learning. Ensure reusability and user-friendly assembly.						
135	ATM Machine Working Model	• Acrylic Sheet		1				
		• Gear System						
		• Ice-cream Stick						
		• Glue Gun						
		• DC motor						
		• syringe						
		• Cardboard						
		• Bottle Cane						
		• Resistor						
		• LEDs						
		• Jumper Wires						
		• Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.						
136	Abacus The First Computer Model	• Thermacol		1				
		• Color Charts						
		• Metal Sticks						
		• Color Beats						
		• Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.						
137	Controlling Multiple Devices Using IoT	• ESP8266 boards		1				
		• LED						
		• Motor						
		• Relay Module						
		• Breadboard						
		• Wires						
		• Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.						
• Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.								
138	Smart Gate Using Arduino	• Arduino board (e.g., Arduino Uno)		1				
		• Ultrasonic Sensor (e.g., HCSR04)						
		• Servo Motor						
		• Breadboard						
		• Jumper wires						
		• USB cable for Arduino						
		• Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.						
139		• Resistor 220 ohm		1				

	Smoke Detector using Gas Sensor	<ul style="list-style-type: none"> • Arduino UNO • 5 mm LED: Green • Buzzer, Piezo • Jumper wires (generic) • Gas Sensor • Breadboard (generic) • 5 mm LED: Red 						
		<ul style="list-style-type: none"> • Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly. 						
140	Make a Siren Using Arduino	<ul style="list-style-type: none"> • Arduino UNO • Some Jumper wires • 10 LEDs with 220ohm resistors • 1 Piezo buzzer/speaker with a resistor value 330-1Kohm • 1 push button and 10K resistor 		1				
		<ul style="list-style-type: none"> • Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly. 						
		<ul style="list-style-type: none"> • Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly. 						
141	AI-Based Anti-Theft Alarm	<ul style="list-style-type: none"> • IOT based Node Mcu • Bulb and Holders • PIR Sensor • Relay • Transistor BC 547 • Diode 1N4007 • Videos Materials • Node Mcu • Bulb and Holders • PIR Sncosr • Relay • Transistor BC 547 • Diode 1N4007 		1				
		<ul style="list-style-type: none"> • Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly. 						
142	Object Detector using LED	<ul style="list-style-type: none"> • Arduino Uno • IR sensor • LED • Jumper wires • USB cables 		1				
		<ul style="list-style-type: none"> • Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug- 						

		and-play components for hands-on learning. Ensure reusability and user-friendly assembly.						
143	Wireless Water-Tank Level Meter with Alarm	• Transmitter Circuit:		1				
		• Arduino Nano						
		• Ultrasonic Sensor						
		• RF Transmitter						
		• 9 Volt Battery						
		• Receiver Circuit:						
		• Arduino Nano						
		• 16x2 LCD						
		• RF Receiver						
		• 9 Volt Battery						
		• Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.						
144	AI Street Light Using Arduino	• Arduino Uno		1				
		• LDR						
		• 10k Resistor						
		• LED						
		• Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.						
145	Voice Control Car/Robot using Arduino	• Arduino UNO Board		1				
		• HC-05 Bluetooth Module						
		• DC Motors 9V						
		• 9V Battery						
		• Motor Driver IC L293D						
		• Robot Chasis & Wheels						
		• Connecting Wires						
		• Breadboard						
		• Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.						
146	Home Automation System using Bluetooth	• Arduino Uno		1				
		• Bluetooth Module						
		• Relay Module						
		• https://drive.google.com/file/d/1WBwgVSu3P_bCXRcct4jRck-j3rNE6FOv/view						
		• Wires						
		• Bulb						
		• Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.						
147	Revolutionizing Home	• Arduino Uno		1				
		• Arduino cable						

	<p>Illumination using an IoT-based control</p> <ul style="list-style-type: none"> PIR sensor Connection wires 18650 rechargeable cells 2-cells holder Medium-Breadboard Double tape Acrylic sheet <p>Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.</p>							
148	<p>Automatic Car Parking Toll System with Arduino</p> <ul style="list-style-type: none"> https://www.youtube.com/watch?v=AEHtnwYDW7c <p>Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.</p>		1					
149	<p>Building a Digital Clock with Arduino and RTC Module</p> <ul style="list-style-type: none"> Arduino board (e.g., Arduino Uno) RTC module (e.g., DS1307) LCD 16x2 display I2C module (for interfacing RTC module and LCD display) Breadboard Jumper wires USB cable for Arduino <p>Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.</p>		1					
150	<p>Barcode Scanner & Display using Arduino</p> <ul style="list-style-type: none"> Arduino Uno Atmega 328 Controller Barcode Scanner USB Connector LCD Display Cables & Connectors Capacitors Transistors PCB Board Power Adapter LED Buzzer <p>Design a STEM activity using an acrylic base, preferably as a modular kit with a PCB featuring plug-and-play components for hands-on learning. Ensure reusability and user-friendly assembly.</p>		1					
	Summary							

Sr #	Title	Quantity	Rate (Excl. Sales Tax)	Sales Tax Rate	Rate (Incl. Sales Tax)	Value in Rs.
1	DIY/Working Model of Arduino/IoT/ELECTRONICS Based STEM KITS	50				
2	DIY/Working Model of BIOLOGY STEM KITS	19				
3	DIY/Working Model of MATHEMATICS STEM KITS	19				
4	DIY/Working Model of PHYSICS KITS	20				
5	DIY/Working Model of CHEMISTRY KITS	22				
6	DIY/Working Model of COMPUTER SCIENCE KITS	20				
	TOTAL	150				
<p>Important Note: Quantity of DIY/KITs /Working Model may be increase, decrees, add or remove with the recommendation/approval of the prototype evaluation committee at any stage before mass scale production/fabrication.</p>						
<p><i>Evaluation Criteria: The bidder/firm fulfilling all mandatory requirements and obtaining minimum 65 marks in the technical evaluation will be considered as technically qualified. The financial proposal of only technically qualified firms would be opened. Financial bids will be evaluated on an aggregate basis, with the lowest price (excluding GST) quoted without compromising on quality.</i></p>						

xiv. TERMS & CONDITIONS

Terms & Conditions for Bidders

1. Only EPADS-registered bidders can apply for the tender. Applications other than EPADS will not be considered and entertained.
2. The firms, Suppliers, Contractors and Manufacturers with nationwide supplies and contracts with own fabrication facilities will be preferred (if applicable)
3. The bidders/firms shall be responsible for complete fabrication, provision of source code, circuit diagram, (where applicable), transportation and working demonstration of each STEM activity kit in Mini STEM FABLABs and Hi STEM FABLAB at designated locations across the country.
4. The bidder will design each prototype in accordance with the specified modules/activities being developed (an ongoing process) by PSF team, in consultation with PSF officials, and obtain approval for each prototype from PSF upon finalization before mass scale production/fabrication. Future/extended orders will also be processed at the same cost initially finalized.
5. The tender will be awarded to bidder based on items/STEM activity kits offering the lowest unit price for each activity kit on aggregate basis excluding GST.
6. The bidder must provide minimum one year performance warranty (where applicable) of the STEM activity kits in terms of replacement/repair of a part or whole kit and all other items and free replacement of the kit for one year from the supply date of the kit and one-time training on that STEM kit to PSF Officials/Master Trainers at PSF/PMNH/Provisional Headquarters.
7. The quantity of STEM activity kits, modules and number of sets can be adjusted by PSF as needed, either increased or decreased. The number of STEM Kits in each set may varies from one unit to multiple in numbers with respect to cost element & experimental repetition/requirement.
8. The bidder/firm will work to the satisfaction of PSF for designing, standardizing, optimizing the prototypes of STEM activity kits and bringing them to international standards.
9. The bidder/firm will work in assistance of the PSF STEM team and experts at PSF for finalizing the STEM activity kits.
10. The bidder/firm shall help in training the STEM teachers and master trainers on these STEM activity kits.

11. Procuring agency i.e. PSF reserves all the copyrights of the fabricated STEM activity kits (from prototype to the commercial scale) and the STEM activity kits will be the intellectual property of the PSF.
12. The developed STEM activity kits cannot be developed for any other organization/School/Education system without the prior written permission of PSF.
13. The Firm/Bidder shall provide services to the STEM Team after the provision of STEM activity kits. The services include any changes in the developed STEM activity kits as per the advice/suggestions of the PSF STEM team.
14. Firm/Bidder will complete the order within stipulated time initially decided or agreed.
15. The supplies will only be deemed as “delivered” and qualify for invoice if it has been delivered to the specified address/destination without any damage/loss.
16. STEM activity kits must be fabricated from nontoxic, ecofriendly, and child/user friendly materials without compromising on quality and international standards.
17. Only those prototypes will be developed on mass/commercial scales that will be approved/finalized by PSF in writing.
18. The firm shall design and develop the stickers, brushers and manuals (with logos & watermark of MoST, PSF & STEM) for students in accordance with the STEM activity kit.
19. Detail of any arbitration / litigation (If any) of similar proceeding against Government / Autonomous / Private body showing extent and results may be enclosed.
20. The participants must submit valid NTN certificate, valid GST certificate (if applicable), and list of clients with contact person (regular and occasional) on PSF specified format.
21. Payment to supplier/s will be made in the form of cross Cheque after deduction of applicable Government Taxes.
22. The bid documents should be submitted online through EPADS portal of PPRA, within 15 days of publication of this advertisement. These bids will be opened on the same day at 10:00 am. In this Single Stage Two Envelop procedure, only the technically qualified will be requested later to provide Financial Proposal.
23. PSF will not consider any proposal from the bidder who is blacklisted or declared defaulted by any forum/organization. The Firm/Bidder should provide affidavit that it is not blacklisted nor it will resort to any litigation regarding the tendering/procurement procedure.
24. Partial Delivery/Partial Payment will be allowed subject to undertaking by the firm to complete the whole consignment/STEM activity Kits within a specified time.

25. The bidder will start the task, on receipt of written Purchase/Work Order from PSF in accordance with the given terms, conditions and specifications.
26. Incomplete proposals or those received after due date and time will not be entertained.
27. PSF reserves the right to cancel the process or reject one or all bids on the basis of technical reasons mentioned in the Tender Documents.
28. Performance Guarantee in shape of bank guarantee of 5% of contract value would be applicable for the successful bidder, where it is applicable.
29. The bidders/firms would submit 2% of the bid amount as earnest money in shape of DD/PO in favor of PSF, STEM at the time of submission of Proposal.
30. **In case of any dispute, the case will be referred to the Chairman, PSF who will be sole arbitrator and his decision will be binding on both parties.**

Company's Stamp

Signature with date

For further information and clarification, please contact:

To, Project Director (STEM)
Pakistan Science Foundation
1-Constitution Avenue, G-5/2
Islamabad.
051-9202519

xv. (LEGAL PART)
SCHEDULE - F TO BID

**only for successful bidder. No need to submit this part.*

1. (INTEGRITY PACT)
DECLARATION OF FEES, COMMISSION AND BROKERAGE ETC.

Payable by the suppliers of goods, services & works in contracts worth Rupees.10.00 Million or more

Contract No.: _____
Dated: _____
Contract Value: _____
Contract Title: _____

_____ [Name of Supplier] hereby declares that it has not obtained or induced the procurement of any contract, right, interest, privilege or other obligation or benefit from Government of Pakistan (GOP) or any administrative subdivision or agency thereof or any other entity owned or controlled by GOP through any corrupt business practice.

Without limiting the generality of the foregoing, [Name of Supplier] represents and warrants that it has fully declared the brokerage, commission, fees etc. paid or payable to anyone and not given or agreed to give and shall not give or agree to give to anyone within or outside Pakistan either directly or indirectly through any natural or juridical person, including its affiliate, agent, associate, broker, consultant, director, promoter, shareholder, sponsor or subsidiary, any commission, gratification, bribe, finder's fee or kickback, whether described as consultation fee or otherwise, with the object of obtaining or inducing the procurement of a contract, right, interest, privilege or other obligation or benefit in whatsoever form from GOP, except that which has been expressly declared pursuant hereto.

_____ [Name of Supplier] certifies that it has made and will make full disclosure of all agreements and arrangements with all persons in respect of or related to the transaction with GOP and has not taken any action or will not take any action to circumvent the above declaration, representation or warranty.

_____ [Name of Supplier] accepts full responsibility and strict liability for making any false declaration, not making full disclosure, misrepresenting facts or taking any action likely to defeat the purpose of this declaration, representation and warranty. It agrees that any contract, right, interest, privilege or other obligation or benefit obtained or procured as aforesaid shall, without prejudice to any other rights and remedies available to GOP under any law, contract or other instrument, be voidable at the option of GOP.

Not with standing any rights and remedies exercised by GOP in this regard, _____ [Name of Supplier] agrees to indemnify GOP for any loss or damage incurred by it on account of its corrupt business practices and further pay compensation to GOP in an amount equivalent to ten times the sum of any commission, gratification, bribe, finder's fee or kickback given by [name of Supplier] as aforesaid for the purpose of obtaining or inducing the procurement of any contract, right, interest, privilege or other obligation or benefit in whatsoever form from GOP.

Name of Employer:

Name of Contractor/Supplier:

Signature: _____

Signature: _____

[Seal]

[Seal]

xvi. PERFORMANCE SECURITY BOND (Bank Guarantee)

Guarantee No. _____
Executed On _____
Expiry Date _____

(Letter by the Guarantor to Pakistan Science Foundation, PSF)

Name of Guarantor (Scheduled Bank in Pakistan) with address:

Name of Principal (Contractor) with address:

Penal Sum of Security (express in words and figures)

Letter of Acceptance No. _____ . Dated _____

KNOW ALL MEN BY THESE PRESENTS, that in pursuance of the terms of the Bidding Documents and above said Letter of Acceptance (hereinafter called the Documents) and at the request of the said Principal we, the Guarantor above named, are held and firmly bound unto the (hereinafter called PSF) _____ in the penal sum of the amount stated above, for the payment of which sum well and truly to be made to the PSF, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that whereas the Principal has accepted the PSF's above said Letter of Acceptance for (Name of Contract)

_____ for the _____

(Name of Project).

NOW THEREFORE, if the Principal (Contractor) shall well and truly perform and fulfill all the undertakings, covenants, terms and conditions of the said Documents during the original terms of the said Documents and any extensions thereof that may be granted by the PSF, with or without notice to the Guarantor, which notice is, hereby, waived and shall also well and truly perform and fulfill all the undertakings, covenants terms and conditions of the Contract and of any and all modifications of the said Documents that may hereafter be made, notice of which

modifications to the Guarantor being hereby waived, then, this obligation to be void; otherwise to remain in full force and virtue till all requirements of Clause 9, Remediating Defects, of Conditions of Contract are fulfilled.

Our total liability under this Guarantee is limited to the sum stated above and it is a condition of any liability attaching to us under this Guarantee that the claim for payment in writing shall be received by us within the validity period of this Guarantee, failing which we shall be discharged of our liability, if any, under this Guarantee.

We _____, (the Guarantor), waiving all objections and defenses under the Contract, do hereby irrevocably and independently guarantee to pay to the PSF without delay upon the PSF's first written demand without cavil or arguments and without requiring the PSF to prove or to show grounds or reasons for such demand any sum or sums up to the amount stated above, against the PSF's written declaration that the Principal has refused or failed to perform the obligations under the Contract, for which payment will be effected by the Guarantor to PSF's designated Bank & Account Number.

PROVIDED ALSO THAT the PSF shall be the sole and final judge for deciding whether the Principal (Contractor) has duly performed his obligations under the Contract or has defaulted in fulfilling said obligations and the Guarantor shall pay without objection any sum or sums up to the amount stated above upon first written demand from the PSF forthwith and without any reference to the Principal or any other person.

IN WITNESS WHEREOF, the above bounded Guarantor has executed this Instrument under its seal on the date indicated above, the name and corporate seal of the Guarantor being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

Guarantor (Bank)

Witness:

1. Name _____ . Signature _____

(Title & Address)

Corporate Guarantor (Seal)

2. Name _____ Signature _____

(Title & Address)

Corporate Guarantor (Seal)