

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE
VIKRAM SARABHAI SPACE CENTRE (VSSC)
THIRUVANANTHAPURAM**

**Tender for DESIGN, SUPPLY, INSTALLATION AND COMMISSIONING
OF HIGH ENERGY DIGITAL RADIOGRAPHY (6 MeV LINAC BASED)
AND INTEGRATED COMPUTED TOMOGRAPHY (CT) SYSTEM WITH
SUITABLE OBJECT MANIPULATORS AND FLAT PANEL DETECTOR**

Bids to be submitted online

Tender No.: VSSC/PURCHASE UNIT III (SPRE)/VS202100492001 dated 09-12-2021

A. Tender Details

Tender No : **VSSC/PURCHASE UNIT III (SPRE)/VS202100492001**

Tender Date : **09-12-2021**

Tender Classification: **GOODS**

Purchase Entity : **PURCHASE UNIT III (SPRE)**

Centre : **VIKRAM SARABHAI SPACE CENTRE (VSSC)**

Procurement of DESIGN, SUPPLY, INSTALLATION AND COMMISSIONING OF HIGH ENERGY DIGITAL RADIOGRAPHY (6 MeV LINAC BASED) AND INTEGRATED COMPUTED TOMOGRAPHY (CT) SYSTEM WITH SUITABLE OBJECT MANIPULATORS AND FLAT PANEL DETECTOR

-This is a TWO - PART bid. Price details shall NOT be mentioned in technical Bid, failing which the offer will be considered as invalid.

-Foreign vendors are not permitted to quote. Quotations directly from foreign OEM/ or from agents quoting on behalf of foreign OEMs are not allowed to participate in this tender.

-Only Class-I and Class-II Local suppliers as per Make in India Policy are eligible to participate in the bid.

-a.The percentage of local content should be specifically mentioned in the offer, without which it will be summarily rejected.

b.Preference will be given to Class-I Local Supplier and in their absence, Class-II Local Supplier will be considered.

-Last minute clarification on tenders will not be entertained.

-This is an E Tender. Hence Postal/Fax/Email tenders will not be accepted.

-Technical Bids will be opened at the scheduled due date & time . No further intimation will be sent to you in this regard. Interested parties can attend the Technical Bid Opening to know the details.

A.1 Tender Schedule

Tender Publish Date : **10-12-2021 17:58**

Bid Clarification Due Date : **29-12-2021 12:00**

Bid Submission Start Date : 29-12-2021 12:01

Bid Submission Due Date : 28-01-2022 10:30

Bid Opening Date : 28-01-2022 10:31

Price Bid Opening Date : 31-01-2022 11:00

A.2 Pre-bid Meeting Details

Date : 22-12-2021 10:02

Place : VSSC, Trivandrum

Location : VSSC, Trivandrum

**Centre : VIKRAM SARABHAI SPACE CENTRE
(VSSC), THIRUVANANTHAPURAM, KERALA**

Details : Pre-Bid Meeting will be held on 22/12/2021 at VSSC, THIRUVANANTHAPURAM via On Line Mode. Details will be shared one day prior to meeting. Please contact Shri.NALLAPERUMAL M, Scientist-Engineer, NDTF/RPP,VSSC (Phone :0471-2563575/09446550873; email: m_nallaperumal @vssc.gov.in) regarding Pre-Bid Meeting details.

B. Tender Attachments

NA

Instructions To Vendors

1. Specific Terms and Conditions to Tender (detailed)

1. As per Notification No. 5/2018-CUSTOMS DTD. 25/01/2018, we are eligible for concessional payment of customs duty and IGST. Hence CD & IGST element shall be specified separately in the quotation. Necessary exemption certificate shall be issued upon request.

2. If any bidder submits forged / false document along with the tender, offer of such vendors will be summarily rejected and such bidders will be blacklisted for all future tenders.

3. In case if any Bidder is submitting their Offer on HIGH SEA SALES BASIS: then the Indian Trader shall submit the following documents mandatorily along with their offer.

- a.The Import Export Code of the Indian Trader
- b.Bank Authorization Code of the Indian Trader
- c.GSTIN of the Indian Trader

4. In case of Foreign/Import Tenders:

- a.The bidder shall clearly mention the full ordering address in capital letters.
- b.The bidder shall clearly mention their bankers address including their SWIFT code compulsorily.
- c.Any change of address shall be compulsorily supported by Documentary proof issued either by Governmental agencies or by Chamber of Commerce.
- d.Foreign Principals Proforma Invoice/quote indicating the Agency Commission payable to the Indian Agent and the nature of after sales service to be rendered by the Indian Agent.
- e.Copy of the Agency Agreement between the Foreign Principal and the Indian Agent, and the precise relationship between them their mutual interest in the business.
- f.Registration and Item empanelment of the Indian Agent.

5. In order to avail of the benefits extended to by Govt. of India to the Micro and Small Sectors, please submit attested copy of the valid Entrepreneur Memorandum Part-II signed by the General Manager, District Industries Centre / Udyog Adhar / NSIC Registration Certification along with your offer.

6. Likewise, while executing the Purchase Order/Contract; the Indian Trader shall mandatorily submit the following:

- a.High Sea Sale Agreement.
- b.Invoice pertaining to the Indian Trader in INR and the invoice of the foreign vendor in foreign

currency.

7. Liquidated Damages: The delivery period quoted should be realistic. The delivery period so quoted and mentioned in the order is the essence of the order/contract. In case of delay in delivery of material as per the delivery schedule, Liquidated Damage @ 0.5% per week or part thereof on the undelivered portion subject to a maximum of 10% of the contract value shall be levied. Wherever, installation and commissioning is also involved, the supply will be deemed to have been completed only when the entire Stores is supplied, installed and accepted.

8. Note: SD, LD and PBG clauses are mandatory and offers of the vendors who have not agreed for the above conditions will be excluded from the procurement process. Micro and Small Vendors are not exempted from the submission of Security Deposit. Only Govt Departments/PSUs/PSEs can submit Indemnity Bond instead of Bank Gurantee towards SD/PBG.

9. Our standard delivery term is FOR, VSSC. In case any vendor offers delivery term of Ex-works, Packing and Forwarding charges if any should be indicated separately either as a percentage of the quoted rate or as a Lumpsum amount.

10. Our standard payment term is 100% within 30 days for indigenous orders and Sight Draft for foreign orders.

11. Performance Bank Guarantee: Wherever products offered carry warranty, the warranty should be for one year or as per manufacturers standard warranty term. Against such cases, please confirm submission of Performance Bank Guarantee. The Performance Bank Guarantee should be for 3% of the order value covering the warranty period obtained from any Scheduled Bank on Rs.200/- Non Judicial Stamp Paper and should be valid beyond 2 months from the completion of the warranty period. Alternately vendors can request for withholding 3% payment till completion of the warranty period.

12. Please quote applicable GST separately.

(a)We are eligible for partial exemption of IGST vide Notification No: 47/2017-Integrated Tax (Rate) dtd 14/11/2017 and 45/2017-Central Tax (Rate) dtd 14/11/2017 issued by Dept. of Revenue, Ministry of Finance. Necessary Exemption Certificates will be issued on demand.

(b)We are eligible for partial exemption of CGST and SGST vide Notification No: 45/2017 dtd 14/11/2017 and No: 169/2017/TAXES dtd 15/11/2017 respectively. Necessary Exemption Certificates will be issued on demand.

13. Please upload the Technical Details / Catalogue / Data Sheets (wherever applicable)

14. Security Deposit: Wherever the offer value is Rs. 5.00 Lakhs or above, the successful tenderer should submit Security Deposit @ 3% of the order value by way of Bank Guarantee / FD Receipt. The Bank Guarantee shall be obtained from any Scheduled Bank on Rs.200/- Non Judicial Stamp Paper

and should be valid beyond 2 months from the completion of all contractual obligations. If the Contractor is called upon by the Purchaser to deposit, Security and the Contractor fails to provide the security within the period specified, such failure shall constitute a breach of the Contract, and the Purchaser shall be entitled to make other arrangements for the re-purchase of the stores Contracted at the risk of the Contractor. In case if Security Deposit is submitted and the contractor fails to execute the order, then the security deposit will be forfeited.

15. The offer should be valid for a period of minimum 90 days from the date of opening of Tender.

16. The other attached forms are our standard terms and conditions, which are to be complied with. If any conflict arise between the specific terms and standard terms, then in those cases, the specific terms will prevail over the standard terms.

17. Where agents participate in a tender;

(a) Either the Indian agent on behalf of the Principal/OEM or Principal/OEM itself can bid but both cannot bid simultaneously for the same item/product in the same tender.

(b) If an agent submits bid on behalf of the Principal/OEM, the same agent shall not submit a bid on behalf of another Principal/OEM in the same tender for the same item/product.

18. Wherever samples are required to be submitted along with the quotation, offer without sample will not be considered.

2. PPP Make in India(Divisible Items-Class I & II Local Suppliers)

1. A committee (with an external expert from a practicing cost accountant or practicing chartered accountant, if required) constituted for independent verification shall verify the self-declarations & auditor's / accountant's certificates on random basis, as per the requirements.

2. a) The subject item falls under divisible category. b) The offers are sought from Class I & II Local Suppliers.

3. Definitions: A supplier or service provider, whose goods, services or works offered for procurement, has local content: i. Equal to or more than 50%: Class-I local supplier. ii. More than 20% but less than 50%: Class-II local supplier. iii. Less than or equal to 20%: Non-local supplier.

4. False declarations will be in breach of code of the integrity for which a bidder or its successor's will not be eligible/debarred for purchase preference from further tenders / pending tenders for two years along with other actions as may be applicable.

5. In case of a complaint received from any local supplier indicating a need for review / verification of Local content of successful vendor / awarded vendor, for accepting a complaint from such complainant

(w.r.t the false declaration given by the successful vendor on the local content), a complaint fee of Rs.2Lakhs or 1% of the locally manufactured items being procured (subject to a maximum Rs. 5Lakhs), whichever was higher, to be paid by demand draft by the complainant. In case, the complaint is found to be incorrect, the complaint fee shall be forfeited. In case, the complaint is upheld and found to be substantially correct, deposited fee of the complainant would be refunded without any interest.

6. In cases the quoted price is in excess of Rs.1000 Lakhs (including duties, taxes and freight & Insurance) the 'Class-I & II local supplier shall provide a certificate from the statutory auditor or cost auditor of the company (in the case of companies) or from a practicing cost accountant or practicing chartered accountant (in case of suppliers other than companies) giving the percentage of local content.

7. In line with Public Procurement (Preference to Make in India), Order 2017 & its amendments issued by Govt. of India from time to time with a view to support the Indian industries, ISRO has implemented "Purchase Preference Policy". The "Purchase Preference" is applicable for the "Class-I Local Supplier" for the goods/ services/ works covered in this tender, subject to the following terms & conditions:-

8. 'L1' means the lowest technically accepted tender / bid / quotation (i.e. lowest landed cost including duties, taxes and freight & Insurance).

9. 'Local content' means the amount of value added in India (i.e. indigenous items/services added in the offered products/ services/ works) be the total value of the item offered (excluding net domestic indirect taxes) minus the value of imported content in the item (including all customs duties/IGST) as a proportion of the total value (excluding net domestic indirect taxes), in percent.

10. 'Margin of purchase preference' means the maximum extent to which the price quoted by the "Class-I local supplier" above the L1 (landed cost).

11. Purchase Preference Policy:- Goods/Works which are divisible in nature (required quantity is greater than 1 or not a package basis):

i.If L1 is 'Class-1 local supplier', the order/contract for full quantity shall be awarded to L1 bidder.

ii.If L1 bid is not from a 'Class-I local supplier', 50% of the order quantity shall be awarded to L1.

Thereafter, the lowest bidder among the 'Class-I local supplier' will be invited to match the L1 price for the remaining 50% quantity subject to the Class-I local supplier's quoted price falling within the margin of purchase preference (i.e. 20%) and contract for that quantity shall be awarded to such Class-I local supplier subject to matching the L1 price (inclusive of duties, taxes and freight & insurance).

iii.In case such lowest eligible 'Class-I local supplier' fails to match the L1 price or accepts less than the offered quantity, the next higher 'Class-I local supplier' within the margin of purchase 'preference shall be invited to match the L1 price for remaining quantity and so on, and contract shall be awarded accordingly. In cases where none of the 'Class-I local supplier' within the margin of purchase agree to match L1 price, in such cases 100% quantity shall be ordered on original L1 bidder.

iv. In case no offers are received from 'Class-I local supplier' or none of the 'Class-I local supplier' falls within the margin of purchase preference of 20%, the order shall be processed on L1 vendor.

v. In case L1 bidder (not a 'Class-I local supplier') is not accepting splitting of order on 50:50 basis, in that case the order/contract shall be awarded to such 'Class-I local supplier' for full quantity subject to matching the L1 price.

vi. Regarding MSEs (Indian vendors):

a) The following additional aspect as indicated below would be applicable for procurement which are falls under divisible category (i.e., not applicable for indivisible category), in case of participation of MSEs in the tendering who are also complying to the Minimum Local Content (MLC) stipulated in the tender.

b) If any Indian vendor satisfies the requirement of MSEs stipulation and also falls within the purchase preference margin as called for in MSME policy (in case of matching L1 price) will be considered for ordering 25% of tendered quantity, the balance quantity / works will be considered for distribution amongst all bidders (including MSEs) as per the purchase preference policy.

c) In case no MSEs qualifies for purchase preference or do not match with L1 price then the total tendered quantity will be distributed amongst all bidders as per the purchase preference policy.

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iii. In case such lowest eligible 'Class-I local supplier' fails to match the L1 price or accepts less than the offered quantity, the next higher 'Class-I local supplier' within the margin of purchase preference shall be invited to match the L1 price for remaining quantity and so on, and contract shall be awarded accordingly. In cases where none of the 'Class-I local supplier' within the margin of purchase agree to match L1 price, in such cases 100% quantity shall be ordered on original L1 bidder.

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c) In case no MSEs qualifies for purchase preference or do not match with L1 price then the total tendered quantity will be distributed amongst all bidders as per the purchase preference policy.

13. The 'Class-I & II local supplier' should provide a "Self Certification" along with technical offer indicating that the item offered meets the minimum local content [as per Sl. No.(3)] as called for in the tender and provide the percentage of local content along with details of the location(s) at which the local value addition is made. In case of two bid tenders, it is mandatory to indicate compliance to MLC(minimum Local Content) in technical bid zone.

14. The ink-signed certificate shall be provided on vendors letter head along with the offer (in case of online tender, copy of ink-signed certificate shall be uploaded along with your offer under concerned tab. Original in Hard copy shall be produced on request). In case of non-submission of certificate, the purchase preference shall not apply.

15. The margin of Purchase Preference shall be up to 20%.

16. The Public Procurement (Preference to Make in India), Order 2017 issued by Govt. of India indicates that if there are any general or specific restrictive clauses to restrict participation of Indian companies in those countries procurement tenders, reciprocity clause need to be invoked as per the order. Hence, if ISRO or Govt. of India come across that Indian suppliers of an item are not allowed to participate and / or compete in procurement by your government, the bid submitted by you will be not be considered and excluded from eligibility for procurement. Please note this point.

17. Works means all works as per Rule 130 of GFR- 2017, and will also include 'turnkey works'. Works includes Engineering, Procurement and Construction (EPC) contracts and services include System Integrator (SI) contracts.

3. Conditions for BIDDER FROM A COUNTRY WHICH SHARES LAND BORDER WITH INDIA

1. Any bidder from a country which shares a land border with India will be eligible to bid in this tender, only if the bidder is registered with the Competent Authority.

Competent Authority for the purpose of registration shall be the Registration Committee constituted by the Department for Promotion of Industry and Internal Trade (DPIIT).

2. Any false declaration and non-compliance of the above would be a ground for immediate rejection of offer or termination of the contract and further legal action in accordance with the laws.

3.

Validity of Registration: Registration should be valid at the time of submission of bids and should be valid at the time of placement of order.

4. Instructions to Vendors

1. Last minute clarification on tenders will not be entertained.

2. This is an E Tender. Hence Postal/Fax/Email tenders will not be accepted.

5. PROFORMA FOR INSTRUCTIONS TO TENDERERS AND TERMS & CONDITIONS OF TENDER where the indent value is Rs. 2.00 lakhs & above for indigenous stores items

1. (a) All available technical literature, catalogues and other data in support of the specifications and details of the items should be furnished along with the offer.

(b) Samples, if called for, should be submitted free of all charges by the tenderer and the Purchaser shall not be responsible for any loss or damage thereof due to any reason whatsoever. In the event of nonacceptance of tender, the tenderer will have to remove the samples at his own expense.

(c) Approximate net and gross weight of the items offered shall be indicated in your offer. If dimensional details are available the same should also be indicated in your offer.

(d) Specifications: Stores offered should strictly confirm to our specifications. Deviations, if any, should be clearly indicated by the tenderer in his quotation. The tenderer should also indicate the Make/Type number of the stores offered and provide catalogues, technical literature and samples, wherever necessary, along with the quotations. Test Certificates, wherever necessary, should be forwarded along with supplies. Wherever options have been called for in our specifications, the tenderer should address all such options. Wherever specifically mentioned by us, the tenderer could suggest changes to specifications with appropriate response for the same.

2. (a) All available technical literature, catalogues and other data in support of the specifications and details of the items should be furnished along with the offer.

(b) Samples, if called for, should be submitted free of all charges by the tenderer and the Purchaser shall not be responsible for any loss or damage thereof due to any reason whatsoever. In the event of nonacceptance of tender, the tenderer will have to remove the samples at his own expense.

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to specifications with appropriate response for the same.

3. ACCEPTANCE OF STORES:

(a) The stores shall be tendered by the Contractor for inspection at such places as may be specified by the purchaser at the Contractor's own risk, expense and cost.

(b) It is expressly agreed that the acceptance of the stores Contracted for, is subject to final approval by the purchaser, whose decision shall be final.

(c) If, in the opinion of the purchaser, all or any of the stores do not meet the performance or quality requirements specified in the Purchase Order, they may be either rejected or accepted at a price to be fixed by the purchaser and his decision as to rejection and the prices to be fixed shall be final and binding on the Contractor.

(d) If the whole or any part of the stores supplied are rejected in accordance with Clause No. (c) above, the purchaser shall be at liberty, with or without notice to the Contractor, to purchase in the open market at the expense of the Contractor stores meeting the necessary performance and quality Contracted for in place of those rejected, provided that either the purchase, or the agreement to purchase, from another supplier is made within six months from the date of rejection of the stores as aforesaid.

4. As a Government of India Department, this office is exempted from payment of Octroi and similar local levies. Tenderers shall ensure that necessary Exemption Certificates are obtained by them from the Purchase Officer concerned to avoid any payment of such levies.

5. a) Your offer should be valid for 90 days from the date of opening of the tender.

b) Prices are required to be quoted according to the units indicated in the annexed tender form. When quotations are given in terms of units other than those specified in the tender form, relationship between the two sets of units must be furnished.

6. DESPATCH: The Contractor is responsible for obtaining a clear receipt from the Transport Authorities specifying the goods despatched. The consignment should be despatched with clear Railway Receipt/Lorry Receipt. If sent in any other mode, it shall be at the risk of the Contractor. Purchaser will take no responsibility for short deliveries or wrong supply of goods when the same are booked on 'said to contain' basis. Purchaser shall pay for only such stores as are actually received by them in accordance with the Contract.

7. d) The term 'Purchase Order' shall mean the communication signed on behalf of the Purchaser by an Officer duly authorised intimating the acceptance on behalf of the Purchaser on the terms and conditions mentioned or referred to in the said communication accepting the tender or offer of the Contractor for supply of stores or plant, machinery or equipment or part thereof.

8. GUARANTEE & REPLACEMENT:

(a) The Contractor shall guarantee that the stores supplied shall comply fully with the specifications laid

down, for material, workmanship and performance.

(b) For a period of twelve months after the acceptance of the stores, if any defects are discovered therein or any defects therein found to have developed under proper use, arising from faulty stores design or workmanship, the Contractor shall remedy such defects at his own cost provided he is called upon to do so within a period of 14 months from the date of acceptance thereof by the purchaser who shall state in writing in what respect the stores or any part thereof are faulty.

(c) If, in the opinion of the purchaser, it becomes necessary to replace or renew any defective stores such replacement or renewal shall be made by the Contractor free of all costs to the purchaser, provided the notice informing the Contractor of the defect is given by the purchaser in this regard within the said period of 14 months from the date of acceptance thereof.

(d) Should the Contractor fail to rectify the defects, the purchaser shall have the right to reject or repair or replace at the cost of the Contractor the whole or any portion of the defective stores.

(e) The decision of the Purchaser notwithstanding any prior approval or acceptance or inspection thereof on behalf of the Purchaser, as to whether or not the Stores supplied by the Contractor are defective or any defect has developed within the said period of 12 months or any other period or as to whether the nature of defects requires renewal or replacement, shall be final, conclusive and binding on the Contractor.

(f) To fulfill guarantee conditions outlined in (a) to (e) above, the Contractor shall, at the option of the Purchaser, furnish a Bank Guarantee (as prescribed by the Purchaser)

9. PACKING FORWARDING & INSURANCE: The Contractor will be held responsible for the stores being sufficiently and properly packed for transport by rail, road, sea or air to withstand transit hazards and ensure safe arrival at the destination. The packing and marking of packages shall be done by and at the expense of the Contractor. The purchaser will not pay separately for transit insurance, all risks in transit being exclusively of the Contractor and the Purchaser shall pay only for such stores as are actually received in good condition in accordance with the Contract.

10. Preference will be given to those tenders offering supplies from ready stocks and on the basis of FOR destination/delivery at site.

11. PRICES: Tender offering firm prices will be preferred. Where a price variation clause is insisted upon by a tenderer, quotation with a reasonable ceiling should be submitted. Such offers should invariably be supported by the base price taken into account at the time of tendering and also the formula for any such variation/s.

12. REJECTED STORES:

Rejected stores will remain at destination at the Contractor's risk and responsibility. If instructions for their disposal are not received from the Contractor within a period of 14 days from the date of receipt of the advice of rejection, the purchaser or his representative has, at his discretion, the right to scrap or sell or consign the rejected stores to Contractor's address at the Contractor's entire risk and expense, freight being payable by the Contractor at actuals.

13. Sales Tax and/or other duties/levies legally leviable and intended to be claimed should be mentioned in the price bid template. If nothing is mentioned, then it will be presumed that the rate quoted is inclusive of all taxes/duties.

14. SECURITY DEPOSIT: Wherever, the Purchase Order value is Rs. 5.00 Lakhs or more, on acceptance of the tender, the Contractor shall, at the option of the Purchaser and within the period specified by him, deposit with him, in cash or in any other form as the Purchaser may determine, security deposit not exceeding ten percent of the value of the Contract as the Purchaser shall specify. If the Contractor is called upon by the Purchaser to deposit, 'Security' and the Contractor fails to provide the security within the period specified, such failure shall constitute a breach of the Contract, and the Purchaser shall be entitled to make other arrangements for the re-purchase of the stores Contracted at the risk of the Contractor in terms of Sub-Clause (ii) and (iii) of clause regarding Delivery. (b) hereof and/or to recover from the Contractor, damages arising from such cancellation.

15. TERMS & CONDITIONS OF TENDER

16. TEST CERTIFICATE: Wherever required, test certificates should be sent along with the despatch documents.

17. The authority of the person signing the tender, if called for, should be produced.

18. The Purchaser reserves the right to place order on the successful tenderer for additional quantity up to 25% of the quantity offered by them at the rates quoted.

19. The purchaser shall be under no obligation to accept the lowest or any tender and reserves the right of acceptance of the whole or any part of the tender or portions of the quantity offered and the tenderers shall supply the same at the rates quoted.

20. The tenderer should supply along with his tender, the name of his bankers as well as the latest Income-Tax clearance certificate duly countersigned by the Income-Tax Officer of the Circle concerned under the seal of his office, if required by the Purchaser.

21. The term Contractor shall mean, the person, firm or company with whom or with which the order for the supply of Stores is placed and shall be deemed to include the Contractor's successors, representative, heirs, executors and administrators unless excluded by the Contract.

22. The term Purchaser shall mean the President of India or his successors or assigns.

23. The term 'Stores' shall mean what the Contractor agrees to supply under the Contract as specified in the Purchase Order including erection of plants & machinery and subsequent testing, should such a condition is included in the Purchase Order.

C. Bid Templates

C.1 Technical Bid - DESIGN, SUPPLY, INSTALLATION AND COMMISSIONING OF HIGH ENERGY DIGITAL RADIOGRAPHY (6 MeV LINAC BASED) AND INTEGRATED COMPUTED TOMOGRAPHY (CT) SYSTEM WITH SUITABLE OBJECT MANIPULATORS AND FLAT PANEL DETECTOR

1. FPD based Digital Radiography and CT System for 6 MeV LINAC

Item specifications for FPD based Digital Radiography and CT System for 6 MeV LINAC

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	The system consists of Automatic Object Manipulator, Flat Panel Detector, CT Software and Workstation for 6 MeV LINAC based digital radiography and CT (The LINAC will be provided by VSSC.)		-		

Document : Detailed Specification

Common Specifications (Applicable for all items)

SI No	Specification	Value	Compliance	Offered Specification	Remark
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1	Overall System includes specifications for Object Manipulator System (ie. LINAC Handling System, Object Rotator, Rotary Table, FPD/Film Handling System), Flat Panel detector, CT workstation and softwares and other requirements which are given below.		-		
2	I. LINAC HANDLING SYSTEM (Part I of Object Manipulator) LINAC Handling system is required to move the LINAC in X, Y and Z directions for positioning it for radiography- Detailed Spec. is given below		-		
3	I.1. The system is to be Designed for handling LINAC with secondary collimator of total weight of 3250 kg and of dimensions 2.5 m (L) X 0.8m (W) X 1m (H)	LINAC with secondary collimator will be provided by VSSC	Yes / No / Explain		
4	I.2. Horizontal movement along object length (X-axis) along rails	9 m	Yes / No / Explain		

5	I.3. Back/Fro Movement (Y axis) along rails	Upto 1000mm	Yes / No / Explain		
6	I.4. Vertical movement(Z-axis)	Upto 4000mm from FFL	Yes / No / Explain		
7	I.5. Vertical(Z-axis) Speed	50 to 500 mm/min (any speed with min and max speeds shown)	Yes / No / Explain		
8	I.6. Speed, Horizontal (X-axis) & Across Horizontal(Y-axis)	100 to 1000 mm/min (any speed with min. and max. speeds shown)	Yes / No / Explain		
9	I.7. Accuracy of Movement (X,Y& Z)	± 0. 25 mm	Yes / No / Explain		
10	I.8. Mechanical drive (X-axis)	Rail(suitable CR profile) & Wheel(double flanged), Hardened steel(BHN-250 to 300)	Yes / No / Explain		
11	I.9. Mechanical drive (Y-axis)	Rail(suitable CR profile) & Wheel(double flanged), Hardened steel (BHN-250 to 300)	Yes / No / Explain		
12	I.10. Mechanical drive (Z Axis)	Double nut recirculating Ball screw with guide rods (hardened steel with HRC-50 (min.) and hydraulic Scissor lift with suitable provision to stabilize LINAC at a particular height in less than 30 sec.	Yes / No / Explain		
13	I.11. Rotation of LINAC carriage Horizontal swivel(pan)	±15° (From Mean Position) with resolution less than 0.05°	Yes / No / Explain		
14	I.12. Rotation of LINAC carriage Vertical swivel(tilt)	±15° (From Mean Position) with resolution less than 0.05°	Yes / No / Explain		
15	I.13. Electrical Drive (X,Y and Z axis)	Flame Proof Servo Motors (suitable for zone 1) with absolute encoder for Automation	Yes / No / Explain		

16	I.14.Position Feedback	Absolute Encoders in addition to electro-mechanical devices such as proximity/limit switches are to be provided for fault diagnosis & safety.	Yes / No / Explain		
17	I.15. Material of construction	IS 2062- Grade E250 Steel for general structural purpose	Yes / No / Explain		
18	I.16.System shall have provisions for two speeds ie. micro and macro and also all speeds selectable in between in order to achieve required X, Y and Z position.	Speed shall be controllable from remote HMI station in the hall and from Control Room and the speed of the movement shall be displayed on either of the systems whichever is being operated.	Yes / No / Explain		
19	I.17.Vibration arresting mechanism for LINAC shall be designed to dampen the vibration of LINAC within 30 seconds.		-		
20	I.18. Remote HMI station in the Hall/Control Room shall have interchangeable provision to control and display location of LINAC, tilt, pan and speeds in X, Y, Z direction.		-		
21	I.19. Limit switches shall be provided at extreme positions of X, Y, and Z motions. Mechanical stopper also may be provided for additional safety.		-		

22	I.20.Range of vertical motion for regular operation of LINAC shall be 750 mm to 4000 mm so that lower most beam exit point shall be at 1000 mm from FFL.		-		
23	I.21. All the LINAC positions shall be controllable from Control room with exact position feedbacks (X, Y and Z) with Initial position (home) of LINAC set.		-		
24	I.22. Provisions for controlling/integrating the LINAC positions and swivel angles by the Computed Tomography Software shall be given for automation.		-		
25	I.23. Home Position for X, Y and Z axis shall be provided to retain the Default values. Only Administrator shall have provisions to Reset the Default values.		-		
26	II. OBJECT ROTATOR (Part II of Object Manipulator)		-		

27	Object Rotator is required to position the job horizontally for radiography. The Rotator should be designed for Object diameter of maximum dia 1500 mm, Length 5000 mm & weight 8T. Details of the system is given below.		-		
28	II.1.The cylindrical object will be rotated over antistatic rubber lined four number of roller sets of suitable diameter, each roller mounted on individual roller stand. The gap between rollers of a pair should be adjustable to accommodate object of variable diameter. The roller stands shall be mounted over a suitable platform structure.		-		
29	II.2. The gap between rollers should be adjustable to accommodate object of variable diameter (300mm to 1500mm) and length (1500mm to 5000mm).		-		

30	II.7. Object Rotator Length	5500 mm	Yes / No / Explain		
31	II.8. Object Rotator Width	1400 mm	Yes / No / Explain		
32	II.9. Roller center Height from FFL	1000 mm	Yes / No / Explain		
33	II.10.Max. load capacity	12 T	Yes / No / Explain		
34	II.11.Job Rotation (Object Rotator System) & position feed back	Absolute Encoders in addition physical devices such as proximity/limit switches are to be provided for fault diagnosis & safety. (If found essential Incremental Encoders may also be used)	Yes / No / Explain		
35	II.12. Rotational Speed of job	0.2 to 1 rpm- System controllable	Yes / No / Explain		
36	II.13. Rotational accuracy	±0.5 mm on job surface of 1 m diameter	Yes / No / Explain		
37	II.14. Roller	Roller of approximate 300 mm dia and 250 mm width with hard rubber of minimum thickness 30 mm to be provided to accommodate the object. Roller shall be designed so as to provide a clearance of 50 mm between object surface and roller supporting bracket after full load compression of roller rubbers. Roller material shall be radiation compatible and shall not be worn out easily.	Yes / No / Explain		
38	II.15. Lateral Distance between rollers	Should be manually adjustable for diameter range of 300 mm to 1200 mm of the object.	Yes / No / Explain		
39	II.16.Separation between rollers	Manually adjustable for a length range of 1 m to 5 m of the object.	Yes / No / Explain		

40	II.17.Lateral movement arrestor	Suitable self-arresting mechanism to be provided on the rotator to prevent lateral movement of object and maintain the set position automatically after any rotation. It shall be roller type to prevent friction.	Yes / No / Explain		
41	II.18. Electrical Drive	Flame Proof Servo Motor (suitable for zone 1)	Yes / No / Explain		
42	II.20. Material of construction	IS 2062- Grade E250 Steel for general structural purpose	Yes / No / Explain		
43	II.21. There shall be provision to rotate the object to the required angle. Auto Calibration and setting the object to Home Position (ZERO) shall happen automatically after positioning the object on object rotator.		-		
44	II.22. Further positions on rotation shall be based on the set Home Position. Suitable braking system to ensure positional accuracy is to be given. Drifting or Lateral movement of object along the roller during continuous rotation shall be arrested fully.		-		

45	<p>II.23.Remote HMI station in the Hall/Control Room shall have interchangeable provision to control and display the angle of rotation and speed of rotation of the object and real-time feedback of the positions shall be available to the system. Local HMI in hall shall display the parameter whichever is under operation.</p>		-		
46	<p>II.24.Provisions for controlling/integrating the object rotator positions by the Computed Tomography/Digital radiography acquisition Software shall be given for automation.</p>		-		
47	<p>II.25.Suitable lifting lugs may be provided at the ends for shifting the object rotator using crane for maintenance.</p>		-		
48	<p>III. ROTARY TABLE (Part III of Object Manipulator)</p>		-		

49	Rotary Table is used to position the job vertically for radiography. (Refer layout in detailed Spec). Details of the job and specification of rotary table is given below.		-		
50	III.1. Object Diameter	150-2800 mm	Yes / No / Explain		
51	III.2. Object Height	3000 mm	Yes / No / Explain		
52	III.3. Maximum Weight of object	6 T	Yes / No / Explain		
53	III.4. Load capacity	12 Ton	Yes / No / Explain		
54	III.5. Table diameter	3000 mm	Yes / No / Explain		
55	III.6. Height from FFL	750 mm	Yes / No / Explain		
56	III.7. Surface flatness	0.2 mm	Yes / No / Explain		
57	III.8. Job Rotation	Absolute Encoded rotation about axis of object from Home Position	Yes / No / Explain		
58	III.9. Rotation about Z axis	0° to 360° in steps of 0.05° (micro) to 1°(macro) (Whole range)	Yes / No / Explain		
59	III.10. Rotation speed	0.05 to 1 rpm- System controllable	Yes / No / Explain		
60	III.11. Rotational accuracy	± 0.1 deg.	Yes / No / Explain		
61	III.12. Mechanical drive(rotation) and its control	Any suitable mechanism that could deliver accurate rotation.	Yes / No / Explain		
62	III.13. Electrical Drive for rotation	Flame Proof Servo Motors (suitable for zone 1)	Yes / No / Explain		
63	III.14. Position Feedback	Absolute Encoders (Flame proof type)	Yes / No / Explain		

64	III.15. Material of construction	IS 2062- Grade E250 Steel for general structural purpose	Yes / No / Explain		
65	III. 16.Once object is positioned, auto centering options shall be given (optical provisions) and Default Home Position may be attained. Accuracy of motion shall be demonstrated at work site in presence of VSSC person.		-		
66	III.17. Remote HMI station in the Hall / Control Room shall have interchangeable provision to control and display the angle of rotation and speed of rotation of the object.	Real-time feedback of the positions shall be available to the system. Local HMI in hall shall display the parameter whichever is under operation.	Yes / No / Explain		
67	III.18. Provisions for controlling/integrating the rotary table positions by the Computed Tomography/Digital radiography acquisition Software shall be given for automation.		-		
68	III.19.Two triangle finish over rotary table-the better Face-out (<0.1 mm) and run-out (<0.1 mm) for rotary table is preferable.		-		

69	III.20. Markings of concentric circles of various diameters 150, 300, 500, 750, 1000, 1250, 1500, 1750, 2000, 2250, 2500, 2750 mm shall be made on the surface of rotary table which shall be laser etched.		-		
70	IV. FLAT PANEL DETECTOR HANDLING SYSTEM (Part IV of Object Manipulator)- Refer detailed specification also		-		
71	FPD is used to capture digital image for digital Radiography and computed tomography. The position of the same is to be adjusted using this handling system.	Provision to position X-ray cassettes also required	Yes / No / Explain		
72	IV.1. Designed for handling FPD of approx. size	420 mm (l) x 420 mm (b) x 30 mm (t)	Yes / No / Explain		
73	IV.2. Shielding requirements for FPD	The FPD has to be positioned safely in a Holding mechanism that is shielded by around 110 mm thick lead block at front side and back side and by around 50 mm thick lead blocks at sides, top and bottom with provisions for smooth cable entry.	Yes / No / Explain		
74	IV.3. Designed for handling FPD of approx. weight	600 kg	Yes / No / Explain		

75	<p>IV.4. The FPD positioning may be done with HMI in hall/remote HMI from control room. Provisions for controlling the whole motion by a centralized system that can be synchronized with the movements of LINAC, Object rotator and Rotary table is required with precision mentioned in movement under each system for automating the whole system to carry out Computed Tomography/Digital Radiography.</p>		-		
76	<p>IV.5.A foldable arm is to be provided on the FPD holder for holding the X-Ray film cassette additionally. The movement of the cassette in X & Y directions will be achieved by the arm movement and Z movement by the Z movement of FPD holder.</p>	<p>The cassette holder shall have grooves for inserting X-Ray film cassette of dimension 420mm X 310mm X 20mm (thk.) which weighs around 2.5 kg.</p>	Yes / No / Explain		

77	IV.6. The cassette holder shall have rotation option through 180° for changing the cassette orientation from portrait to landscape mode.		-		
78	IV.7. Vertical up/down(Z-axis) movement	750 mm to 4000 mm from FFL	Yes / No / Explain		
79	IV.8. Horizontal movement along length of object (X-axis)	9000 mm	Yes / No / Explain		
80	IV.9. Movement, to &fro (Y-axis)	1300 mm	Yes / No / Explain		
81	IV.10.Speed of X, Y & Z -axes movement	50 mm/min (micro) and 1000 mm/min (macro)	Yes / No / Explain		
82	IV.11.Accuracy of movement in X, Y & Z-axes	± 0.25 mm	Yes / No / Explain		
83	IV.12.Mechanical drive(X-axis)	Rail(suitable CR profile) & Wheel(double flanged), Hardened steel(BHN-250 to 300)	Yes / No / Explain		
84	IV.13. Mechanical drive (Y and Z Axis)	Double nut recirculating Ball screw with guide rods (hardened steel with HRC-50 (min.))/ any other suitable mechanism that can provide accurate movement	Yes / No / Explain		
85	IV.14. Electrical Drive for FPD Handling system (X,Y and Z Axis)	Flame proof Servo Motors (suitable for zone 1)	Yes / No / Explain		
86	IV.15. Position Feedback	Absolute Encoder in addition to physical devices such as limit/proximity switches are to be provided for fault diagnosis & safety.	Yes / No / Explain		

87	IV.16. Material of construction	IS 2062- Grade E250 Steel for general structural purpose	Yes / No / Explain		
88	IV.17. Anti-Vibration Requirements for Radiography	Visco-elastic padding can be used in structure for damping vibration towards avoiding image blurring.	Yes / No / Explain		
89	IV.18. HMI station in the Hall/remote HMI in the Control Room shall have interchangeable provision to control and display the position and speed along X, Y, Z directions.		-		
90	IV.19. HMI controlled motorised shutter system with lead shielding for FPD and swiveling option from 0 deg. to 180 deg.		-		
91	IV.20. Anti-collision interlock to avoid collision between FPD and object Rotator/Rotary Table/Job is to be provided.		-		

92	IV.21. Required sensors for maintaining min gap between FPD and object Rotator/Rotary Table/Job shall be there and motion controlled through software. Minimum gap shall be mentioned specifically and cut off shall happen once that gap is reached.		-		
93	IV.22. Limit switches at the extremities of X, Y and Z travel. Mechanical stopper wherever possible.		-		
94	IV.23. FPD handling system shall be designed preferably for an SWL of 600 kg approx. Proper counter balancing positions at extreme points shall be defined.		-		
95	IV.24. Vibration arresting mechanism is to be designed to dampen the vibration in 30 seconds.		-		
96	IV.25. Suitable Templates made of lead plates shall be provided to shield the over exposed areas of FPD during radiography.		-		

97	V. FLAT PANEL DETECTOR FOR DIGITAL RADIOGRAPHY AND COMPUTED TOMOGRAPHY (Refer detailed spec. also)		-		
98	The FPD shall be capable of usage for Digital Radiography and Computed Tomography applications. Details of the same are given below.		-		
99	V.1. Detector	a-Si (Amorphous Silicon)	Yes / No / Explain		
100	V.2. Scintillator screen	DRZ Plus	Yes / No / Explain		
101	V.3. Pixel number or Image size (Min.)	3072 x 3072	Yes / No / Explain		
102	V.4. Pitch	140 µm	Yes / No / Explain		
103	V.5. Active pixel area	420 mm x 420 mm	Yes / No / Explain		
104	V.6. ADC	16 bits	Yes / No / Explain		
105	V.7. Data Output	Gigabit Ethernet	Yes / No / Explain		
106	V.8. Dynamic range	77 dB	Yes / No / Explain		
107	V.9. Response non uniformity	± 2 percentage	Yes / No / Explain		
108	V.10. Total number of underperforming pixels	0.5 percentage	Yes / No / Explain		
109	V.11. Image Resolution	3 lp/mm	Yes / No / Explain		
110	V.12. Frame rate per second	4fps @ 1x1 binning and 15 fps @ 2 x 2 binning	Yes / No / Explain		

111	V.13. X-ray Radiation energy range	20 keV – 16 MeV	Yes / No / Explain		
112	V.14. Cable length from Detector to Computer	60 m	Yes / No / Explain		
113	V.15. Internal shielding of electronics	upto 225 kV	Yes / No / Explain		
114	V.16. FPD shall have motorized shutter system for preventing direct exposure of active area of detector. Motorized movements of four jaws system with swiveling provision from 0 deg to 180 deg shall be given.		-		
115	V.17. Lead template plates of sufficient thickness of various curvatures shall be provided to shield the detector area.		-		
116	VI. IMAGE ACQUISITION SOFTWARE FOR DIGITAL RADIOGRAPHY/COMPUTED TOMOGRAPHY		-		
117	VI.1. The software shall support functions for acquisition of a single frame/sequence of frames/or continuous frames.		-		

118	VI.2. It should have provision for Automated acquisition of projection data from CT manipulators for performing 3D reconstruction. It should support cone beam, fan beam, parallel beam CT.		-		
119	VI.3. It should have provision for stitching the 2D images for bigger objects (objects handled mostly is 300 mm to 1500 dia) for CT reconstruction.		-		
120	VI.4. The imaging software shall have provisions for cross-sectional imaging of components for carrying out Computed Tomography. This cross-sectional imaging software may have individual modules as	Acquisition Module, Calibration Module, Reconstruction Module, Visualization Module, Analysis Module (Refer detailed specification)	Yes / No / Explain		
121	VI.5. It should have Line Profile tool.		-		

122	VI.6. All standard image processing tools such as –Interactive windowing, Grayscale invert, Zooming, Flip / Rotate, ROI tool, Magnifier, Pointer, BNC, Reference image viewer, thumbnail views & 3D plotting etc.		-		
123	VI.7. Provision for selection of integration times, selection of gain setting, selection of trigger modes, calibration procedures to acquire offset and gain correction files.		-		
124	VI.8. Should perform real-time (On-Board) corrections for offset correction, multiple gain correction with up to 10 signal levels and Pixel correction. The First Image shall be omitted while CT reconstruction takes place.		-		

125	VI.9. The software also should have image quality improvement provisions like beam hardening correction (in single material or multiple material jobs) and Artifact Reduction tools such as Iterative Artifact Reduction (IAR).		-		
126	VI.10. The software shall have provisions for dimensional measurement of features and defects from images.		-		
127	VI.11. The images should be DICONDE compatible with provision for storing in multiple formats. It should have the facility to calculate detector characterization parameters such as SNR, CNR etc.		-		
128	VI.12. For detector calibration and qualification viz., bad pixel map, gain-offset correction, the FPD shall comply with ASTM E 2597, 2736.		-		

129	VI.13. Software shall have features in compliance with ASTM E2699, 2339 for image archival, sharing, image tag and storage.		-		
130	VI.14. Supplier shall demonstrate radiographic sensitivity of 1-2T and image resolution with 6/9 MeV X-ray system available at the site.		-		
131	VI.15. The software also shall have provision to confirm the details of underperforming pixels as furnished in the Test certificate for FPD.		-		
132	VI.16. The supplier shall extend necessary support for interfacing with the standard microcontroller of an object manipulator of the purchaser.		-		
133	VII. WORK STATION AND IMAGE DISPLAY REQUIREMENTS		-		
134	VII. A. Acquisition Module Work Station configuration		-		
135	A1. Processor (acquisition module)	3rd Generation Intel Xeon Scalable Processors or latest	Yes / No / Explain		

136	A2. Board (acquisition module)	Asus Rampage V Edition 10 or better	Yes / No / Explain		
137	A3. RAM (acquisition module)	64 GB RAM (PC will be mostly involved in Digital radiography and image processing for interpretation)	Yes / No / Explain		
138	A4. GPU (acquisition module)	NVidia Quadro RTX 6000, 24GPU or better	Yes / No / Explain		
139	A5. Storage cabinet (acquisition module)	8TB SSD (2 TB * 4) in the RAID 1 configuration and a normal optical 2TB HDD for regular usage. (Essential since Digital Radiography involves continuous imaging and storage of images). Each image (flight data) to be stored for min. 5 years.	Yes / No / Explain		
140	A6. Operating System(acquisition module)	Windows 10 ultimate or better (Upgradation to Windows 11 in one year)	Yes / No / Explain		
141	A7. Monitor(acquisition module)	Standard LED Colour Monitor-27 inch, Dual video display provisions – 2 Nos. with Display sharing options	Yes / No / Explain		
142	A8. DVDRW drive (acquisition module)	With DVD writer	Yes / No / Explain		
143	A9. Essential ports (acquisition module)	USB 3.0 ports or better , Video Input terminals : DVI-D (dual Link)x 1, Display Port x 2, HDMI port	Yes / No / Explain		
144	A10. Additional Storage of Data and back up (acquisition module)	Suitable Network attached Storage (NAS) servers with 18 TB storage with RAID 1 configuration. Provisions to add on the storage limits shall be given.	Yes / No / Explain		
145	A11. Warranty (acquisition module)	5 years onsite warranty may be provided	Yes / No / Explain		

146	A12. Microsoft Office and Adobe Acrobat Reader latest with license installed. (acquisition module)	Yes	Yes / No / Explain		
147	A13. Computer Table for positioning the Acquisition Workstation shall be provided. (acquisition module)	Yes	Yes / No / Explain		
148	A14. Provisions to transfer data to 3D CT Reconstruction Work Station or a Super Computer System		-		
149	VII. B. 3D CT RECONSTRUCTION WORKSTATION CONFIGURATION		-		
150	B1. Processor (reconstruction module)	Intel Xeon Platinum 8368 or better Processor. Min 57M Cache, 38Cores, Dual Processors.	Yes / No / Explain		
151	B2. Board (reconstruction module)	Asus Rampage V Edition 10 or better	Yes / No / Explain		
152	B3. RAM (reconstruction module)	512GB RAM or better, provisions to improve RAM capacity to be given.	Yes / No / Explain		
153	B4. GPU (reconstruction module)	NVidia Quadro RTX 6000, 24GPU or better	Yes / No / Explain		
154	B5. Storage cabinet (reconstruction module)	8TB SSD (2 TB * 4) in the RAID 1 configuration and a normal optical 2TB HDD.	Yes / No / Explain		
155	B6. Operating System (reconstruction module)	Windows 10 ultimate or better (Upgradation to Windows 11 in one year)	Yes / No / Explain		

156	B7. Monitor (reconstruction module)	32" 4K Colour Monitor	Yes / No / Explain		
157	B8. DVDRW drive (reconstruction module)	1 No. with DVD writer	Yes / No / Explain		
158	B9. Essential ports (reconstruction module)	USB 2.0 ports, Video Input terminals: DVI-D (dual Link)x 1, Display Port x 2, HDMI port	Yes / No / Explain		
159	B10. Additional Storage of Data and back up (reconstruction module)	Suitable Network attached Storage (NAS) servers with 18 TB storage in RAID 1 configuration. Provisions to add on the storage limits shall be given.	Yes / No / Explain		
160	B11. Warranty (reconstruction module)	5 years onsite warranty may be provided	Yes / No / Explain		
161	B12. Microsoft Office and Adobe Acrobat Reader latest with license installed. (reconstruction module)	Yes	Yes / No / Explain		
162	B13. Computer table for positioning 3D reconstruction Workstation shall be provided.(reconstruction module)	Yes	Yes / No / Explain		
163	VII. C. DISPLAY SYSTEM UNIT FOR X RAY IMAGES		-		
164	C.1. Display system	12 MP Colour Diagnostic High-resolution LCD Display Monitor (31 inch)	Yes / No / Explain		
165	C.2. Native resolution	4200 x 2800 (3 : 2 Aspect Ratio)	Yes / No / Explain		
166	C.3. Viewable Image Size	650 x 430 mm or better	Yes / No / Explain		
167	C.4. Brightness	1200 cd/m2	Yes / No / Explain		

168	C.5. Viewing Angles	178° (Right/Left)/178°(Up/Down)	Yes / No / Explain		
169	C.6. Contrast ratio	1500 to 1	Yes / No / Explain		
170	C.7. Essential ports(reconstruction module)	Video Input terminals : DVI-D (dual Link)x 1, Display Port x 2, HDMI port	Yes / No / Explain		
171	C.8. Interfacing Cables	Suitable interfacing cables are to be supplied to connect to PC to transfer Data and Power	Yes / No / Explain		
172	C.9. Screen	Anti-Glare and Anti Reflection coated for continuous interpretation by operator.	Yes / No / Explain		
173	VII. D. Essential CT modules with artifact reduction, scatter correction and beam hardening correction tools provided as follows.		-		
174	D.1. CT Reconstruction Basic	CT Reconstruction Basic including a five-year update/service agreement.	Yes / No / Explain		
175	D.2. CT Reconstruction (Cone Beam, Fan Beam, Parallel Beam)	CT Reconstruction (Cone Beam, Fan Beam, Parallel Beam) including a five-year update/service agreement.	Yes / No / Explain		
176	D.3. CT Reconstruction modules for Composites & Plastic, Dongle License	Composites & Plastic Dongle License, the add-on modules Coordinate Measurement, Nominal/Actual Comparison, Wall Thickness Analysis, Porosity/Inclusion Analysis, Fiber Composite Material Analysis, and a five year update/service agreement.	Yes / No / Explain		

177	VIII. GENERAL REQUIREMENTS (Detailed Spec. also to be referred)		-		
178	VIII. 1.All mechanical structure and components shall be designed with factor of safety of 3 (min.) on yield strength. Factor of 3 can be shown in calculations however load test has to be carried out at 1.25 times of SWL		-		
179	VIII.2. Design of all the structural members shall confirm to IS 807 and 3077.		-		
180	VIII.3. All the movements in horizontal, vertical & curved paths (except rail-wheel) are to be provided via Linear Motion (LM) guides. The LM guides shall be of good quality conforming to THK C5 standards.	The grooves for fixing the LM guides should be such that required parallelism can be achieved. The LM guides are to be covered with bellows for protection against dust. All the rail sections where movements using rail-wheel is to be used shall conform to IS 3443. All LM guides shall have foldable flop type coverings.	Yes / No / Explain		

181	VIII.4. All the vertical and horizontal movements are to be achieved by flame proof Servo Motors with absolute encoders. Proximity & safety limit switches and end building block/stopper are to be provided at extreme ends.		-		
182	VIII.5. All the motions has to be such that all manipulator subsystems can be moved to any distance required within the specified range by giving proper commands through PLC/SCADA.		-		
183	VIII.6. There shall be a provision of brass etched scale with LC 5 mm to read the position of all movements wherever possible.		-		
184	VIII.7. All the vertical and horizontal movements are to be achieved by flame proof Servo Motors with absolute encoders. Proximity & safety limit switches and end building blocks/stoppers are to be provided at extreme ends.		-		

185	VIII.8. Each system shall be provided with proper lifting arrangement through lifting lugs/eye bolts to lift the entire manipulator by an overhead crane.		-		
186	VIII.9. All support structure has to be properly grouted and leveled during installation.		-		
187	VIII.10. All electric connection shall be flame proof/enclosed type for field mounted accessories and installation. Insulation class of all the electrical motors shall be F or better and Duty S4.		-		
188	VIII.11. All the motors shall be flameproof Ex-d and conform to hazardous area classification i.e. zone 1, Group IIA, IIB. Temperature classification T5 with inverter duty, embedded thermistor in the motor winding.		-		

189	VIII.12. All the motors used should be designed to consume only 80% of rated current. All the electrical motors used in each sub system shall be able to achieve the required speed of motion in addition to bearing the load.		-		
190	VIII.13. Encoder shall be flame proof. It shall be absolute encoder/resolver to show the position. If absolute flame proof encoders are not available party can use explosion proof absolute encoder.		-		
191	VIII.14. Proximity limit switches (Sensor) of intrinsically safe with suitable IS barrier interface.		-		
192	VIII.15. For all the subsystems of the manipulators, the operation philosophy should be Local (by portable pendant/HMI) and remote selection (by PLC/SCADA screen in Control room) through key way switch.		-		

193	VIII.16. For each sub system, proper cable management system shall be designed. Cable chain system shall be of IGUS make.		-		
194	VIII.17. Field mounted instruments comprising of primary measuring elements, junction box, evaluation unit, digital display, switches, induction/servo motors shall be flame proof (Ex "d").	Suitable for Class 1 Division 1 or Zone 1 Hazardous areas with Gas group A,B,C,D or IIA/IIB, Temperature rating of T5 or maximum 100 deg C and IP65 or better ingress protection rating, Flameproof /Explosion proof or Intrinsic safe (Ex "ia/ib")	Yes / No / Explain		
195	VIII.18. Power, screened and Control cables should be FRLS armored. All cables must be provided with braided sheathing.		-		
196	VIII.19. All indigenous FLP/Explosion proof/ Intrinsic safe electrical fittings should have approval of CMRI, Dhanbad or ATEX / ICEX/NEMA or corresponding Government bodies in case of import.		-		

197	VIII.20. Programmable Logic controller along with visualization system should be installed in a console, and associated peripherals for the complete systems.		-		
198	VIII.21. Power Distribution Panel should comprise set of double pole MCBs for powering of Automation system.		-		
199	VIII.22. All working parts, as far as possible, are to be arranged for convenience of operation, inspection, lubrication and ease of replacement with minimum down time.		-		
200	VIII.23. All like parts of the equipment furnished are to be interchangeable. For each sub system, for easy maintenance, greasing points to be identified and all the sub systems should be easily amenable for assembling and disassembling.		-		

201	VIII.24. All items of manipulator system shall be thoroughly cleaned and painted as per the steps mentioned.	i) Sand blasting over the surface ii) Degreasing/dewatering of surfaces to be painted iii) Epoxy primer coating (2 coats) iv) 40micron thick epoxy paint coating (I coat) v) 30 micron of epoxy paint coating (II coat)	Yes / No / Explain		
202	VIII.25. Noise level of all the components of the object manipulator system together should not exceed 80 dB at 1 meter distance.		-		
203	VIII.26. Party shall provide list and quantity of all maintenance spares and spares parts which are required for two years normal trouble-free operation of the equipment.		-		
204	VIII.27. The party shall supply the first fill of consumable and supplies along with the main equipment.		-		

205	VIII.28. All equipments shall be complete with approved safety devices, wherever a potential hazard to personnel exists, and with provision for safe access to personnel to and around equipment for operational and maintenance functions.		-		
206	VIII.29. The party shall provide safety items such as coupling guards, belt guards, gearing and chain guards, etc., wherever required.		-		
207	VIII.30. Wherever Automated movements are there, suitable sensors with sufficient redundancy and mechanical stoppers shall be provided so as to prevent accidental hitting on any items being tested.		-		

208	VIII.31. All equipment shall be designed for smooth, efficient and trouble free operation in tropical humid climate of 45 deg C ambient on a 24 hour average and a humidity of 95 percent.		-		
209	VIII.32. The panels shall be properly ventilated/air-cooled to enable proper functioning with the panel doors closed.		-		
210	VIII.33. The party shall provide all relevant tools as per the list.	<ul style="list-style-type: none"> i. Soldering Gun (1 No.) ii. Greasing Gun and oiling Gun (1 No. each) iii. Double Ended spanner set (6mm to 32mm) (1No.) iv. Ring Spanner Set (6mm to 32mm) (1No.) v. Allen Key Set (1.5mm to 16mm) (1No.) vi. Socket Spanner Set (6mm to 32 mm) (1No.) vii. Socket accessories such as Ratchet handle, T-handle, Extension bar 6', Universal Joint (1No. each) viii. Torque wrench (Ratchet Type) 0-250Nm capacity (1No.) ix. Tool box for proper storing & handling of all above tools. 	Yes / No / Explain		

211	VIII.34. Control System	The system shall have two HMI units to control the operation of the manipulator system one inside the equipment bay(Local control) and another one in the control room(remote control).	Yes / No / Explain		
212	VIII.35. Control Philosophy: i. Command from SCADA and local HMI (local control station inside equipment bay) should be given as input to PLC and command from PLC drives the motor. The system shall be designed such that the PLC shall monitor and control the individual system associated with the manipulator system		-		
213	ii. Process will be monitored through the graphic and data display of the HMI station located in the adjacent control room and from the equipment bay.		-		
214	iii. Provisions to link the SCADA system to CT software and use the manipulator system for Automated capture of CT images shall be adopted.		-		

215	VIII.36. Emergency stop push buttons shall be provided inside the equipment bay and in control room.		-		
216	VIII.37. All control circuit in local HMI and DPM/display shall be of intrinsically safe (EX-i) with suitable IS barrier (P&F and MTL make)		-		
217	VIII.38. Master license for PLC & SCADA development along with detailed program documentation is to be supplied.		-		
218	VIII.39. Visualization System: i. The visualization system (HMI station) shall be two (2) nos. non – industrial and shall serve as operator interfaces for control, monitor and data acquisition of the plant and equipment. The visualization unit shall communicate with the processor of the PLC on Ethernet communication bus through the layer – 2 switches.		-		

219	ii. The HMI station shall be provided with Ethernet card. The HMI station shall perform all functions of operator station as well as engineering station. It shall have provision of HMI development and PLC programming facility.		-		
220	iii. The party shall supply three numbers of cloned hard disks (same model and make with software loaded) and mother boards each as standby to the remote control station i.e PC based HMI station. Party shall also supply 3 Nos. of local HMI stations with software pre-loaded as standby.		-		
221	iv. Party shall provide upgradation of HMI software as and when available for a period of atleast 3 years.		-		
222	VIII.40. The surface temperature of electrical equipment, located inside process/storage plant unit, shall not exceed 100 °C.		-		

223	VIII.41. Equipment earthing shall be provided as per IS 3043 and shall meet the stipulations of IE Rules. Insulated cables shall be used as earthing conductors.		-		
224	VIII.42. Conductors for equipment earthing shall be connected to the nearest earth grid to be provided by the purchaser, running along the building periphery.		-		
225	VIII.43. All equipment shall be earthed by connecting it to the earth grid by two separate conductors.		-		
226	VIII.44. All power and control cables essentially to be radiation shielded.		-		
227	VIII.45. All power and control cables shall be 1.1 KV grades, PVC insulated and PVC sheathed with special flame retardant smoke less properties, conforming to IS:1554 Part 1.		-		

228	VIII.46.The power cables shall have electrical grade purity standard aluminium conductors and all control cables shall annealed high conductivity standard copper conductors.		-		
229	VIII.47. All special cables including screened cables, twisted pair cables etc. required for signals, sensors, instruments, etc. along with the termination accessories as required shall be included in the scope of supply.		-		

230	VIII.48.The cables shall be suitably derated for site ambient of 45° C and cable grouping as per IS:3961. Cabling materials and accessories shall include supporting steel work, racks, trays, cables identification tags, cable jointing and termination kits, clamps, pipes and fittings as required for complete installation of the equipment covered by this specification. No cable joints shall be provided.		-		
231	VIII.49.All cabling work between the mains room, housing power distribution board (PDB)/MCC room housing motor control centre (MCC), located adjacent to the process room, shall be included in the scope of work of the successful party.	The minimum length of cables required shall be around 80 m to connect from the control room to hall through trenches provided in the building with proper routing.	Yes / No / Explain		
232	VIII.50.Cable harnessing for field wiring is through connectors		-		

233	VIII.51.All motors are essentially to be enclosed, flame proof and dust tight type.		-		
234	VIII.52.The motors shall have standardized dimensions and ratings strictly conforming to IS 1231 for foot mounted, IS2223 for flange mounted and IS2254 for vertical shaft motors.		-		
235	VIII.53. The technical features of Servo Motors shall be as per the requirements:		-		
236	i. Adequately sized terminal box suitable for terminating, 1.0KV PVC insulated, PVCsheathed, multicore cables with aluminium conductors considering derating for cables in air as per IS 3961		-		
237	ii. Motors shall be provided with integral feet & Lifting hooks/lugs shall be provided..		-		

238	iii. Dust tight terminal box as per type B enclosure conforming to IS 11005 shall be provided		-		
239	iv. Two earthing terminals shall be provided		-		
240	v. Motors shall be dynamically balanced to comply IS 12075, including the amplitude of vibration.		-		
241	vi. IP 65 Type B dust tight enclosure as per IS 11005 for motors located in process room with brake and other attachments.		-		
242	VIII.54. Proximity limit switches (Sensor) of intrinsically safe with suitable IS barrier interface. Soft limit using encoder information can be redundant limit switch for hard wired(Through PLC software).	One important point which needs to be taken care in this issue is both L/S shall not be in series, and operate one relay. Both the L/S shall form two independent circuit and operate two relays. This is required because in case of malfunctioning of relay the purpose of redundant L/S gets defeated	Yes / No / Explain		
243	IX. TIME PERIOD FOR COMPLETION -WARRANTY-AMC TERMS		-		

244	IX. 1. Time period of completion of the project is from the date of approving of last design documents and drawings to installation, commissioning and trial run of the complete system from the party.	The period of submission of drawings should not exceed by 4 months. Party has to submit their QA plans along with the design drawings for all mechanical, electrical / instrumentation items.	Yes / No / Explain		
245	IX. 2. The party shall provide 36 months warranty for complete system from date of completion of installation, commissioning and acceptance for its performance.		-		
246	IX. 3. The party shall provide AMC support for 5 years after completion of warranty for which a separate contract will be made.		-		
247	X. DESPATCH CLEARANCE	The vendor shall deliver the equipment to RPP/VSSC Thiruvananthapuram only after obtaining clearance for dispatch from purchaser.	Yes / No / Explain		
248	XI. ERECTION & COMMISSIONING		-		

249	<p>XI.1.It is to be noted that supply and erection of the system with all accessories, auxiliaries, piping, structures, platforms, staircases, electrics and controls as specified including motors, controls, cables, earthing connections, field mounted control devices, etc. and any equipment not covered in the specification but essential for proper installation, operation and maintenance of the system shall be included and executed by the party.</p>	<p>The supply will not be deemed complete until the commissioning trial of the whole system is carried out by the vendor with 6 MeV LINAC head at RPP/VSSC site successfully.</p>	<p>Yes / No / Explain</p>		
250	<p>XI.2.Preferred Makes, Applicable Codes, Documents to be submitted, Standards and other requirements, Testing and clearance are given in detailed Specification</p>		-		

Supporting Documents required from Vendor

1. COMMERCIAL COMPLIANCE MATRIX

2. TECHNICAL COMPLIANCE MATRIX

3. DETAILED PRICE BREAK UP WITH AMC DETAILS (Price Bid Related)

4. Self declaration with respect to local content(Make in India policy)

5 additional documents can be uploaded by the vendor

C.2 Commercial Terms / Bid

Sl. No.	Description	Compliance	Vendor Terms
1	The party shall provide 36 months warranty for complete system from date of completion of installation, commissioning and acceptance for its performance.	Yes / No / Explain	
2	Performance Bank Gurantee to be provided by the party during the warranty period	Yes / No / Explain	
3	Time period of completion of the project is from the date of approving of last design documents and drawings to installation, commissioning and trial run of the complete system from the party.	Yes / No / Explain	
4	The supply will not be deemed complete until the commissioning trial of the whole system is carried out by the vendor with 6 MeV LINAC head at RPP/VSSC site successfully.	Yes / No / Explain	
5	Supply and erection of the system with all accessories, structures, electrics and controls as specified and any equipment not covered in the specification but essential for proper installation of the system shall be included and executed by the party.	Yes / No / Explain	
6	The vendor shall deliver the equipment to RPP/VSSC Thiruvananthapuram only after obtaining clearance for dispatch from purchaser.	Yes / No / Explain	
7	Installation	Yes / No / Explain	
8	Taxes and other costs, if any . [Note: VSSC is a Public Funded Research Institution under the administrative control of Department of Space and is eligible for partial exemption of IGST @5% vide Notfn No. 45/2017, 47/2017 dt 14.11.2017 respectively. Necessary IGST EXEMPTION CERTIFICATE shall be issued.]	Yes / No / Explain	

9	Security Deposit: Successful Tenderer shall submit Security Deposit equivalent to 3% of the order value valid for a period of 60 days beyond the date for completion of the Purchase Order shall be furnished. This security deposit is collected towards the performance of the Contract. The said Security Deposit shall be submitted either in the form of Bank Guarantee or Fixed Deposit receipts from Nationalised/Scheduled Banks.	Yes / No / Explain	
10	Warranty [Minimum 36 months from the date of Installation required.]	Yes / No / Explain	
11	3% Performance Bank Guarantee valid two months beyond warranty period to be provided.	Yes / No / Explain	
12	The offer from suppliers who are not agreeing to submit Warranty, Security Deposit , Performance Bank Guarantee , LD & AMC will NOT be considered.	Yes / No / Explain	
13	Delivery Terms [Normal delivery terms - FOR Destination (for Indigenous cases)]	Yes / No / Explain	
14	Delivery Period [Please Specify the period, LD Clause applicable]	Yes / No / Explain	
15	Liquidated Damages (Applicable beyond the delivery period mentioned in this tender @ 0.5% per week or part thereof on the undelivered portion subject to a maximum of 10% of the contract value. Mandatory compliance required).	Yes / No / Explain	
16	PO ordering Address in full with Contact Person Name, Mail ID, Phone No:	Yes / No / Explain	
17	Confirm if PFMS registered. If YES provide the unique code. Else provide the following details on Company Letter Head signed by authorised person and attach as scanned copy. 1) Bank details(Bank Name; Branch address; Acct No.; IFSC Code etc., Copy of personalized cheque leaf in the name of vendor or NEFT Mandate form duly endorsed by the Bank of the vendor; 2) GST No.	Yes / No / Explain	

18	Payment Term: (Our Default payment term: For indigenous orders: 100% within 30 days after receipt and acceptance of item at our site. NOTE: CONSEQUENT TO COVID 19 PANDEMIC AND AS PER EXTANT GUIDELINES FROM DEPARTMENT OF SPACE, NO ADVANCE PAYMENT IS PAYABLE TO THIS TENDER).	Yes / No / Explain	
19	Definitions: A supplier or service provider, whose goods, services or works offered for procurement, has local content: a) Equal to or more than 50% : Class-I local supplier. b) More than 20% but less than 50% : Class-II local supplier. c) Less than or equal to 20% : Non-local supplier. Mention your category.	Yes / No / Explain	
20	Local content means the amount of value added in India (i.e. indigenous items/services added in the offered products/services/works) be the total value of the item offered (excluding net domestic indirect taxes) minus the value of imported content in the item (including all customs duties/IGST) as a proportion of the total value (excluding net domestic indirect taxes), in percent. Indicate extent of Minimum Local Content in offered product/service and location of such value additions.	Yes / No / Explain	
21	The Class-I & II local supplier should provide a Self Certification along with your offer in PDF format indicating that the item offered meets the minimum local content as called for in the tender as mentioned above and provide the % of local content along with details of the location(s) at which the local value addition is made. In case of two part tenders, it is mandatory to indicate compliance to MLC(minimum local content) in technical bid itself. Confirm attachment of Self declaration along with the offer.	Yes / No / Explain	
22	AMC charges quoted will be considered for comparative purpose for arriving at the L1 cost.	Yes / No / Explain	
23	Quote Validity: Minimum 180 days [for Two Part Tender]. [Mandatory. Otherwise offer will not be consider for evaluation];	Yes / No / Explain	

C.3 Price Bid

Sl. No.	Item	Quantity	Unit Price	Currency	Total Price	Remark
1	FPD based Digital Radiography and CT System for 6 MeV LINAC	1.00 Nos.		-		

Common charges (Applicable for all items)

P&F Charges	
Freight charge	
AMC Charges for 1st Year after warranty period	
AMC Charges for 2nd Year after warranty period	
AMC Charges for 3rd Year after warranty period	
AMC Charges for 4th Year after warranty period	
AMC Charges for 5th Year after warranty period	