Date: 08th Mar 2024

Local Tender (Ref: IISc-Med-2023-24/1)

This is an RFQ (Request for Quote) for planning, supplying, installation, testing, commissioning & training of the following equipment/devices; Linear Accelerator, MR LINAC, Brachytherapy, Gamma Knife, Dosimetry Equipment and Immobilisation Devices as a package for IISc, Bangalore.

At IISc, the planned infrastructure includes a Linear Accelerator (LINAC) and supporting treatment planning system with Oncology information systems, MR LINAC, Brachytherapy, Gamma Knife, Dosimetry Equipment, and Immobilisation Devices. IISc is planning to have research & academic wing, clinical research to develop new treatments and healthcare solutions and imaging modalities will play integral part of research activities.
The vendors are requested to factor this exposure's value into their quotes. Details of IISc can be gleaned from:

https://medicine.iisc.ac.in/

I. Procedure:

1. Vendors are required to submit a technical proposal and a commercial proposal in **two separate sealed envelopes**. Only vendors who meet the technical requirement will be considered for the commercial negotiation.
2. The Bidder should be either an Indian original equipment manufacturer or belong to either class 1 or class 2 suppliers distinguished by their "local content" as defined by recent edits to GFR. They should mention clearly as to which class they belong to in the cover letter.

    a. Indian OEM
    b. Class 1 supplier: Goods and services should have local content of equal to or more than 50%.
    c. Class 2 supplier: Goods and services should have local content of equal to or more than 20 % and less than 50%.

    Bidders offering imported products will fall under the category of non-local suppliers. They cannot claim themselves as Class-1 local suppliers/Class-2 local suppliers by claiming the services such as transportation, insurance, installation, commissioning, training, and other sales service support like AMC/CMC, etc., as local value addition.
3. Purchase preference as defined by the recent edits to GFR (within the "margin of purchase preference") will be followed.
4. MSMEs can seek an exemption to some qualification criteria. IISc follows GFR2017 for such details
5. Sperate detailed justification needs to be given to substantiate the qualification as Class 1 and Class 2 suppliers, and the intender reserves the right to cross-check the factual validity of the same.
6. The quote should come only from Indian Original Equipment Manufacturer (OEM) or their Indian authorized distributor.

7. The deadline for submission of proposals is **1st April 2024, 5:30 pm** Indian Standard Time. Bids should arrive at the office of Dean (A & F), Main building**, Indian Institute of Science, Bangalore 560012**, India, by the above deadline.
8. The technical proposal should contain a technical compliance table with 5 columns.
    a. The first column must list the technical requirements in the order that they are given in the technical requirement below.
    b. The second column should provide specifications of the equipment against the requirement (please provide quantitative responses wherever possible.
    c. The third column should describe your compliance with a "Yes" or "No" only. Ensure that the entries in column 2 and column 3 are consistent.
    d. The fourth column should state the reasons/explanations/context for deviations, if any.
    e. The fifth column can contain additional remarks from the OEM. You can use this opportunity to highlight technical features and qualify the response of previous columns.
9. Vendors are encouraged to highlight the advantages of their equipment over comparable equipment from the competitors
10. In the commercial bid, please provide the itemized cost of the equipment and required accessories, etc.
11. As an option, please provide itemized cost for any suggested accessories/add-ons that may enhance the equipment usability, capability, accuracy or reliability. Vendors are encouraged to quote for as many add-ons as their tool portfolio permits.
12. In the quote, you are requested to provide itemized cost for spares, accessories, consumables expected over 2 years of use.
13. Please indicate the warranty provided with the equipment
14. Any questions or clarifications can be directed to:
    Dean (A & F)
    Main building, Indian Institute of Science,
    Bangalore 560012
    office.iiscmedicalschoolfoundation@iisc.ac.in

II. Terms and Conditions

1. The decision of the purchase committee will be final
2. The vendor is responsible for the supply, installation, testing, commissioning & training of the equipment at the IISC.
3. The RFQ must include references to 5 previous installations, preferably in India. Please provide the names and contact addresses of the referees so that the committee can contact them independently. Details of such systems with model numbers and users should be provided. The reference letters can be used to disqualify vendors with poor track records of service, build quality, system performance, or poor availability of spares.
4. The vendor must also submit a list of customers where similar systems were installed.
5. Clarify if a trained on-site engineer does periodic (preventive) maintenance or requires a specialist from the OEM. The vendor should have qualified technical service personnel for the equipment based in India and must assure a response time of <2 hours after receiving a service request.
6. The indenter reserves the right to withhold placement of the final order. The right to reject all or

any of the quotations and to split up the requirements or relax any or all of the above conditions without assigning any reason.

7. Wherever requested in this specifications sheet, data must be supplied along with technical compliance documents. Technical bids without supporting data will be deemed as technically non-compliant.
8. Upon request, all guaranteed specifications will have to be demonstrated in an active installation. Failure to demonstrate any promised specifications will be deemed as technical non-compliance.
9. Printed literature and published papers to support compliance with the prescribed specifications may be provided.
10. Technical evaluation by the IISc may include a demonstration to verify the functionalities and capabilities of the equipment quoted. Any discrepancy between the promised and demonstrated specifications will be deemed technical non-compliance. If the need arises, the vendor must be ready to visit IISc for a techno commercial discussion physically.
11. The validity of commercial quotations should be at least 90 days from the last date for the submission of tender documents.
12. The quotations should be on FOR-IISc Bangalore basis in INR only.
13. 100% of payments will be released after delivery and satisfactory installation completion, subject to TDS as per rules. As per GFR, no advance payment can be made to domestic vendors unless an equal amount of bank guarantee is provided

III. Tender specification

Common Technical Requirements

S.NO		HIGH ENERGY LINAC
1	**EQUIPMENT SPECIFICATION AND STANDARDS**	
2		Linear Accelerator (with 2D, 3D-CRT, IMRT, VMAT, IGRT, SRS, SBRT capabilities)
3	**ENERGY SPECIFICATIONS:**	
4	Photons	**(i)** 6,10 and 15 MV with FF. (Flattening Filter) mode
5		(ii) 6MV and 10MV with FFF (Flattening Filter-Free Mode)
6	Electrons	(i) At least 5 energies between 6 - 15 MeV
7		(ii) Electron energies available for TSET/ HDTSe mode. **Specify** in detail
8	RF power source	Klystron / Magnetron **Specify**
9	Waveguide Type	Standing / Travelling wave **Specify**
10	Target Type & Materials	**Specify** Detail
11	Flattening Filter	**Specify** the flattening filter materials in details
12	Electron Gun	Sealed / Unsealed also mention type of gun **(Specify)**
13	Bending Magnet	Mention Characteristics **(Specify)**
14	Focal Spot	beam focal spot should be less than 3 mm.
15	**TREATMENT MODES:**	
16		Normal - TSD / TAD
17		Rotation: CW/CCW
18		ARC: CW/CCW
19		Dose Rate: MU/degree
20		Research Mode must be ENABLED
21	**PHOTONS / X-RAY BEAM PARAMETERS:**	
22	Dose Rate Specifications	Sustainable high Dose rate will be preferred
23		**(i)** Conventional (FF) mode-Range from **100 to 500 MU/min or mo**re for field size 10 cm X10 cm at depth of the dose maximum for TSD 100cm.
24		**(ii)** High Dose Rate in FFF mode- Minimum of 1000 or more MU/min for 6MV and 2000MU/min or more for 10 MV.
25	Dose rate in Arc mode	It shall have continuously variable dose rate. **Specify** the range in terms of MU/deg
26	Field size	Min. 0.5 cm x 0.5 cm to Max. 40 cm x40 cm or more, at 100 cm TSD.

27	Beam quality	**Specify** the beam penetrative quality parameters for all offered photon beam energies with FF: (i) depth of maximum dose (dmax) (ii) percent depth dose at 10cm depth (D10) or (iii) quality index, TPR 20,10
28		**Specify** the beam penetrative quality parameters for all offered photon beam energies with FFF: (i)depth of maximum dose (dmax) (ii) percent depth dose at 10cm depth (D10) (iii) field intensity at 10cm depth (measurement at three points from the central axis for 10X10 cm2 and 30x30 cm2 or above).
29		**Photon Beam Specifications (As per AERB guidelines)**
30	Beam Flatness	It shall be within ± 3 %. Please **specify** the same for both FF and FFF beams.
31	Beam Symmetry	Shall be within ± 3 %. Please specify the same for both FF and FFF beams.
32	Penumbra	≤ 10 mm for 10 cm x 10 cm field at 10cm depth and SSD 100 cm
33	**ELECTRON BEAM PARAMETERS:**	
34	Dose Rate Specifications	Sustainable high Dose rate will be preferred
35		Minimum 600 MU/min at isocenter or higher for each electron energy. Maximum of the range not less than 1000 MU/min
36		Maximum of the range not less than 2500 MU/min for High dose 6 MeV (electron Energy)
37	Electron Applicator	Minimum four applicators from in range from 5cm x 5cm to 20cmx20cm
38		A method to obtain irregular field shapes should be provided along with beam shaping mould,
39	Electron Beam Quality	**Specify** the electron beam quality specification parameter such as R50 depth of ionization for all offered electron beam
40		**Electron Beam Specifications (As per AERB guidelines)**
41	Beam Flatness	shall not exceed 5%
42	Beam Symmetry	shall not exceed + 3% at gantry angles of 0, 90, 180 and 270 degrees.
43	X-ray Contamination	The x-ray contamination of the electron beam shall be less than 5% of the maximum dose for all electron energies specified above.
44	**DOSE MONITORING SYSTEM:**	
45		Built-in chambers: Independent system of Two or more separate internal ionization chambers with built-in digital electrometer
46		Precision: ± 1% or 1 MU
47		Linearity: ± 1% or 1 MU
48		Reproducibility ± 1% or 1 MU

49		Isocenter: The mechanical and radiation isocentre of the equipment should be less than 1 mm along the x, y and z directions.
50		Dose Rate Dependence: Please Specify
51	**GANTRY:**	
52		Rotation: 360° (± 180 degree)
53		Read Out: Digital and Mechanical (Accuracy digital readout 0.5°)
54		Control: Control-console and hand pendants
55		Target-Axis Distance: 100 ± 0.2 cm
56		Optical Distance Indicator (ODI) Range: 75 cm to 150 cm
57		ODI Accuracy: ± 0.1 cm
58		Rotation iso-center accuracy: within 2 mm diameter sphere
59		Isocenter height: Less than ≤130 cm from finished floor
60	**TREATMENT HEAD:**	
61		Distance between isocenter and lower collimator shall be ≥ 40 cm
62		Distance between bottom of blocking tray and isocenter shall be > 30 cm
63		A complete set of pre shaped beam blocks shall be provided.
64	**COLLIMATOR**	
65		Rotation: ± 95° about mid position
66		Control: Hand pendent and control- console
67		Read out Digital: +- 0.5 °
68		Rotation iso-center accuracy: within 2 mm diameter sphere
69		Dynamic / Motorised / Virtual Wedge
70		Asymmetry: X & Y both Asymmetrical, Treatment Delivery with Dynamic Jaw Tracking. Please Specify. Travel ranges & over travel range. Please specify
71		Light / Radiation Field coincidence: ≤ 2mm
72	**MULTI-LEAF COLLIMATOR**	
73		An Integrated multi-leaf collimator (MLC) leaves shall be at least 60 pairs or more to provide maximum field size of 40 cm x40 cm (Specify independent drives for each leaf)
74		The MLC leaf width resolution of not more than 5 mm at the isocentre across the field size.
75		Specify all other physical characteristic parameters of the offered MLC
76		The MLC interleaf leakage shall be less than 4% and the leaf position accuracy less than or equal to 1 mm at the isocentre plane.
77		Dynamic Conformal therapy procedures: Enabled
78		Dose delivery system dynamic
79		The vendor shall provide compatible interface between MLC and the application system used for execution of treatment delivery.
80		Auto Field Sequencing (AFS): should be available
81		Capable of performing Conformal therapy (IMRT, Rotational IMRT, SRT, SBRT) procedures.
82		Facility to treat patients conventionally, using blocks without MLC. Please specify
83		Work Station HW/SW – Please Specify details
84		Capable of Integration (full Networking) with existing Planning System and existing CT Simulators.
85		IGRT delivery please specify

86		SPECIFY FOLLOWING PARAMETERS:
87		Max. leaf retracting position
88		Over travel (jaws)
89		Over center travel of MLC leaves (≥10 cm) for IMRT treatments
90		Max. field length
91		Leaf height & material.
92		Coincidence of light & x-ray field
93		Penumbra
94		Transmission
95		Interleaf leakage
96		Leaf position accuracy
97		Max. carriage speed
98		Max. leaf speed
99		Positional accuracy of the leaves during treatment.
100		Inter-digitation of leaves if available
101	**LEAKAGE RADIATION AS PER IEC/AERB STANDARD**	
102		Head leakage. Please specify.
103		Collimator transmission. Please specify.
104		Neutron Dose: Please specify
105	**TREATMENT CONSOLE**	
106		Fully computerized with 21/23" colour LED monitor(s), printer etc.
107		**Display Features:** Power OFF/ ON, Total Dose, Set-time, MU/deg, Mode-selection, Radiation-ON, Interrupt, Complete Arc-therapy, Wedge and Port-film, etc.
108		All Digital-scales for gantry, collimator and couch motions, as well as digital display of the patient set-up provided in the treatment room has to be displayed at operator console.
109		**Adjustments from Control console**: Dose rate, System calibration and servicing, Event logging, Gantry angle and Collimator size etc.
110	**IGRT SYSTEM**	
111	KV Imaging system	KV based image guidance system with control console should be provided
112		Specify the KV generator KV, MAs and exposure time ranges and their accuracy.
113		Specify the KV x-ray tube source/focal spot size, collimation minimum and maximum field sizes, maximum anode heat capacity and heat dissipation rate etc.
114		Specify CBCT imaging FOV, HU accuracy and uniformity, spatial resolution, low contrast resolution and slice thickness range as available Necessary IGRT commissioning and quality assurance phantoms for HU water and flex map calibration, image quality phantom, CBCT electron density phantom shall be provided.
115		Retractable arms
116		System shall have an integrated amorphous silicon based flat panel detector and kilovoltage (KV) X-ray source tube for generating radiographic, fluoroscopic and 3D and 4D cone beam computed tomography (CBCT) imaging for 2D,3D and 4D IGRT treatment verification with 3D and 6D correction strategies.

117		The quality of image, especially axial CT images from the CBCT should be sufficient to delineate target and critical structure volumes.
118		All Advanced image registration software commercially available should be supplied and should be able to overlay original reference images from the TPS to the on-board images and calculate offset values based on user defined reference points and structures. The software should be able to move the table as per the offset values in 3D and 6D.
119		Flat panel detectors of min 40 X 30 Cm or more, with Pixel Matrix of min 1024 X 1024 or more. Please specify.
120		CBCT reconstruction, registration (MV-MV, KV-KV, KV-MV), Pl specify the analytical tools
121		System shall be capable of acquiring images such as 3DCBCT, pretreatment inter-fraction 4D-CBCT, intrafraction 4D-CBCT or Triggered imaging, Gated CBCT(Automatic/Manual)
122		3D image data should be reconstructed from series of 2D projection images acquired as the linear accelerator gantry is rotated, please specify all acquisition & review modes with ONLINE GATED CBCT or Manually Gated CBCT, 4D-CBCT with Reconstruction.
123		System shall be capable of performing reconstruction methods of either feldkamp back projection (FDK) algorithm and/or iterative algorithm.
124		System shall be capable of manual registration, automated bone registration, automated soft tissue registration or gray value-based registration methods.
125		All Advanced image registration methods such as region of interest registration, deformable image registration if commercially available shall be provided.
126		Fully integrated with latest R & V system and TPS, pl specify the report generation tools
127	Adaptive radiotherapy	Please specify latest modes of approaches towards acquisition, registration, review, dose reconstruction etc along with Deformable Image Registration software. Dose Accumulation, Dose calculation on deformed images and Adaptation should be available.
128		The offered 3DCBCT image quality should be sufficient to delineate target and critical structure volumes for adaptive planning dose calculations
129		System shall be able to transfer images to (from) EPID/CBCT from (to) treatment planning system (TPS).
130	Portal Imaging	ln-room image Guidance System (Electronic Portal imaging System)
131		Should fully integrate with Accelerator
132		Should be able to take images at any Gantry angles with variable X-Y/Z movements
133		Imaging area should be 40 x 30 cm2 with energy range 4-25 MV
134		Should have latest Digital technology with High Resolution Imaging (Amorphous silicon (a-Si) flat panel technology)- please specify
135		The system shall provide a suitable means to import & export images for verification and display on the same workstations; to acquire & transfer images through the existing oncology network; and to be capable of registration
136		Vendor shall provide features on image processing, image display, image analysis, image storage, image print and image enlargement. Details shall be stated.
137		Avoidance of irradiation of area outside sensitive detector panel and anti-collision device, vendor shall state and provide details including the usable life span of the EPID.
138		Vendor shall provide all accessories including necessary QA tools, maintenance tools etc. for EPID.
139		Provision of facilities for storage / archival of electronic portal images.

140		Portal images can be exported to external facilities in a recognized format including BMP and TIFF.
141		Vendor should provide IMRT and VMAT portal dosimetry verification system of EPID for all available energies including FFF beams.
142		There shall be a geometric calibration phantom for kV to MV isocentre alignment and other calibration.
143		Image quality phantom to determine the low contrast and spatial resolution shall be provided
144		IGRT daily QA phantom for kV and MV projection imaging and kV CBCT checks and dynamic thorax phantom for validation of 4DCBCT imaging along with mechanically independent of platform motion and programmable through motion control software and all other necessary IGRT QA tools shall be provided.
145		The vendor should provide CBCT Electron density and image quality phantom specifically designed for CBCT with increased HU value for adaptive radiotherapy commissioning and QA of CBCT image quality.
146	**TREATMENT TABLE /COUCH SYSTEM:**	
147		A treatment table/couch with motorized lateral, longitudinal and vertical movements with isocentric table rotation up to ±90° shall be possible.
148		Treatment couch with 6 degree-of-freedom (6DOF) in translational and rotational movements capability and accessories used for image guided radiation therapy shall be provided.
149		The table top shall be of carbon fibre, free of metal or other radio-opaque materials.
150		The couch top shall be indexed to allow reproducible placement of immobilization equipment and also to provide interface for mounting the quality assurance equipment at the head of the couch.
151		The lateral range of the couch shall be at least ±20 cm. The longitudinal range of the couch shall be greater than 70 cm. The vertical motion of the couch shall range from the isocentre to at least 57 cm below the isocentre.
152		The sag of the couch top shall be less than 5 mm with a patient of 80 kg weight. The couch shall be able to take a maximum weight of at least 200 kg.
153		Provision to compensate for the rotational error during patient setup.
154		It should have the capability for remote controlled robotic positional correction facility in three translational and three rotational axes with respect to the 6D shifts derived from the integrated to KV cone beam CT and Orthogonal KV images acquisition system.
155		Electrical backup in service mode & Mechanical Control (in case of power failure). Please specify
156		Minimum height from floor - specify
157		The offered system should facilitate the automated treatment couch adjustments based on treatment planning data for automatic patient setup process in single button click
158	**PATIENT ALIGNMENT LASER SYSTEM:**	
159		Green/Red, remote controlled, fixed lasers mounted on the treatment room walls having two lateral cross lasers, one ceiling cross laser and one sagittal line lasers shall be provided.
160		A separate back pointer laser alignment system shall be provided and installed onto the linear accelerator.
161		All laser products shall comply with respective code of IEC safety of laser products.
162	**ACCESSORIES:**	

163	Wedge System	System shall be equipped with dynamic/motorised wedges providing wedge angles up to 60°. Along with dynamic/motorised wedges, physical wedge (if possible) will be appreciated. Interlocks shall be provided so that the operator has to positively confirm that the correct wedge has been selected. Specify the maximum possible wedged field size.
164	Front pointer	Digital and/or Mechanical
165	Accessory mount	shadow block and electron tray
166		One Set each of Divergent blocks
167	Laser Alignment System	(3 cross and one Sagittal) Green/red laser system (as mentioned above)
168	Portable Hard Disk	Two (2) nos. of 1TB each, for patient data backup.
169	UPS	Suitable UPS required to run the machine with 30 min back up
170	Chiller	Suitable Chiller required to run the machine.
171		Last Man Out Switch
172		In-room Colour flat Monitor LED 24" or higher
173		Manual retraction tool (manual crank) for couch in case of power failure
174		CCTV Camera. Remote controlled with remote zoom & focus facility.
175		Two-way audio communication system
176		Fully functional Hand pendent
177	**2D, 3DCRT:**	
178		The machine shall be capable of delivering 2D treatment with open, rectangular fields, where the field size and beam angle can be determined at the time of treatment delivery, inside the treatment Ability to perform standard 3D conformal radiotherapy treatments
179	**INTENSITY MODULATED RADIATION THERAPY & VOLUMETRIC MODULATED RADIATION THERAPY SYSTEM**	
180		The linear accelerator system shall be capable of delivering Intensity (fluence) modulated photon beam within and across the given field apertures in order to produce highly conforming dose distribution as per the physician prescription.
181		Bi-directional arc therapy should be included with Automatic calculation of Dose per degree based on the Dose Rate selected and the Arc angle set.
182		Support for "step and shoot" IMRT and/or dynamic sliding window" IMRT delivery
183		Specify the LINAC performance for small MU delivery
184		Capable of delivering high quality intensity modulated fields using fractions of MU (please state minimum MU per segment)
185		Extended intensity modulated field size shall be at least 30 cm x 30 cm
186		Capable of automated delivery of multiple co-planar fields in sequence from the console with remote control of gantry, collimator and jaws motions between co-planar treatment fields.
187		Capable of verifying every parameter of segments downloaded from treatment planning systems through network for IMRT treatment
188		The latest technology for faster implementation of IMRT such as Volumetric Intensity Modulated Arc Therapy (VIMAT) or its equivalent should be provided.

189		Based on the comparison of initial planning images and on-board images, change in treatment plan should be possible.
190		The system should have latest configuration of hardware (CPU, hard drive, RAM, min 21" square TFT monitor, colour LASER printer)
191	**FOUR-DIMENSIONAL SURFACE GUIDED RADIATION THERAPY (SGRT)**	
192		The vendor should provide advanced and latest model of gating solutions for entire four-dimensional (4D) treatment chain from imaging (4DCT) to (4D) treatment delivery. The system should consist of 4DCT acquisition and Gating Systems with following features: -
193		The system should support for patient positioning/surface mapping with colour projection on the patient skin, intrafraction motion tracking/monitoring and respiratory gating of complete workflow.
194		The system should facilitate the 4D treatment of thoracic and abdominal tumours.
195		The system should have advanced algorithms for non-rigid and deformable models to enable real time assessment of patient positioning errors before and during treatment delivery.
196		The system should check the patient position more than once every second with sub millimetre accuracy.
197		The system should have provision for audio-visual coaching apparatus to detect the deviation outside the set tolerance which also helps the patient to follow optimal breathing pattern.
198		The system should support for 4D CT imaging acquisition and should be installed both in the CT room and also treatment room.
199		The gating system should be capable of prospectively gated and retrospectively gated imaging and treatment delivery. Real-time 6-DOF isocenter monitoring-cum-gating should be available
200		All necessary phantoms and QA systems/tools/gadgets required for Commissioning and validation tests for clinical implementation of above systems should be provided.
201		The vendor should provide latest model of the stand-alone deformable image registration system with following features;
202		System should be capable of performing deformable image registration using CT/MRI/PET/SPECT images and should be provided with all commercially available deformable algorithms.
203		Treatment Delivery Techniques
204	**TOTAL BODY IRRADIATION:**	
205		Total Body irradiation: The machine shall be capable of delivering photon beam with total body irradiation (TBI) mode and vendor shall provide necessary accessories (like TBI stand/frame, beam spoiler/degrader. Shielding blocks for kidney, lung, eyes, gonads for delivering TBI treatment
206	**ELECTRON BEAM THERAPY:**	
207		The machine shall be capable of delivering electron beam treatment for superficial tumours.
208	Total Skin Electron Therapy:	The offered Linac shall be able to deliver total skin electron therapy (TSET). Necessary energy degrader system and other accessories shall be provided
209	**SAFETY FEATURES**	
210		Radiation Safety Features: The following radiation safety features shall be provided:

		Facility access interlocks.
211		Emergency-off buttons in the treatment room and control room.
212		Various beam off interlocks. Please Specify
213	**TREATMENT PLANNING SYSTEM**	
214		The treatment planning system (TPS) shall be capable of performing conventional conformal 3D-planning, inverse treatment planning for IMRT and VMAT, 4D treatment planning and adaptive treatment planning for clinical application of various standard and advanced treatment delivery techniques in radiotherapy. The TPS shall have modules of (i) Image import and registration (ii) Contouring (segmentation) tools for tumour volumes and organs at risk (iii) Treatment planning environment, including 3D patient image and dose distribution display; (iv) Plan review module, including dose statistics calculation and tabulation (v) Plan preparation and export module (vi) Dose calculation algorithm and beam modelling module.
215		The TPS shall be supplied with dedicated hardware, including workstation, monitors and printer.
216		Capable of doing 3DCRT, IMRT, IGRT, VMAT, SRS, SRT and 4D planning
217		CT/MRI/PET-CT fusion facility
218		Auto contouring option should be available
219		DICOM connecting networking system between TPS, LINAC and CT simulator
220		System should be capable of performing Auto contouring and Atlas based segmentation for Adaptive re-planning.
221		System should be capable of Adaptive re-planning inter-fraction Dose Accumulation.
222		System should be capable of template-based planning/knowledge- based planning
223		System should support for DICOM /DICOM RT Import: CT, CBCT, PET CT, PET, MR, SPECT and diffusion weighted MRI (DWI), including cine/4D modes for all relevant imaging types.
224		System should support for DICOM / DICOM RT export: all meta-data and imaging data (including structure sets, treatment plans with doses) must be exportable in a DICOM-readable format along with deformations, either as deformable vector fields (DVF) or as resample deformed DICOM images or as resample deformed DICOM images or as DICOM image with deformed contours
225		System should have tools to generate maximum intensity projection, minimum intensity projection, average projection, mid-ventilation position reconstruction from 4D-scans.
226		System should be capable of performing 4D dose accumulations over all phases of respiration for evaluating the actual dose delivered to moving target.
227		Should have tools to reduce artifacts/noise from the images, e.g. attenuation correction, HU replacement in a user contoured or automatically defined area.
228		It should have Biological Optimization solutions (EUD or TCP or NTCP etc.).
229	The TPS shall include:	Two (2) treatment planning workstations with dose calculation licenses and three (3) virtual simulation workstations without dose calculation licenses shall be provided. All the contouring workstation should have medical grade monitors of minimum 2 mega pixels or more
230		The system shall have latest technology of hardware and software features commercially available at the time of delivery.

231		Treatment planning workstations, including 23-inch or above medical grade monitors printer, keyboard, mouse with network capability
232		Display of all relevant planning and treatment system parameters shall be in accordance with the IEC 61217 scale and coordinate convention.
233		For the purpose of additional requirements in near future, the vendor shall provide each unit of both additional TPS and workstations offered which should be valid for up to two years. The same will not be considered for pricing ranking.
234	Imaging and Image registration	System shall enable import of patient data sets from various imaging modalities that are used to facilitate target definition using the DICOM standard.
235		Image import shall be achieved through direct connectivity and also provision to be used through CD/DVD media.
236		The Networking with picture archiving and communication system (PACS) system
237		System shall support for CT, MRI, CBCT, and PET registration.
238		System shall use both rigid and deformable image registration
239		Specify the type of DIR methods available in the offered system.
240		Deformable image registration shall be capable of fusing CT and CBCT images.
241		Contouring/ Segmentation Contouring tools shall allow the definition in 3D of structures, including target, organs at risk and patient outline.
242		Automated tools shall allow the expansion of the clinical target volume (CTV) to a planning target volume (PTV) with non-uniform margins in three dimensions.
243		System shall have ability to add bolus structures to the patient data set of various shape and density.
244		System shall be capable of 3D visualization of patient data display, beam display and dose distribution display.
245	Contouring and segmentation	System shall have the following advanced contouring and segmentation functionalities:
246		a) Multi-modality contouring
247		b) 4D image dataset support- MIP, AIP, and minIP image creation
248		c) Auto PET SUV contouring
249		d) Advanced Boolean operations
250	Planning, Optimization and Dose Calculation	The offered system shall have the following basic and advanced planning and optimization functionalities:
251		i) A comprehensive “forward planning” environment shall allow the user to modify beam weights, beam positioning, jaw position, wedges and blocks, or MLC to optimize the treatment plan.
252		ii) 3D, electron planning and composite planning
253		iii) Field-in-field forward IMRT planning
254		iv) Static and dynamic IMRT and VMAT planning
255		v) Stereotactic Treatment planning

256		vi) 4D treatment planning
257		vii) Physical DVH based and biological optimization methods.
258		viii) Advanced and latest version of planning algorithms
259		ix) The dose calculation grid shall be user adjustable for desired, better dose calculations accuracy.
260		x) Photon beam and electron beam algorithms shall calculate the dose to the patient considering the 3D nature and heterogeneity of the patient data set.
261	Plan review and approval:	i) System shall have basic and advanced plan review and evaluation tools such as dose volume histograms (DVHs), dose statistics, 2D and3D dose visualization, and plan addition and plan comparison.
262		ii) System shall also have the Radiobiological model-based treatment response evaluation tools such as BED/EQD or TCP and NTCP or physical-based models such as DVH, dose-volume based tools
263		iii) System shall be able to generate, view and transfer DRRs
264		iv)User and password security shall allow approval/locking of treatment plans and different levels of access to the functionality of the TPS based on the user's profile, e.g. administrator, planner, medical physicist, radiation oncologist.
265		v) Shall be possible for electronic/auto plan approval, if commercially available
266	Beam Modelling:	i) Comprehensive beam modelling module shall allow the configuration of complete geometric and dosimetric models for treatment unit with photon and electron beams.
267		ii) The module shall have the following features:
268		1. Ability to import measured beam profiles and output factors.
269		2. Ability to model dynamic, fixed and internal wedges.
270		3. Tools to allow the comparison of the beam model and measured data.
271		iii) Security features that protect beam data and beam models from modification.
272		iv) A module shall allow the creation of CT number to mass density or electron density data for various CT scanners for use by the photon and electron beam algorithms.
273	Plan output and network connectivity	i) A laser printer for A3/A4 output of isodose distributions, beam shapes and treatment plan parameters shall be provided.
274		ii) System shall allow export of beam block shapes to a third- party block cutting device.
275		iii) System shall allow export of approved treatment plans and DRRs to an oncology information system (OIS).
276		iv) System shall haveHL-7 and IHE-RO compliant capability.
277		Networking with TPS: All the software with licences required should be included.
278		Complete DICOM-RT export/import licence should be available.
279	**ONCOLOGY INFORMATION AND IMAGE MANAGEMENT / TREATMENT RECORD AND VERIFY SYSTEM:**	
280		The oncology information system (OIS) is a software application that manages the workflow and storage the electronic information, including patient data in the radiation oncology department
281		Three (3) OIS workstations with concurrent licenses shall be provided.
282		The system shall have latest technology of hardware and software features having vendor recommended specification of the system commercially available at the time of delivery, not minimum specification.

283		Transfer of DRR images from TPS to portal imaging system for comparison
284		Transfer and execution of MLC position parameters for normal treatment and IMRT treatment including step & shoot & sliding window (dynamic) techniques from treatment planning system
285		Transfer & Execution of Conformal, IMRT, VMAT, SRS and SRT treatment plans from Treatment Planning System should be provided.
286	The OIS should be able to use as	(i) record and verify system
287		(ii) to transfer treatment plan information and images from the TPS to the treatment unit
288		(iii) to record detailed dose delivery information and images for each treatment session
289		(iv) image review module
290		(v) manage the patient care pathway
291		(vi) electronic patient record and manage staff workflow through defined tasks
292		(vii) treatment unit schedules and appointments.
293	**GENERAL REQUIREMENTS**	
294		The offered OIS shall be compatible with OIS, Linac and TPS in the radiation oncology department. The OIS, KV, MV, TPS should be integrated for a seamless workflow.
295		OIS shall be interfaceable with the hospital EMR/HIS using HL7/ FHIR standards
296		The software should also be compliant with the requirements of the National Health stack and should have undergone ABDM sandbox testing if indicated in the NHA guidelines.
297		The system shall be capable of integrating with CT Simulator, MRI, PET and linear accelerators, treatment planning system, dosimetry equipment and hospital PACS. The specifications for network to be provided by the vendor.
298		The OIS shall use the DICOM RT standard for transfer of radiation oncology specific electronic information and shall comply with IEC standards.
299		The OIS shall include a secure, remote servers and workstations at least 23-inch monitors, Colour printer, keyboard, mouse with network capability.
300		An UPS to be provided to the TPS to prevent loss of planning data in case of power failure
301		The offered system shall have the following technical specifications.
302		OIS workstations shall be capable of:
303		Manual data entry of 2D cases, clinical mark-ups and emergencies.
304		Approval and entry of prescriptions and free text setup instructions.
305		Upload of photographic images.
306		Electronic chart checks.
307		Image review of DRRs and treatment images (portal and setup)
308		Networking to the TPS to allow import of the patient administration data, beam delivery parameters and DRRs of graphically planned patients.
309		The importation of data should be customized to correctly download and translate the TPS information to the scales and graduations of the department treatment units.
310		Workstation and software for Offline image review to be provided

311		The workstations should include an in-room alternative monitor to facilitate patient identification and viewing of the setup instructions, including digital images.
312		The Linac system should be supported by a local UPS with the minimum of 30 minutes backup such that there is no interruption to the on-going treatment delivery in the event of a power failure.
313		Latest HW/SW, upgradable for next 10 yrs.
314		DICOM3 and full DICOM family
315		DICOM RT Import/export from all existing CT/MR/PET/PACS/etc
316		Multi-modality (CT, MR, PET etc) Image registration (rigid and deformable). Pl specify the solutions.
317		Exit Dosimetry-Integrated Exit dosimetry/Portal dosimetry feature, please specify details for all available energies
318	**SOFTWARE SHALL HAVE THE FURTHER FOLLOWING FUNCTIONALITIES**	
319		Hierarchical security features, including requirement for authorized approval of the dose prescription and field parameters prior to treatment.
320		Complete log of activities and users.
321		Generation of statistical data according to user-defined fields, e.g. diagnosis and managing consultant.
322		Library of diagnoses according to the WHO International classification of diseases, (ICD-10).
323		Ability to correctly log cumulative dose in the event of a treatment interruption or termination.
324		Patient appointment scheduling.
325	**SERVER**	
326		Advanced Server (Minimum 10 TB SSD Server on a single/two server/s) capable for connecting a minimum of two linear accelerators, 6D Robotic couch, treatment planning systems and workstation for contouring, OIS etc. (safe and secured backup/restore) – latest HW/SW and upgradable for next 10 yrs.
327		All necessary licenses to be provided for above all mentioned where relevant

S.NO	TENDER SPECIFICATIONS OF MR LINAC
1	**GENERAL**
2	The quoted model should be Type Approved by AERB.
3	The bidder should have direct operations in India, Company owned service centres should be available in India.
4	Ware house for spare parts should be available in India.
5	Company employed trained service engineer for both LINAC & MRI should be posted in India.
6	**TECHNICAL**
7	Digital Linear Accelerator with Integrated High-Field 1.5 Tesla or more Superconductive MRI System mounted on a single platform, having continuous 360° rotation around the MRI.
8	MR Integrated Linear Accelerator must have the latest FULLY INTEGRATED technology and should be fully computer-controlled with the latest state of the art digital control system. The offered system should be designed to combine state-of-the-art MR and LINAC technology without compromising either system (For Real-time Imaging while delivering Radiation Dose).
9	The combination of two sophisticated technologies high field with at least 1.5T MRI scanner providing higher signal-to-noise-ratio (SNR), with better contrast and fast image acquisition times and minimum 6 MV linear accelerator.

10	A powerful tool in shape of online dose re-planning software enhances the ability to re-shape the treatment dose on the go while the tumour changes the shape, size and position.
11	**MR LINAC PARAMETERS**
12	Digital Linac
13	Minimum of leaves 120
14	Energy (MV) Minimum 6 MV or high FFF beam
15	Leaf Speed 5 cm / sec or better
16	Diaphragm Speed 6 cm / sec or better to provide the plan optimizer maximum flexibility to define the field across the leaves.
17	Gantry Speed 6 RPM or better
18	Field Size Minimum 22 x 55cm
19	SSD Minimum 130cm or above
20	**MRI SYSTEM PARAMETERS**
21	Magnetic Field 1.5 Tesla or more
22	Type Superconductive
23	Patient Bore 70cm or more
24	Bore Length 172cm or shorter
25	Stroke Length 290 cm or more
26	Table Top (Height) 40 – 85 cm or better
27	Maximum Load 225Kg or more
28	Magnet Shielding: Active
29	Field Width 57cm or more
30	System should have head- or feet- first positioning to ease patient anxiety.
31	Imaging protocols should be dedicated for MR/RT purposes
32	It should have a patient friendly ultra-short magnet bore that will be preferred by claustrophobic patients.
33	MRI receive-coil solution should be specifically developed for low attenuation of the beam: One posterior coil in a fixed position at the magnet iso-center and one anterior coil in an indexed sliding frame with flexibility in how to be positioned.
34	MR System should provide real-time imaging in up to three orthogonal planes for continuous visualization.
35	The offered system should have dedicated MR imaging console for advanced MR sequences.
36	It should provide 1.5T diagnostic grade Diffusion-weighted imaging (DWI) protocols with ability to perform volumetric DWI.
37	Signal to noise ratio (SNR) should be stated.
38	Spatial accuracy should be stated.
39	Imported RF Cage (tailor-made) as per the requirements of the room/site.
40	Means to reduce time taken for sequences without impacting image quality should be provided
41	**PATIENT POSITIONING SYSTEM**
42	The system should comprise on Flat Tabletop with comfortable mattress
43	Patient headphones and call bulb
44	**PATIENT POSITIONING PACKAGE**
45	The Patient Positioning Package should contain all the necessary components to generate individual patient set-ups for a wide range of anatomical sites.

46	Headrest For Patient comfort and support.
47	Wing Board Indexed base plate with two arm support and two wrist supports, headrest for patient comfort and support.
48	Knee Board Indexed Knee or Ankle Support
49	Knee Elevation Used to increase the height of the Knee
50	Feet Board Indexed Support for Feet
51	Prone Position Pillow Allows patients to be scanned/treated in a prone position.
52	Headrest Indexing Adapter Headrest adaptor which allows headrest position pillow to be indexed to couch.
53	Handgrip Reduces the risk of induction loops during MR Imaging.
54	Armrest Providing support for the arms.
55	**QUALITY ASSURANCE TOOLS**
56	The dedicated MR-Integrated Linear Accelerator QA tools should comprise on:
57	1. QA platform and inter-changeable interface plates
58	2. MV alignment phantom
59	3. MR to MV alignment phantom and supporting software
60	4. MR Head phantom and supporting software
61	5. 3D Geometric phantom.
62	6. Hardware supporting the integrated software solution
63	7. Patient experience solutions – mood lighting – in bore lighting solutions
64	8. Patient Setup Tools
65	9. CCTV and Intercom Solution
66	**TREATMENT PLANNING SYSTEM**
67	Treatment Planning System must have GPU based calculation algorithm and include Particle Transport Algorithm (PTA) which allows modelling of the beam path in a magnetic environment.
68	The online plan adaptation module should support responsive online adaptive workflows to allow for position and shape adaptation, different levels of treatment planning from warm start optimization to full Monte Carlo re-planning, online dose calculation engine using latest Particle
69	Transport Algorithm to fully model the magnetic environment, cryostat, RF coils and table.
70	The offline Treatment Planning System workstation package should support delineation
71	activities, reference plan planning and plan reviews.
72	Additional Contouring software License with Hardware must be supplied with the Treatment planning system.
73	Note: During the implementation phase, supplier should provide the customer Physical Support & Services in order to speed up and streamline the ramp up to clinical go live.
74	**QUALITY ASSURANCE MANAGEMENT SYSTEM**
75	QA management system designed to integrate devices such as treatment delivery, imaging and quality assurance equipment in routine use within today's radiation therapy departments, irrespective of vendor, should be offered for:
76	· Linear Accelerators
77	· Quality Assurance Equipment
78	· CT Simulator
79	· MR Simulator
80	· Brachytherapy

81	·Radiosurgery equipment available
82	QA System should provide a web-based database for easy monitoring and maintenance of all machine QA processes across the clinic, or multiple sites, allowing centralized data management and remote access.
83	All relevant items needed for the Dosimetry and commissioning of MR linear accelerator must be included in the package
84	**ONCOLOGY INFORMATION SYSTEM**
85	Connectivity to the Oncology information system must be provided with the system to maintain complete patient database including all images as well as treatment record and verification. It must include at least 03 workstations. It should be interfaceable with the hospital EMR/HIS using HL7/ FHIR standards
86	The software should also be compliant with the requirements of the National Health stack and should have undergone ABDM sandbox testing if indicated in the NHA guidelines.
87	**DOSIMETRY SYSTEM**
88	Required dosimetry system to be offered for the MR -LINAC
89	**WATER PHANTOM**
90	The Radiotherapy Water Phantom system shall be dedicated for extensive 3-D radiation beam scanning and analysis. It shall be used for testing, commissioning, acceptance and regular Quality Assurance (QA) schedules of the Linear Accelerators.
91	**PATIENT SPECIFIC QA**
92	The system shall be an electronic 2-D array detector to perform Real-Time Beam QA and Dosimetry, without film or water tank.
93	Essential gadgets and tools with software to perform daily and routine QA of the LINAC as per TG recommendations should be provided
94	**OTHERS**
95	Online Pure Sinewave Double Conversion at least 160KVA UPS with 8-10 minutes backup.
96	The quoted system must have at least 2 of the following quality & safety certifications:1. FDA / CE / MHLW
97	MR LINAC Bunker interior design and standardisation should be offered as a standard feature
98	All necessary licenses to be provided for above all mentioned where relevant

S.NO	HDR BRACHY THERAPY MACHINE
1	**GENERAL SPECIFICATIONS:**
2	A high dose rate remote after loading Co-60 Brachy therapy system capable of Intracavitary, Intraluminal, Interstitial, surface mould radiation therapy.
3	The HDR system should be microprocessor based with PC controlled.
4	The HDR unit must be from a well-established company with a documented history of reliability.
5	The HDR system manufactures should have ISO / FDA / CE / Type approval from AERB. The copy of certificate should be enclosed
6	The system needs to be flexible for use in thinner implants
7	A single operated quick lock system shall be provided to secure the unit in position when parked or during treatment.

8	The HDR system must have a “Check” cable that automatically checks the operation of the complete prior to treatment. The check cable must also be possible to use as a “Dummy” source to allow simulation a particular source location.
9	All the AERB specified radiation safety features in the control unit and in the room should be available
10	The HDR Unit quoted in the tender shall have type approval certificate from the competent authority. A copy of type approval of the same must be enclosed with the offer.
11	**DETAILED SPECIFICATIONS TREATMENT UNIT:**
12	High dose rate brachytherapy unit capable of intracavitary, interstitial, intraluminal and surface mould radiation therapy.
13	Unit should be on wheels for easy mobility
14	Separate stepper motors to control the check cable and source cable
15	Equipment should have Integrated radiation detector to confirm source return.
16	The maximum source holding capacity without exceeding AERB specified air kerma rate at a distance 1 meter from the surface of the after loader and on the surface of after loader should be specified
17	Multichannel indexer with a minimum of 20 PHYSICAL channels or more having an automatic/optical verification of channel number and applicator connection.
18	The source must be retractable in the event of an emergency / power failure by an independent DC motor or manual source retraction through hand crank.
19	Equipment should have additional battery powered DC motor source retraction system as back up for source return security.
20	UPS back up for at least 30 min should be provided separately for HDR Brachytherapy Machine, control unit and in the TPS.
21	Battery backup and a detailed circuit for checking the battery condition.
22	Start enable switch (Last Man Out)
23	Transport Container
24	Emergency Container
25	Patient couch (OT table & trolley with necessary accessories for treatment: Please specify details. Mention separately for imported and indigenous couch.
26	All Transfer tubes should be of standard length for ease of use.
27	**CONTROL UNIT:**
28	High resolution minimum 21inch TFT/LCD/LED display with CPU, keyboard, mouse, printer etc.
29	Network facility to treatment planning system
30	Control unit should be of user-friendly console and a graphical user interface and should contain an extensive reporting facility.
31	Control Unit Software Should Run on Windows Application.
32	Control Unit should have a self-testing including battery, indexer / RAM.
33	Control unit must allow storage of multiple standards and keep track of patients for fractionated treatment.

34	Access to authorized user with password protection
35	The treatment times must be automatically corrected for the decay of the source.
36	Treatment length must cover 40cm or more with a corresponding 1mm step source size with accuracy of +/- 0.5 mm or better.
37	There should at least be 100 dwell positions for the source in each channel.
38	Dwell position display
39	Dwell time display- please specify range
40	Display Window should show step position and corresponding dwell time to 0.1 sec.
41	Display of indexer length, activity and dose
42	Display of Total reference Air Kerma and dose.
43	The HDR should have daily Q. A. Customer Q.A test plans, individual checklists and documentation, reminder function.
44	All required QA and Dosimetry items like well type chamber, electrometer along with cable, gamma Zone monitor, source position check ruler, source position simulator, contamination monitor and Survey meter etc. must be supplied by supplier as per radiation safety guide lines.
45	The source position accuracy check shall be enabled with a stepping source viewer and a camera connected to a TV system/ Control Computer.
46	Source position adjustable by user (+/- 2mm). Using the source alignment, you can achieve a dwell position.
47	The HDR should have integrated solution for source and dummy calibration.
48	HDR should have digital source position verification and adjustment system
49	The HDR with Automatic/Manual length measurement
50	The safety systems of the unit shall be integrated into the existing safety infrastructure (e.g. door interlocks)
51	The control unit should contain inbuilt protection circuit to prevent treatment without proper applicator connection and proper indexer locking.
52	Equipment should have facility to Import treatment planning parameters in DICOM format from Brachytherapy planning systems via network, CD/DVD, or USB storage.
53	Online extensive display of status codes with an indication of the action required.
54	Large patient database should be provided with a backup option to an external storage device. Control unit should contain a built-in log book and all events should be recorded.
55	**RADIATION SOURCE & TRANSFER MECHANISM**
56	The HDR Brachytherapy system should have Co-60 source Specify the max, source activity.
57	Mention the source half-life and clinical working life of Co-60 source.
58	The source transfer guarantee must be enhanced in such a way that each source – must be utilized for an extended period (higher is preferred).
59	Mention the diameter of source and its characteristics of clinical usage, transfer guarantee and usability.

60	The source cable must be a multi strand type and must be able to negotiate treatment curvature of 1 cm radius.
61	The source cable should have a safe movement (Forward / backward) with an accuracy of (+ 1 mm and must be controlled by stepper motors.
62	The source transfer guarantee must be enhanced in such a way that each source must be utilized for an extended period of time
63	Source Capsule Shield should be Stainless Steel
64	Source Capsule Diameter Of maximum 1mm
65	Source Active length of minimum 3.5 mm
66	Source Active Diameter of minimum 0.5mm
67	Source position Accuracy must be +/-2.0 mm
68	Maximum treatment length should be minimum 400mm
69	The source drive out length from indexer should at least be 400 mm to reach farther sites of treatment.
70	Maximum number of source transfer capacity per source: Please specify
71	Treatment pathway curvature: Please specify
72	Source movement of incremental stepper motor must be 50cm/sec
73	Source step size should be 1mm
74	Maximum time required to supply the source from the date of placing order: Please specify
75	Surface contamination test to ISO 9979
76	Leak testing meets requirements of ISO 2920
77	**QUALITY ASSURANCE TOOLS:**
78	The vendor should ensure that all items required for commissioning and QA which are mandatory for as per AERB regulations should be provided.
79	Within the after loader there shall be a radiation detector, which shall give audible and visual warnings at the operator console and the after loader, that radiation is present when the source is extended in normal operation. The same radiation detector shall sound an alarm and will give visible indication radiation is present when it is intended that the source should have returned to the safe.
80	A Gamma Zone Monitor with latest calibration certificate shall be provided by the vendor which gives visual and audible warning inside the treatment room and at or near the operator console that radiation is present when the source is extended in normal operation.
81	LMO (Last Man Out) switch shall be provided and installed as per AERB guidelines
82	A source calibration well type chamber with matched cabling and electrometer shall be provided with latest calibration certificate.
83	Source position accuracy verification tool shall be provided.
84	A calibrated contamination monitor shall be provided.

85	CCTV Monitoring system with Two-way communication system
86	Survey Meter (Geiger-Meller Based) – High quality established brand
87	Source position check device
88	Indexer length measurement tool
89	Digital Barometer & Thermometer
90	Specify any other necessary quality assurance tools & supply
91	Insurance and Freight cost of the Sources for both onward and return of used source. The Clearance and transport of the sources and the Re-export / disposal of the decayed sources must also be included in the offer.
92	Company must provide site planning, installation, source loading and unloading commissioning & quality control
93	**APPLICATORS**
94	Oesophagus applicator with mask
95	Bronchus applicator with mask
96	Breast implant template set
97	Prostate implant template set
98	Mupit Template set with 30 needles of 20cm
99	Standard Intracavitary Fletcher Applicator set
100	Vaginal applicator set
101	Flexible Implants complete set of Flexible tubes 100 no's SL and 100 no's DL
102	Rigid Needle Implants complete set - (for each Length 20 numbers each small, medium, large please specify the length)
103	CT & MR compatible Cervix for Intracavitary Fletcher Type with Interstitial option
104	CT & MR compatible Vaginal Cylinders with variable length & Diameter
105	CT & MR Compatible Interstitial Ring Applicator set (60 Degree and 26mm Diameter) With Interstitial Application for Cervix including all the needles and accessories (minimum 30 needles)-Qty-01no's
106	Surface mould applicator-Qty-01no's
107	**TRANSFER TUBES**
108	Transfer tubes for all channels for flexible tubes, rigid needles and other applicators.
109	**RADIO OPAQUE DUMMIES**
110	For all applicators
111	A set for interstitial dummies for implants
112	Applicators Sizes to be customized as Indian Standard
113	**TPS FOR HDR BRACHYRTHERAPY**
114	The equipment should have a complete 3-D Brachytherapy Planning system based on state-of-the-art hardware independent of the equipment console and with the latest user-friendly operating system.

115	The Planning System should be dedicated, in-house product of the HDR equipment manufacturer specifically developed to integrate with the HDR equipment.
116	It should support all brachytherapy treatment modalities capable for HDR stepping source.
117	It should be DICOM 3.0 and DICOM-RT compliant with import and export and print facility.
118	It should be possible to input CT images through network or CD and it should support multiple localization algorithms including CT & MRI based reconstruction. It should be possible to do 3- D multi-planar, volumetric catheter reconstruction. It must have different types of Dose Volume Histograms. The software should be FDA approved and must follow international recommendations like ICRU-38, TG-43 & ICRU-85.
119	Intel Core i5 processor/Higher Specification available
120	4 GB RAM
121	1 TB hard disk
122	DVD-RW drive, internal
123	4 x USB ports, 1 x serial
124	2/3 button wheel mouse and WIN keyboard
125	Windows 10 and Antivirus
126	22” or more with TFT/LCD/LED screen – Flat panel display
127	The hardware should be upgradable
128	Brachytherapy software must be provided and should support all of the Brachytherapy treatment modalities including intracavitary, interstitial, intraluminal and surface mould techniques.
129	All the reconstruction technique like, Orthogonal, Semi-orthogonal with reconstruction box, Variable angle, Isocentric must be available, CT Image based reconstruction, Dose Calculation based on TG43U1, Automatic placement of Basal Dose Points for Paris Technique, Automatic shielding for Applicator
130	Advanced optimization using dose points like geometry based, full or polynomial optimization for irregular, regular volume implants should be available in order to give dose conformity on implant volume and dose points.
131	Fast and accurate dose calculation considering radial dose function, anisotropy function and geometric function should be there.
132	Rapid reconstruction of catheter using tracking algorithm and indication of corresponding lines on the images should be present.
133	TPS should be capable to do Contouring in arbitrary planes
134	For outpatient treatments, extremely accurate and dwell time optimization and dose calculation must be available.
135	A standard library of treatment must be present for easy retrieval for protocol patients
136	Wide range of dose volume histogram methods, point dose option, Different plane’s view must be available.
137	Inverse/Hybrid inverse Planning of Brachytherapy using volume optimization should be included in the offer.
138	TPS should be capable for calculation-based TG 43U1 Algorithm and TG 186
139	TPS should be capable of doing INVERSE PLANNING (IPSA and HIPO)
140	APPLICATOR MODELING LICENSE

141	PRINTER FOR TPS AND HDR
142	**NETWORKING**
143	Networking with the treatment machine for treatment execution should be possible.
144	Networking with CT, MRI for image acquisition should subsist possible.
145	Equipment should have capability to communicate to oncology Information system and should be interfaceable with the hospital EMR/HIS using HL7/ FHIR standards
146	The software should also be compliant with the requirements of the National Health stack and should have undergone ABDM sandbox testing if indicated in the NHA guidelines.
147	All necessary licenses to be provided for above all mentioned where relevant

S.NO	TENDER SPECIFICATIONS OF GAMMA KNIFE
1	The State-of-Art , advance and latest Stereotactic radiosurgery system should be able to perform stereotactic irradiation of head structures ranging from very small target size of few millimetres to several centimetres e.g. metastatic tumours, Arteriovenous malformations, Trigeminal neuralgia, Medically refractory essential tremor, Meningioma, Vestibular schwannomas, post-surgical Pituitary adenomas and recurrent Glioblastomas through gamma radiation with the principle of simultaneous cross-firing from more than 180 non coplanar stationary radiation sources spread over a large spatial angle. It should provide different workflow options and adaption possibilities to each individual case like single or multiple sessions, frame based and frameless mask-based immobilization, routine Radiosurgery or Micro Radiosurgery.
2	**SYSTEM CONSOLE**
3	System should be supplied with all components of a fully automated system with integrated. Single robotic system, consisting of a radiation unit with three collimator sizes, housing for more than 180 Co-60 source(s) and Radiation shielding doors.
4	It should have fully integrated stereotactic cone-beam computed tomography (CBCT) imaging system for accurate stereotactic positioning
5	It should offer both frame based and frameless stereotactic radiosurgery procedures
6	It should be supplied with treatment planning system, system tool kit, spare part kit for coordinate frame, skull scaling instrument, mask adaptor, magnetic resonance (MR) head support, Thermoplastic masks for patient fixations, Patient marker set, CT Adaptor, MR Adaptor, Colour Laser Printer, UPS etc
7	Last Man Out Switch should be provided
8	**QUALITY ASSURANCE TOOLS FOR**
9	Focus precision, CBCT precision, and clearance check tool (CCT)
10	Perform tests for spatial resolution, contrast to noise (CNR), and uniformity of the CBCT imaging
11	Dosimetry phantom compatible with both metallic and non-metallic frames
12	Radiation phantom for standard dosimetry test - Dose-rate determination according to international code of practice e.g., IAEA-TRS-483, and AAPM TG-178 and Precision of the dose-distribution using film dosimetry
13	Film holders for independent QA Check for system accuracy
14	Radiation source(s) should be stationary during irradiation of patient
15	It should be able to treat functional targets as small as 4mm up to several centimetres.

16	It should offer advanced intrafraction motion management system to monitor micro movements of the patient's head enabling to cut off the radiation if the movement exceeds the set limit that has been defined by the user. The treatment should be continued from where it stopped when the patient returns back to the set tolerance
17	System should provide 'Adaptive Dose Control' with online Dose Evaluation algorithm to compare dose distribution
18	Dose delivery should be fully integrated, adaptive and automatic with auto correction of delivery plan according to patient position obtained from CBCT images taken at the time of treatment
19	Company must provide site planning, installation, source loading and unloading commissioning & quality control
20	In case of power failure, treatment should continue for at least one minute and all treatment parameters should be saved and treatment should be paused for resumption on return of power
21	Patient Surveillance System: Treatment room should include one intercom audio and video facility for communication with and observation of the patient
22	Operator console should include visual display of alarm system
23	Tampering Intrusion Detection Kit for Co-60
24	The vendor should ensure the following items required for commissioning and QA for the Stereotactic radiosurgery system should be provided. Thermometer, Barometer, thimble chamber, electrometer, survey meter.
25	Latest Gamma Zone Monitor with latest calibration certificate shall be provided by the vendor
26	**TECHNICAL PARAMETERS**
27	Patient Positioning System: Fully automatic & robotic with auto set up time
28	Minimum load capacity of couch: ≥ 200 kg
29	Real time High-Definition Motion Management with optical infrared tracking system with frame-based reference markers, patient marker and foldable infrared Camera to be provided with an accuracy of ≤ 0.2 mm and Motion gating threshold in HD motion: 0.5-3.0 mm
30	Mixed Collimation set up time (composite shot): < 3 sec
31	Radiobiological accuracy: Should be < 0.5 mm and guaranteed by manufacturer for the lifetime of the equipment if the system is under CMC
32	Positioning repeatability: ≤0.05mm
33	CBCT Imaging accuracy: ≤0.5 mm
34	Beam Penumbra: ≤1.4mm for smallest collimator
35	Mean extra-cranial dose: <0.01% of prescription dose at 50 cm from isocentre during a radio surgical procedure
36	Equipment should conform to the international standards of safety & radiation protection
37	Effective Dose Rate: > 3Gy/min at the time of loading
38	Collimator sizes: 4,8 & 16-mm diameter
39	Maximum Cobalt 60 activity at loading should be ≤6600Ci (244TBq)
40	The no. of radiation source: >180 s
41	It should be capable of a through put of >600 patients per year.
42	**TREATMENT PLANNING SYSTEM WITH RESPECTIVE NUMBER OF LICENSES AND WITH BELOW CAPABILITIES 3 NO'S**
43	Integrated treatment planning and management software system
44	Server, one connectivity license for System, one patient database, one DICOM server
45	**Licenses for the following:**
46	Preplanning /Retreatment- Real Time Dose Planning
47	Image Merge
48	Inverse Planning

49	Colour PET
50	DICOM RT
51	Convolution License
52	Mask License
53	Functional Planning
54	Software to create plans quickly and automatically for one or more targets through optimization based on dose constraints for targets and organs at risk, together with controls to minimize beam-on-time and overall low dose to surrounding tissues to reduce both planning and treatment time
55	System should be capable of providing remote access solution which enables off-site planning and screen sharing for the purpose of collaborative plan review and approval
56	DICOM to support images from MR, CT, PET, Projective Xray angiograms
57	Non stereotactic images co-registration should be able to automatically co-register with stereotactic images
58	Stereotactic Image fusion should be automatic
59	Image import capability should be DICOM Image transfer over network
60	Critical structure protection using automatically generated beam blocking
61	Should support at least 30 or more isocentres per plan
62	Should support planning of at least 30 or more targets in one treatment
63	Possibility to create different plans for one treatment for one evaluation
64	Pre-planning of treatment should be possible days before surgery
65	Should be capable of supporting re-treatments & possibility to overlay previous treatment data
66	Functional targeting using AC-PC landmarks & functional target formulas and stereotactic atlas
67	Check & verify protocol: export of treatment plan protocol prior to treatment and operators reports after completed treatment
68	Stereotactic scaling should be automatic with full error analysis.
69	Online patient database with instant accessibility & back up up to 10 Terabytes.
70	Realtime update of dose distribution should be provided
71	**TREATMENT PLANNING CONSOLE HARDWARE**
72	Latest Branded High-End Workstation. The workstation provides the performance needed for heavy dose calculation and real-time 3D visualization
73	Integrated CBCT alternatively should provide online reference image to set coordinates for frameless SRS with help of mask with same accuracy as attained with frame-based fixation
74	Equipment should have capability to communicate to oncology Information system and should be interfaceable with the hospital EMR/HIS using HL7/ FHIR standards
75	The software should also be compliant with the requirements of the National Health stack and should have undergone ABDM sandbox testing if indicated in the NHA guidelines.
76	All necessary licenses to be provided for above all mentioned where relevant

SL. NO.	TENDER SPECIFICATIONS FOR DOSIMETRY
1	**MOTORISED 3D WATER PHANTOM & DOSIMETRIC ACCESSORIES RADIATION FIELD ANALYSER (RFA)**
2	Require state of art motorized 3D Automatic Rectangular/Cylindrical water phantom and Dosimetry system and therapy beam analyser for fast, precise and accurate measurement for Acceptance and commissioning of C-type Linear Accelerator machine after installation, Measurements after repair or replacement of major treatment unit components, Beam data input for commissioning primary & secondary Treatment Planning System, Periodic quality control. All the measurement should be computer controlled and user friendly. All components comply with national and international regulations and safety rules. All components of the system and all available options are controlled by the same software that runs under Microsoft Windows. The system should suitable to measure pulsed radiation with fluctuation dose rate.
3	The motorized 3D rectangular/Cylindrical water phantom should have three axis motions with three independently controllable arms. It should have a remote-controlled 3D acrylic water tank with minimum 12mm thick walls supporting a scanning range of more than 48 cm×48 cm× 40 cm.
4	The phantom should have magneto strictive sensor/Stepper technology/calibration free, high speed stepper motor for superior positioning accuracy of 0.1mm.
5	Necessary accessories should be supplied along with motorized 3D rectangular/Cylindrical water phantom to measure easily and accurately pulsed photon, electron from all types of accelerators and measurement of continuous radiation from tele-cobalt machines.
6	There should be a dedicated detector positioning device to quickly mount the ionization chambers and solid-state detectors in water phantom and automatically align the same to their effective point of measurement. There should be a software-controlled option to automatically set the chambers at the EPOM (Effective Point of Measurement) recommended by international protocols.
7	The zero-point, reference point and limit of the different detector units should be stored separately in the control unit /Pendant/ in the computer system. The control pendant should display the actual position of the chamber position at any given measuring time.
8	The motorized 3D rectangular/Cylindrical water phantom should be supplied with a specially designed, high precision electro-mechanical lift table/carriage on wheels with at least 500 mm range of movement to allow for height adjustment of the water tank during measurement. The RFA wheels should be out of the base plate/turn table.
9	The water reservoir should be at least 190 litres to store the water. The Lift table and water reservoir should be preferably integrated for easy movement and handling. The wheels of the lift table should be outside the base plate. The water reservoir should be bi-directional and supplied with inbuilt hose connector to avoid water spillage.
10	The water should be automatically filled exactly to a pre-set level.
11	Preferably Provision for levelling water phantom automatically should be provided.
12	There should be an integrated / separate dual channel electrometer with user selectable measurement time for fast and precise measurements. There should be a facility to vary the chamber voltage for both the channels individually in 50V increments up to 400 V with reversible polarity. The dual channel electrometer should be fast enough to have a minimum measuring interval of less than 20ms with necessary software the dual channel electrometer should be used for absolute dosimetry.
13	There should be an option for radiation beam centre check which will adjust the chamber accurately for precise data measurement. There should be an option to check and correct for the beam inclination
14	There should be an inclined bottom to drain water without adjusting the tank physically
15	The motorized 3D water phantom should be supplied with two numbers of waterproof thimble ionization chambers of volume 0.13cc or less than for dose distribution measurements in photons and electrons. The chambers should

	be cylindrically shaped with flat angular response and uniform spatial resolution along all three axes of the water phantom & preferably can be used in both axial / radial direction.
16	Require a small field ionisation chamber of 0.01cc or lesser with high response and excellent spatial resolution for dose measurements in small photon fields. The chamber should be waterproof for use in beam profile measurement for SRS.
17	The 3D Water phantom should be supplied with most advanced, comprehensive, and user-friendly software for beam data acquisition and data analysis in radiation therapy. The software should support all important dosimetry tasks in radiotherapy as modules. The software should support measurement programs for PDD's profiles, matrices for isodoses, and point measurements. Axis definition for each defined radiation device with name and direction should be possible.
18	The software should support task list for beam data collection for Linac commissioning and TPS beam data collection. All established international protocols including Linac vendor specifications should be available. The user should also be able to generate their own analysation protocols.
19	There should be an option to save the measurements parameters for future use.
20	The software should preferably have scan time predictor that calculates the expected measuring time in advance
21	There should preferably be an option to choose a set of reference data (PDD & Profiles) which can be compared periodically with standard deviation and with Gamma.
22	It is preferred to have an AI based algorithm for photons for both FF & FFF profiles for the offered field chamber to reduce the volume averaging effect along penumbra
23	Isodoses and rotational 3D display in colour wash or lines with dual cross hairs, zoom and various normalization functions should be available.
24	FFF Analysis using Inflection point option should be available as per international protocols.-
25	Software should have an option to adjust the speed & steps of a measurement. There should be an option where user can customize the steps and speeds of a measurement according area of interest.
26	Software should have an option to adjust the resolution and speed in the Continuous mode of measurement. The minimum speed should be at least 0.3 mm/sec
27	Software should have some special modules like Beam Adjust modules, Beam Inclination for fine beam data collection for TPS.
28	In-built TPR option should be available with necessary hardware. There should also be dedicated software to convert PDD's to TPR curves. Necessary software to format and convert the measured data to TPS specification must be provided.
29	In built thermometer and barometer are preferred and they should have the option to be calibrated using the reference.
30	There should be dedicated software to do output factor measurement. Additionally, the determination of the exact beam centre for small fields should preferably be automated.
31	Software license should be used in at-least 5 number of systems simultaneously.
32	The software should have license for film and EPID image analysis for machine QA or equivalent to be provided
33	**ABSOLUTE DOSIMETRY SYSTEM**

34	A compact high precision and independent Reference Class secondary standard dosimeter with necessary calibration certificate should be supplied for routine daily QA checks and absolute dose measurements in photon and electron beams. The dosimeter should have colour display with capacitive touch screen to visualise the measurements and control the device. This Display can be on the Dosimeter or in PC and should show the Chamber library to store the calibration factor of the chambers so that dose and dose rate in Gy, C, Gy/min, C/min can be measured. It should have options to store the details of 100 detectors along with the options to input air pressure correction and other user defined corrections. There should be LAN and USB interface to connect to external device. Both dose & dose rate should be displayed along with the chamber details. There should be option to choose between manual and automatic measurement. The dosimeter should have the provision to be controlled from a PC. It should show the history of at least 50 measurements from the past. It should show the statistics like mean and standard deviation of selected measurements from history. It should be capable of measuring from 400 fA or lesser to 2.6 microamp in the current/dose rate mode and 4 pC to 9.3 C in the charge/dose mode. It should have repeatability <+0.25 % and long-term stability of <+0.1 % per year. The leakage of the system should be less than 1 fA at STP.
35	A 0.6 cc waterproof Farmer type chamber should be supplied for absolute dosimetry of photons and electrons. The chamber should be of rugged construction with wall material as graphite (with protective acrylic cover) and an aluminium electrode. The chamber should be supplied with Absolute Dose to Water calibration factor.
36	One Triaxial Cable having minimum 18 mtr. length for connecting the chamber to the electrometer to be offered.
37	There should be dedicated plane parallel ion chamber for high energy electron measurements in 3D water phantom. The chamber should have a flat energy response in the range of 2MeV till 25MeV. The chamber should be provided with necessary waterproof cover for use in 3D water phantom. The chamber should be supplied with Absolute Dose to Water calibration factor.
38	A small size water phantom with dimension of 30x30x30 cm3 must be provided for absolute dosimetry in photon beam with vertical beam incidence. There should a chamber adaptor to mount Farmer Type chamber at a fixed distance. The phantom should have adjustable supports for levelling, etched cross hairs for alignment and a collision protected drain tap for emptying without tilting or changing the phantom's position.
39	A water equivalent solid phantom of different thickness must be provided for absolute measurements in photon and electron beams in external beam therapy. The phantom should be of 30 x 30 cm size consisting of various thickness so as to achieve any thickness with 1mm resolution up to 30cm. All these slabs must be precisely machined to ensure free of contaminants and air bubbles. Necessary chamber adapter plates for the offered chamber should be provided.
40	It should have a dedicated software which will calculate and give the output directly of Photons & Electrons of the Machine according to protocol.
41	There Should be a dedicated unshielded diode detector for SRS beam data commissioning.
42	A precise Calibrated barometer and Calibrated thermometer must be supplied for air density correction.
43	**IMRT & VMAT/RAPID ARC QA TOOLS: -**
44	A state- of- art Ion Chamber/diode-based array detector along with necessary phantom for complete verification of IMRT and VMAT/Rapid Arc plans must be offered.
45	Necessary software with license for at-least 5 systems must be provided to use the detector array for routine quality assurance of Linac like checking flatness, symmetry, dose deviation, wedge angle in dynamic wedge, Constancy of field size.
46	The Ion Chamber/diode Detector array should be of modular design with chambers with rotation symmetric response behaviour.
47	The Ion Chamber/diode-based detector array should have minimum 1200 vented ion chambers/diodes and are arranged regularly across the complete field size minimum 25cmx25cm and resolution of less than or equal to 7 mm.

48	The Ion Chamber/diode Detector array should use gold standard ionization chamber/diode technology with exceptional accuracy and reliability for patient specific and routine Linac QA.
49	The Array device should be supplied with cylindrical/octagonal/multi cube Phantom along with necessary hardware and software for correcting angular dependency of detectors. It should be compatible to IMRT/VMAT QA.
50	Software should have option to show Gamma distribution, failed points, Gamma table after comparison. In addition, the calculated and measured profiles along cross hair and in plane should also be displayed
51	Software should be able to show histogram, compared results.
52	User should be able to modify Gamma passing criteria in the software.
53	Software should be able to show Pass and Fail of a plan with all the relevant information like number of detectors evaluated, number of detectors passed the criteria and number of detectors failed the criteria.
54	There should be an option to measure lengthy field greater than 36 cm.
55	Software license should be issued for at least 5 systems**.**
56	**DAILY QA CHECK DEVICE: -**
57	A wireless/Wired QA device for FF and FFF with minimum of 12 ionization chambers which can perform constancy checks on LINACs to check homogeneity, symmetry, central dose, wedge angle needs to be supplied with option to analyse the data according to all the International and Linear accelerator vendor protocol. The measurement orientation should be same for Photon and Electron and FFF without adding any additional compensators. If the Patient QA Array Device can be used for both Patient and Machine QA, the same can be offered.
58	The device should be capable of printing the daily data for selective period, selective energy, field size and any other filter options. There should be options to print the trend analysis in graphical format, along with the summary for the chosen period. It is also desirable to print the analysis of the daily data for the selected period. The actual measurements of the chambers should also be pintable in table format.
59	The device should have a capability to store up to 8000 number of measurements in PC.
60	The device should trigger the next measurement automatically.
61	Dedicated software should be provided for data documentation and trend analysis.
62	The device should be capable of correcting for temperature and pressure variation
63	The device should also have the feature to be operable through software.
64	Software License should be at least for five systems.
65	**RADIATION MONITORING DEVICE: -**
66	A pressurized ion chamber Survey meter with enhanced sensitivity (micro-R resolution) and good energy response for measuring radiation rate and dose for survey of tele-therapy installation must be supplied. The ion chamber in the survey meter should have fast response time to radiation from leakage, scatter beams and pinholes. The survey meter should have digital display with analogue bar graph and automatic backlight function.
67	**OTHERS**
68	An Appropriate Phantom shall be offered for SRS Patient Specific QA using offered chamber with all accessories. The system should offer a base phantom for SRS/SRT QA with detector insert for patient specific QA using ion chamber and film, to verify end to end process of SRS treatment, to perform Linac QA covering kV / MV isocenter coincidence & Winston lutz isocenter test.
69	Necessary build-up caps to be quoted for the offered cylindrical chambers for in air measurements.
70	A Laptop should be supplied for use of all application software offered. The latest version of operating system, Professional laptop (with higher version processor, 8GB RAM, 1TB hard disk, 2GB graphics card) should have all the latest feature with colour FULL HD monitor and with printer/plotter (colour). The system should be upgradable
71	Vendor should offer Flatbed film scanner (A3 Size) and EBT3 small and large size films, and analysing software should be provided.

72	A Software which allows for independent verification of the dose per monitor unit (MU) to deliver prescribed dose to patient (Adhering to AAPM TG 219 guidelines) to be provided.	
73	**IN VIVO DOSIMETRY**	
74	The vendor should provide in-vivo dosimetry	
75	Software should be able to communicate with the hospital EMR/HIS using HL7/ FHIR standards	
76	The software should also be compliant with the requirements of the National Health stack and should have undergone ABDM sandbox testing if indicated in the NHA guidelines.	
77	All necessary licenses to be provided for above all mentioned where relevant	

Sl.No.	**TENDER SPECIFCICATIONS FOR IMMOBILIZATION**
1	**PATIENT POSITIONING AND IMMOBILIZATION DEVICES SPECIFICATION**
2	Patient positioning and immobilization devices are accessory tools which are used to prevent patient movement during radiation treatment with linear accelerator. The patient positioning and immobilization system shall consist of base plate, thermoplastics masks, vacuum bags and other additional support systems for particular anatomical site-specific tools.
3	**GENERAL REQUIREMENTS:**
4	All patient positioning and immobilization devices offered shall have FDA (USA) and CE (Europe) certified product.
5	As the patient positioning and immobilization devices such as fixation materials, couch top and thermoplastics mask alter the patient dose of radiation significantly as per the AAPM TG-176 findings, the product of vendors those who will provide with FDA endorsed data of dosimetric properties of all offered devices are only eligible for the bidding
6	The vendor should provide three (3) sets of All-in-one solutions (AIO) of universal treatment base plate (AIO) /Separate Boards 2 made of Carbon Fiber and 1 made of fibre glass immobilization devices having a total solution to treat Paediatrics to Adult, Head, Head & Neck, Breast, Thorax, Abdomen, and Pelvis with facility to make custom made supine and prone head rest for individual patients to maintain an accuracy of less than 2mm along with appropriate thermoplastics sheets
7	The vendor should provide Thermo Sheets with Push pins/clamp for day-to-day easy setup for regular 3D CRT, IMRT, VMAT, IGRT treatments as follows: Thermo Sheets for head regular 3 point (50 nos.), Head & Neck 5 point (50 nos.), Thorax 4 pin cast (50 nos.), Pelvic 4 pin and 6 pin cast (50 nos. each), Paediatric Head 3 clamp (25 nos.)
8	The same base plate shall be upgraded to adopt for frameless SRS/SBRT and there shall be 3 set of each to be provided with all necessary accessories.
9	Double shell mask for SRS/ SRT treatment (10 nos.) should be provided along with all accessories
10	True Carbon fibre Breast Board for supine patient with different angulation, arm support, wrist support with grip hole, bottom stop with hip position adjustment (Compatible with 80 cm bore aperture of CT scan)- 2 sets
11	Extremity base plate made of carbon fibre -1 no.
12	The vendor should provide Thermo Sheets with Push pins/clamp for day-to-day easy setup for extremities: - 3-points foot mask- 5 nos. 2-points knee mask- 5 nos.

	2-points elbow mask - straight- 5 nos.
13	**Vacuum cushions: -** For Head and Neck-6 nos. For Thorax -10 nos. For Abdomen -10 nos. paediatric vaclock- 5 nos. And for whole body -10 Nos. with indexing devices
14	Suitable Vacuum pump -1 No.
15	Vendor should also provide the storage cabinet for all offered system which will be located inside the treatment room
16	Cushion for shoulder- 2 nos.
17	Multipurpose support cushions of various shapes - 2 sets
18	Shoulder retractor for head and neck patients -2 sets
19	Carbon Fibre Head rest (2 sets of all sizes)
20	Prone Head rest universal -1 nos.
21	Paediatric Supine head rest - 2 nos.
22	MR compatible head rest universal - 1 nos.
23	Carbon Fibre Wedges with 3 different angles -2 set each
24	Leg rest (2 sets) (Knee & foot Support)
25	Leg separator Low - 2 nos.
26	Leg separator Medium - 2 nos.
27	Thorax Abdomen- Arm rest – low -2 nos.
28	Mouth bite - 10 nos.
29	Pressure belt for SBRT with manual pump -1 nos.
30	Tegaderm- 75 pieces
31	Indexer bar for LINAC couch top carbon fibre to fit variety of base plates. - 4 sets each
32	Tattoo ink - 10 bottles
33	Sagittal Lasers for Mould Room Couch -1 nos.
34	Water bath for heating thermoplastic material, with digital Temperature display, control and timer -1 No.
35	Body calliper -2 Nos
36	Heat Gun (with temperature and flow control) -1 No
37	Low/medium melt shielding alloy (cadmium free) -25 Kg
38	Melting pot (alloy dispenser): Alloy dispenser for alloy melting, temperature control up to 120^{o}C with digital readout, alloy capacity at least 50 kg
39	Cooling plate: Aluminium cooling plate, at least 30 cm x 30 cm, levelling adjustment
40	Foam blocks: Styrofoam blocks for electrons -1 set
41	Hot-wire cutter for electron cut-outs Foam cutter for perpendicular cutting, heated metal cutting wire, able to handle foam blocks up to 25 cm x 25 cm, stock of cutting wire
42	Tools- Block grip tool, metal file, clamps, alloy pourer and any others (if required) for proper functioning of the mould room.

43	**BOLUS**: The bolus build-up materials made up of a solid, homogenous, uniform, tissue equivalent approved by FDA for human contact is encased in a tough layer of thin plastic having: Size: 30 x 30 cm2, Thickness: 0.5 cm, 1.0 cm (0.5 cm: - 10 NOS, 1.0 cm: - 4 NOS)
44	The bolus build up materials made up of wax / pellets should be provided - 50 Box
45	**EYE SHIELDING KIT**: Tungsten eye shields set consist of three sizes, for paediatric and adult patients - 1 each
46	**GONAD SHIELD:** Lead shielded, a range of sizes (small, medium, large), with holding stand
47	**CT Makers: Lead** balls (2 mm dia) -300
48	Mould room table with Indexing and two pin bar to lock immobilization devices to be provided
49	The Vendor shall arrange for training at an appropriate facility for All Radiotherapy Technologists from the centre for at least 2 weeks (On site + off site) for Immobilization Devices by trained personnel for the seamless functioning of the entire system. All necessary training should be provided by the vendor or company