HSCC/PUR/LHMC/2014 **Date:22.8.2014**

Amendment-III

Ref.: Tender Enquiry No.: HSCC/PUR/LHMC/2014 Dated 16.07.2014.

Sub.: Procurement of Radiotherapy Equipment for LHMC, NewDelhi.

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Equipment Added:

Technical Specifications an Isocentric Mobile C-arm X-ray Imaging System

1. **System Description**

1.1 The C-arm needs to be capable of performing fluoroscopy / radiography during brachytherapy procedures in pelvis, abdomen, chest, head & neck, limbs for all patient sizes.

2. **Operating requirements**

2.1 Should be a mobile unit including C-Arm and image processing / viewing system with large wheels for easy transportation and with easy maneuverability.

2.2 Patient support system (C-Arm table) shall be versatile, adjustable, having removable sections equipped with removable x-ray film cassette tray & grid.

2.3 Should provide the integration of the function with 3D TPS and HDR Unit.

3. Technical Specifications

3.1 C-Arm Mechanical:

3.1.1 The system shall be equipped with cable pushers on the C-Arm wheels so that cable lying on the floor will not limit the C-Arm movements.

3.1.2 The C-Arm shall have a minimum distance of 90 cm between the source & image receptor to facilitate large imaging space and clearance around the patient/table.

3.1.3 The system shall allow interchanging the positions of X-ray tube and imaging system.

3.1.4 The C-Arm shall be able to rotate ± 180° to allow the image chain to accomplish angled projections.

3.1.5 The system shall have vertical C-Arm travel capability (preferably 16° higher) to adjust the imaging chain height.

3.2 Movements:

Orbit Rotation motor driven or manual, Multiple angulations, with provision to take orthogonal views of the application from multiple angulations, Horizontal Travel, Swivel travel, Free space, Electromagnetic brakes for precise positioning of the arms.

3.3 X-ray Tube:

3.3.1 The x-ray tube shall be preferably rotating anode type.

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	3.3.2 Dual focal spots of sizes 0.3 & 0.5/0.6 mm 3.3.3 Higher anode heat storage capacity would be preferred (Please specify) 3.3.4 Higher anode cooling capacity would be preferred (Please specify). **3.4 X-ray Generator:** 3.4.1 should be of microprocessor controlled. 3.4.2 The generator shall be 1.5 KHz or higher frequency or DC converter type. 3.4.3 The power load shall be of minimum 10 KW and KVp Range: 40 – 110 KV, Radiographic Current: 20mA or higher, Fluoroscopic Current: 0.2 – 15 mA. 3.4.4 The mAs range is radiographic mode shall be of minimum 120 mAs. **3.5 Collimator system: Shutters – Iris Diaphragms** **3.6 Imaging and Image Intensifier TV system:** 3.6.1 Should have DICOM imaging capabilities, image memory, Image processing, Text/graphics & other functions 3.6.2 Image intensifiers based panel for x ray imaging. 3.6.3 The image intensifier (II) shall be at least 9 – 12" to have wide coverage. 3.6.4 The minimum image resolution shall be 15 lp/cm at TV monitor 3.6.5 The image intensifier shall be equipped with a carbon fiber grid with 8:1 ratio. 3.6.6 The system should be DICOM compatible for image transfer to TPS and any other image workstation. 3.6.7 The system shall be equipped with a high resolution of minimum 1K x 1K imaging chain. 3.6.8 Image display shall be minimum 19" high resolution TFT monitor. TFT Color display 1280x1024, 2 monitors. **3.7 Radiographic Film Cassette Holder:** 3.7.1 System must be supplied with minimum 10" x 12" film cassette holder with screen & grid. **4. System Configurations Accessories, Spares and Consumables** **4.1 A. C-Arm compatible OT table top** The C-Arm compatible OT table top to be supplied along with standard accessories including (i) Radio-translucent table top for radiography, (ii) Cassette holder with provision for anterior-posterior and lateral radiographs, adjustable arm support for lithotomy position. 4.2 UPS of the required capacity for the C-arm system 4.3 Two-way intercom and CCTV system 4.4 Lead aprons of minimum 3 nos. 4.5 DICOM ready & compatible with connection to TPS, DICOM connectivity with all licenses, DICOM storage send / receive, DICOM image archiving DICOM print, DICOM Query / Retrieve. 4.6 DICOM DVD writer. 4.7 Additional workstation with 19" monitor and adequate and large image storage capacity 4.8 Offer should include complete spare parts kit for the C-arm and Table. The list of items to be supplied should be included. **5. Environmental Factors** 5.1 All approvals such as FDA, IEC etc should be enclosed for the quoted model.

	5.2 List of installation for the quoted model should be submitted. 5.3 Complete installation should include: 5.3.1 Room planning, designing and modifications, space requirements to be spelt out in advance. Site study in advance prior to submitting the bid. 5.3.2 Electrical Requirements to be specified and necessary power supply arrangements and cabling and points to be installed. Site visit a must before submitting the bid. 5.3.3 All AERB clearances and Environmental clearances to be arranged with local authorities. Institute will provide all the documentations. 5.3.4 Air Conditioning and monitoring of Temperature; Relative Humidity and Air changes (To specify no. per hour) to be installed. 5.4 The unit shall be capable of being stored continuously in ambient temperature of 0.50deg C and relative humidity of 15 – 90% 5.5 The unit shall be capable of operating in ambient temperature of 20 - 30 deg C and relative humidity of less than 70%. **6. Power Supply** 6.1 Power input to be 220 – 240VAC (single phase), 400 – 440 V (3 phase) / 50 Hz as appropriate fitted with Indian plug. 6.2 UPS of suitable rating with voltage regulation and spike protection for 30 min back up. **7. Safety Standards and Training** 7.1 Should be FDA, CE, UL or BIS approved product 7.2 Comprehensive warranty for 5 years and provision of CMC for next 5 years 7.3 Shall comply with AERB guidelines and type approved by AERB 7.4 Comprehensive training on application after installation for one week on site for one doctor, one physicist and 2 technologists. 7.5 Electrical safety conforms to standards for electrical safety IEC-60601-1 General requirements. **8. Documentation** 8.1 User/Technical /Maintenance manuals to be supplied in English. 8.2 Certificate of calibration and inspection. 8.3 List of Equipments available for providing calibration and routine maintenance support as per manufacturer documentation in service/technical manual 8.4 List of important spare parts and accessories with their part number and costing. 8.5 Log book with instruction for daily, weekly, monthly and quarterly maintenance checklist. **Estimated Cost : Rs.1.50 crores. EMD: Rs.3.00 lakhs.**		
	<u>High Energy Linear Accelerator</u>		
S. No.	**Tendered Specifications**	**Amendments Requested by Prospective Bidders**	**Amendmendments Proposed in the Tendered Specifications**
	Sealed tenders (sealed separately as the "Technical Bid & the Price Bid-in duplicate)	M/s. Elekta Ltd. Sealed tenders (sealed separately as the	No change

	are invited directly from the manufacturers/principles for the supply of a state-of the-art clinical Radiotherapy Linear Accelerator cabable of producing 6MV and 15 MV dual photon energy for the routine and specialized treatment techniques. Linear Accelerator must have the latest technology and should be fully computer controlled with the latest state-of-art control system. The Linear accelerator system includes Medical Linear accelerator, Treatment Planning System, Record and Verification System, Dosimetry System, Quality Assurance and Radiation Safety System with other required ancillary and accessories. It should be capable of integrating with standard networking and PACS systems available in the market. The offered equipment should have the following technical features.	"Technical Bid & the Price Bid-in duplicate) are invited directly from the manufacturers/principles for the supply of a state-of the-art clinical Radiotherapy Linear Accelerator cabable of producing 6MV and 15 MV dual photon energy for the routine and specialized treatment techniques. Linear Accelerator must have the latest technology and should be fully computer controlled with the latest state-of-art control system. The Linear accelerator system includes Medical Linear accelerator, Treatment Planning System, Record and Verification System, Dosimetry System, Quality Assurance and Radiation Safety System with other required ancillary and accessories. It should be capable of integrating with standard networking and PACS systems with **HL7 Compatibility, DICOM 3 and DICOM RT Interface** available in the market. The offered equipment should have the following technical features.	
	1. Linear Accelerator An Advanced, new generation of high-energy medical linear accelerator should be equipped with a multileaf collimator (MLC) and an electronic portal imaging device (EPID) and kV-cone-beam CT (CBCT) to perform conformal treatment techniques such as three dimensional conformal radiotherapy (3D-CRT), intensity modulated radiation therapy (IMRT) and image-guided		**1. Linear Accelerator** An Advanced, new generation of high-energy medical linear accelerator should be equipped with a multileaf collimator (MLC) and an electronic portal imaging device (EPID) and kV-cone-beam CT (CBCT) to perform conformal treatment techniques such as three dimensional conformal radiotherapy (3D-CRT), intensity modulated radiation therapy (IMRT), **VIMAT (Volumetric Intensity Modulated Arc**

	radiotherapy (IGRT) through record and verification system. The system should have the capability for future upgradation in order to perform advanced treatments of stereotactic radiosurgery and radiotherapy (SRS/SRT), volumetric Modulated Arc therapy, 4D-Radiotherapy and Adaptive Radiotherapy.		**Therapy)** and image-guided radiotherapy (IGRT) through record and verification system. The system should have the capability for future upgradation in order to perform advanced treatments of stereotactic radiosurgery and radiotherapy (SRS/SRT), volumetric Modulated Arc therapy, 4D-Radiotherapy and Adaptive Radiotherapy.
	2.1**Beam Energies** The accelerator shall be capable of producing two clinically useful photon beams with energies of 15 MV as high energy and 6 MV as low energy.	2.1**Beam Energies** The accelerator shall be capable of producing two clinically useful photon beams with energies of 15 MV as high **energy and 6 MV as low energy.**	No change
	2.2 **Dose Rate and Beam Stability** 2.2.1 The maximum dose rate for routine clinical applications shall equal at least 300 monitor units (MU)/min or more for a 10 x 10 cm field at the depth of maximum buildup at a TSD of 100 cm for both photon beams.		2.2 **Dose Rate and Beam Stability** 2.2.1 The maximum dose rate for routine clinical applications shall equal at least **500** monitor units (MU)/min or more for **6mV & 200 MU/min. or more for 15mV for** a 10 X 10 cm field at the depth of maximum buildup at a TSD of 100 cm for both photon beams. **Flattening filter free beams shall be 1000 or more MU/min**.
	3.6**Total Skin Electron Therapy** A high dose rate electron mode for total skin electron therapy must be provided with a minimum dose rate of 900 MU/min or above for the 6 MeV electron beam.	To delete	3.6**Total Skin Electron Therapy** A high dose rate electron mode for total Skin electron therapy must be provided with a minimum dose rate of 900 MU/min or above for the **4/6 MeV** electron beam.
	5.1Sealed type of dose monitoring chambers must be provided and should operate independent of ambient temperature and pressure. All dosimetry, patient and unit safety related interlocks must be sensed and	5.1Sealed/**unsealed** type of dose monitoring chambers must be provided and should operate independent of ambient temperature and pressure. All dosimetry, patient and unit safety related interlocks must be sensed and controlled	5.1Sealed/**unsealed** type of dose monitoring chambers must be provided and should operate independent of ambient temperature and pressure. All dosimetry, patient and unit safety related interlocks must be sensed and controlled

	controlled by hardware and software.	by hardware and software.	by hardware and software.
	6.4 Multileaf Collimator 6.4.1.Number of multileaf collimator (MLC) leaves shall be at least 40 pairs or more. However, the better specification i.e more no. of leaves would be preferred. 6.4.2MLC leaf width projected at 100 cm TSD shall be 10 mm or less.	6.4.1.Number of multileaf collimator (MLC) leaves shall be at least 40 pairs or more. However, the better specification i.e more no. of leaves would be preferred **as option**. 1.Uniform 5mm leaves though out 40 x 40 cm2 field. 2.Uniform confirmity for any tremor treated. 3.Treats uniformly the multiple island tumors within 40 x 40 cm2 field due to inter digitization. 4. High speed of 6.5cm per sec. for every leaf and 9cm per sec for both diaphrams. 5. Lowest penumbra of 5.5mm 6. Lowest leakage of 0.5%. 7. Lowest transmission of 0.5%. 8. All purpose MLC which can treat large field as well as stereotaxy. Note: Elekta will not accept 120 leaf or more MLC specifications since it will be completely biased to competition.	**The MLC System shall have all leaves of 5mm resolution or combination of 5mm or less and 10mm set to have maximum field size of 40 x 40 cm^2.**
	6.6 Electronic Portal Imaging System 6.6.14.Vendor state and provide any value-added features such as IMRT portal dosimetry and verification system of EPID (it must be quoted as optional items separately).	To delete	To delete
	6.7 Patient Alignment system 6.7.1 Vendor is required to supply and install 4 sets LAP green laser alignment systems. A separate back pointer laser alignment system shall be provided and installed onto the		**6.7 Patient Alignment system** 6.7.1 Vendor is required to supply and install 4 sets green laser alignment systems. A separate back pointer laser alignment system shall be provided and installed onto the linear accelerator

	linear accelerator on offer. All laser products shall comply with respective code of IEC safety of laser products. 6.7.2 Two spare sets of LAP green lasers shall be provided.		on offer. All laser products shall comply with respective code of IEC safety of laser products. 6.7.2 Two spare sets of green lasers shall be provided.
	7. Intensity Modulated Radiation Therapy System 7.9 The latest technology for faster implementation of IMRT such as Volumetric Intensity Modulated Arc Therapy (VIMAT) or its equivalent should be provided as optional item quoting the price separately.		**To delete**
	9. Optional Features (Price must be quoted separately) 9.1 The linear accelerator offered model should be a ready platform for upgradation to techniques without any design/functional constraints for newer radiotherapy techniques. 9.2 It should be possible to upgrade to perform the stereotactic radiosurgery and stereotactic radiotherapy (SRS/SRT) treatment. The SRS/SRT frames, localizers, table attachments, MicroMLC, treatment planning system and all other necessary phantom and quality assurance tools should be provided.		**9. Optional Features (Price must be quoted separately)** 9.1 The linear accelerator offered model should be a ready platform for upgradation to techniques without any design/functional constraints for newer radiotherapy techniques **viz. flattening filter free Linear Accelerator Technology**. 9.2 It should be possible to upgrade to perform the stereotactic radiosurgery and stereotactic radiotherapy (SRS/SRT) treatment. The SRS/SRT frames, localizers, table attachments, treatment planning system and all other necessary phantom and quality assurance tools should be provided.
	II. Technical Specification for Advanced Treatment Planning System 1.4Two treatment planning workstation with calculation licenses and additional Two workstation enabling simultaneous contouring with licenses and additional should be provided.		**II. Technical Specification for Advanced Treatment Planning System** 1.4Two treatment planning workstation with calculation licenses and additional Four workstation enabling simultaneous contouring with licenses and additional should be provided.
	III. Oncology Information & Image Management / Treatment Record and	1.14. The OIS shall provide the capability to integrate simulation, CT, MRI, PET and	1.14. The OIS shall provide the capability to integrate simulation, CT, MRI, PET and

	Verify system 1.14. The OIS shall provide the capability to integrate simulation, CT, MRI, PET and electronic portal imaging system images into the OIS database to provide a readily available reference during the patient's course of treatment. Reviewing images immediately after acquisition from a remote location shall be permitted. The OIS shall provide the additional feature of managing drug administration to patients.	electronic portal imaging system images into the OIS database to provide a readily available reference during the patient's course of treatment. Reviewing images immediately after acquisition from a remote location shall be permitted.	electronic portal imaging system images into the OIS database to provide a readily available reference during the patient's course of treatment. Reviewing images immediately after acquisition from a remote location shall be permitted.
	IV. Dosimetry, Radiation Safety and Quality Assurance Systems/Tools	**IV. Dosimetry, Radiation Safety and Quality Assurance Systems/Tools**	**Dosimetry, Radiation Safety and Quality Assurance Systems/Tools – To be quoted separately** To be separated from High Energy Linear Accelerator and bidders to quote as separate item: The following dosimetry instruments / accessories, radiation safety equipments and quality assurance tools that are required for the optimal functioning of the radiotherapy department shall be provided by the vendor. 1.Dosimetry System 1.1Absolute dosimetry: <u>Secondary Standard Dosimeter Electrometer, Ion-Chambers, Water Phantom, Solid Water Phantom and Check Sources</u> 1.1.1.A well-proven, reliable, high quality secondary standard dosimeter shall be provided. Two calibrated Farmer type thimble 0.6 cc ion

			chambers (N_{Dw} calibration factors) along with one check source, one large volume ion chamber (with calibration certificate), shall also be provided. The calibration certificates for the 0.6 cc ion chambers shall also contain the reading of the check source mentioned 1.1.2. The dosimeter/electrometer and all the detectors/ion chambers shall have triaxial TNC threaded connector to facilitate uniformity amongst all the dosimetry instruments. 1.1.3 The dosimeter/electrometer shall have wide measurement range and a large multifunction display. It shall be capable of measuring both current and charge with excellent resolution. It shall have negligible leakage current. There shall be provision for at least 2 different bias voltages. 1.1.4 Additionally it shall be possible to alter the polarity. BNC to TNC and TNC to BNC connector adapters shall also be supplied. The dosimeter shall have extremely good accuracy, repeatability, and stability. Two such dosimeters are to be supplied. Please provide specifications. 1.1.5 One simple, open-top water phantom of interior size 30 cm x 30 cm x 30 cm shall be provided for performing teletherapy dosimetry. The phantom shall have a Perspex slot for inserting the 0.6 cc cylindrical ion chamber at a position such that there is a clearance of at least 10 cm or more from the bottom of phantom. The outer surface of the phantom shall have accurate markings to know the water height above the

			center of chamber. At the bottom of phantom there shall be a rectangular marking with cross hairs to align the phantom and ion chamber with the central axis of the beam. There shall be a tap on one of the sides for draining out the water. 1.1.6. For the calibration of electron beams a parallel plate ion chamber system complete with a dedicated check source and N_{DW} calibration certificate (with the check source reading noted on it) shall be provided. The chamber shall be a ROOS type or Markus type or NACP chamber. The chamber shall preferably not have any water-proof caps, sheathing and should be directly immersible for use in water or alternately the chamber shall have water-proof caps, sheathing for use in water phantom. It shall have triaxial TNC threaded type connector. 1.1.7. Please provide exhaustive details about the items offered. Since these items shall form the backbone of dosimetry, stress will be on the quality of items offered. 1.1.8. A solid, water equivalent phantom made up of slabs of different thicknesses shall be provided by the vendor for external beam teletherapy dosimetry. It shall be possible to use this phantom for both photon and electron beam dosimetry. The phantom shall be free of contaminants and air bubbles. Guarantee should be provided for electron density and homogeneity and shall be certified to be within 0.5% of water at photon energies. The slabs shall be of 40 x 40 cm size totaling a thickness of 50 cm. The exact details of the slab thickness and their quantities shall be obtained from the user

			department. Different slabs (of 2 cm thickness) with appropriate cavities to accommodate the two 0.6 cc ion chambers, parallel plate ion chamber should be provided additionally. Please note that these special slabs are in addition to the simple, solid slabs totaling a thickness of 50 cm. The phantom shall be of rigid type and should not show any kind of charge build-up effects. It shall not be affected by any change in ambient temperature and humidity. 1.1.9. For the all linear accelerator, permanent cabling between the control console of two linear accelerators and the interior wall of the treatment room for dosimetry measurements shall be provided and installed. The permanent cabling shall be for the complete RFA setup that can also be used for absolute dosimetry measurements with 0.6 cc ion chamber and parallel plate chamber. Complete description must be provided. <u>2. Reference Dosimetry System</u> 2.1. Radiation Field Analyzer (RFA)/ Water Scanning System 2.1.1 A 50 cm X 50 cm X 50 cm water phantom with water drain kit, as well as motorized system with remote control must be provided. State the scanable dimensions of the water phantom. The positional resolution of the movement shall be 0.1 mm or better. Radiation hardened probe holders for all detectors must be provided with the system. The Servo system shall be supported from all sides and has position feedback mechanism for long term reliability.

			2.1.2 Appropriate semi-conductor photon detector, semi-conductor electron detector, small volume ion-chamber (0.125 cc approximately), reference detector shall be supplied. The ion chambers provided shall be completely water proof and totally immersible in water up to very large depths. Give details how the supplied detectors can be used to perform relative dosimetry for linacs' photon & electron beams. 2.1.3 Appropriate build-up caps shall be provided for the detectors provided to do in-air dosimetry for the photon energies of cobalt, 6 MV, 15 MV, and 18 MV. Provide complete details on this account. 2.14 The RFA computer system shall have Intel Xeon processors with at least 20 GB RAM, 500 GB hard disk space, 2 CD drives (out of which one shall be a DVD-Writer), at least 2 high speed USB ports, 21" TFT flat monitor, 4 GB storage capacity USB drive. A UPS system with 1 kVA capacity with 30 minutes backup time shall be supplied. A locally designed good quality mobile wooden rack (on strong wheels) for stacking the RFA control parts and computer shall be provided. 2.15 The RFA software shall have licenses for beam data conversion to the treatment planning systems. Besides these it shall also be possible to convert the curves / profiles into simple ASCII format and Excel format and transfer to other Windows applications.

			2.16 For the quality assurance and the clinical implementation of the various features of the linear accelerator, and for comprehensive QA of film dosimetry software along with a 16-bit advanced scanner shall be supplied. The scanner shall have excellent scanning qualities with long term stability and shall be from a reputed manufacturer who is in the field of radiotherapy film dosimetry. The scanner shall be able to handle an optical density range of 0 to 3.5 or better. Its geometric accuracy shall be better than 1% or 2 pixels in both the axes. <u>3. Periodic QA/Safety Devices and Software Systems/Tools</u> 3.1 A simple QA device (two numbers) that can measure accuracy of the gantry angle, collimator angle, couch angle, isocenter accuracy, optical-radiation field congruence, optical field readouts, etc shall be supplied. 3.2 Two sets of QA device that can perform daily QA like photon/electron energy checks; radiation field flatness, symmetry; output consistency, etc shall be provided. The detector instrument supplied shall get connected to a laptop (high resolution, high-end, 10 GB RAM, wide screen, at least 500 GB or more hard disk, DVD writer, Bluetooth technology, etc) that will be kept in the control console. One laptop must be provided with each such QA device. Permanent cabling must be laid between the control console area and the interior wall of the treatment room for two linac machines or alternately a reliable wireless connectivity can be provided. Appropriate software must be

			provided that can store analyze all the data, store them and report the data in a user friendly format. Provide comprehensive details on the systems offered. 3.3 The institute has multiple CT scanners. A QA phantom for treatment planning system shall be supplied that has different electron density inserts for calibrating CT numbers (Hounsfield units) against electron density and mass. Furnish complete description about the phantom. 3.4 Two calibrated digital thermometers, two digital barometers, two ion chamber based survey meters, two digital survey meter, one neutron survey meter shall be provided. All survey meters and the barometers shall have proper calibration certificates. **4. Dosimetry System for IMRT Pre-Treatment Patient-Specific Verification/QA** 4.1 IMRT Phantom 4.1.1 For performing QA of IMRT, a latest, state-of-the-art water equivalent phantom (one number) shall be supplied. It shall be possible to do exposure of multiple directions for high accuracy in IMRT verification. The phantom material shall be water / tissue equivalent. It shall have a universal design for both dose and dose distribution verification of patient-specific pre-treatment IMRT treatment plans. 4.1.2 It should be possible to easily adjust the phantom on the Linac couch and on CT scanners couch top. It shall be possible to do absolute dose verification with different ionization chamber types that are being offered.

			4.1.3 Appropriate markers shall be engraved on the surface of the phantom in different colors for its easy adjustment under the accelerator and in a CT scanner. Localizer plates for the use of the phantom in a CT scanner shall also be quoted. 4.2 IMRT QA Detector and Software System 4.2.1 For easy verification of IMRT fluences and doses, a separate fluence/dose verification device/equipment shall be supplied. The department requires one number of this device. All the necessary software shall be supplied. The device must be based on either ion chamber or diode array of detectors giving the highest resolution possible with the software. The active volume of the chamber/diode must be small. It must be possible to do both photon and electron measurements. Adequate amount of buildup materials of different thicknesses should be provided for measurements with different energy beams. It must be possible to do automatic temperature and pressure verification devices. Latest available technology should be quoted for the transferring of data from the detector array to the processing laptop computer. In addition to the cable based connection, cable less technology also to be quoted. Suppliers of both High Energy Linear Accelerator and Dosimetry Systems shall be responsible to co-ordinate with each other at site for their integration and their satisfactory installation and commissioning, training as hand-over.

	5.Mould Room, Patient Fixation and Immobilization Accessories **5.2 Shielding blocks and compensator filter device** 5.2.1 A computer controlled system for design and fabrication of shielding blocks, and tissue-compensating filters should be quoted. The system should mill (milling machine) or cut Styrofoam blocks by software controls. The data for shielding block cutting should be either manually acquired or using film digitizer or by means of direct interfacing with 3-D treatment planning systems. It should be possible to make both simple non-divergent and accurately divergent shielding blocks. It should be possible to view the shielding block contours on a computer monitor and produce a template printout for quality control, patient record, etc. 5.2.2 Using the CT images as the input, the system should be capable of designing a 3-D missing tissue compensator. The designing should be based on 3-D calculation using CT pixel values. It should be possible to transfer the data from the treatment planning system by either direct link or by floppy disk 5.2.3 Physical characteristics and performance specifications are as follows; a. Positioning accuracy: ± 0.5 mm b. Reproducibility: ± 0.5 mm c. Dimensions of foam blocks: From a minimum of 20 cm x 20 cm x 2 cm to a maximum of 45 cm x 45 cm x 10 cm or		**To delete** **Add/Change to:** The vendor shall provide 4 complete sets of Universal All in One Multipurpose Base Plate, upgradable to SBRT, SRS/SRT frameless, made of carbon fibre, having a total solution for adult and pediatric to treat all body sites viz. Head, Head & Neck, Breast, Thorax, Abdomen, Pelvic SBRT, SRS & SRT. Ct Markers – 300 nos.

	more d. Maximum cutting area within one block: 40 cm x 40 cm e. Cutting accuracy: Better than 0.5 mm f. Focus to tray distance: Adjustable g. Connectivity with a computer h. Computer: Latest system configuration i. Backlit Digitizer: Minimum active area should be 50 cm x 50 cm, with 2000 lines per inch resolution j. Plotter: Flatbed A3 plotter. Plotting on tray should also be possible.		
	6.6.2.Cadmium free Low melting point alloy for making customized shields: 300 Kg.		6.6.2.Cadmium free Low melting point alloy for making customized shields:**50 Kg.**
	6.6 Electronic Portal Imaging System 6.6.14 Vendor state and provide any value-added features such as IMRT portal dosimetry and verification system of EPID (it must be quoted as optional items separately).		To delete
	6.8 Water Bath System 6.8.1 One suitable water bath system with temperature control shall also be provided for preparing the thermoplastic mask for the patients.		**6.8 Water Bath System** 6.8.1 One suitable water bath system with **Digital** temperature control shall also be provided for preparing the thermoplastic mask for the patients. **Cost of Dosimetery System is Rs.2.00 crores approx. EMD will be Rs.4.0 lakhs.**
	<u>Low Energy Linear Accelerator</u>		
	Sealed tenders (sealed separately as the "Technical Bid & the Price Bid-in duplicate) are invited directly from the manufacturers/		Sealed tenders (sealed separately as the "Technical Bid & the Price Bid-in duplicate) are invited directly from the manufacturers/

	principles for the supply of a state-of the-art clinical Radiotherapy Linear Accelerator capable of producing 6MV single photon energy for the routine and specialized treatment techniques. Linear Accelerator must have the latest technology and should be fully computer controlled digital system. It should be capable of integrating with standard networking and PACS systems available in the market. The offered equipment should have the following technical features.		principles for the supply of a state-of the-art clinical Radiotherapy Linear Accelerator capable of producing 6MV single photon energy for the routine and specialized treatment techniques. Linear Accelerator must have the latest technology **viz. Amorphous (Si) based EPID, IMRT & Volumetric Modulated Arc Therapy (VIMAT) along with 5 or more electron energies** and should be fully computer controlled digital system. It should be capable of integrating with standard networking and PACS systems available in the market. **KVCBCT based IGRT (optional), price to be quoted separately.**
	2.2.1 The maximum dose rate for routine clinical applications shall equal at least 300 monitor units (MU)/min or more for a 10 x 10 cm field at the depth of maximum buildup at a TSD of 100 cm for both photon beam.		2.2.1 The maximum dose rate for routine clinical applications shall equal at least **500** monitor units (MU)/min or more for a 10 x 10 cm field at the depth of maximum buildup at a TSD of 100 cm for both photon beam.
	3.0 Electron Beam Characteristics		**3.0 Electron Beam Characteristics** **Deleted from Page 53 (under High Energy Linear Accelerator and added & modified to High Energy Linear Accelerator at Page No. 74, under 2.5 Beam Quality Index as under:** **3.1 Electron Beam Energies** Five clinically useful electron beam energies shall be provided. The lowest energy shall be 4 or 6 MeV and the highest energy shall be 15 MeV/16 MeV or above. Energy shall be specified as the most probable energy (E_p) of the electron energy spectrum at 100 cm from the accelerator exit window. **3.2 Dose Rate** The dose rate at the isocenter shall not be less than **600 MU/minute** for each

			electron energy. **3.3 Field Size** The electron beam size is defined by the inside dimensions of the electron beam applicators projected geometrically to a plane surface at 100 cm SSD. A range of field sizes from 4 x 4 cm to 25 x 25 cm is required. A method to obtain irregular field shapes shall be provided. 3.3.1 It shall be possible to visualize both the field defining light and the optical distance indicator with an electron applicator in place. **3.4 Beam Profile** 3.4.1 Field Flatness The maximum percent variation of the electron intensity at 100 cm SSD at D_{max} shall not exceed 5% (within the central 80% of the longitudinal and transverse axes relative to the central axis) for field sizes from 10 x 10 cm to 25 x 25 cm and for all the electron beam energies. 3.4.2 Beam Symmetry The maximum percent variation in the average electron intensity to the longitudinal and transverse halves of the electron field at D_{max} for a 10 x 10 and 25 x 25 cm field at 100 cm SSD shall not exceed $\pm$ 2% at gantry angles of 0, 90, 180 and 270 degrees. The average electron intensity is the average of the maximum and minimum points within the central 80% of the field for each of the axes. **3.5 X-ray Contamination** The x-ray contamination of the electron beam shall be less than 5% of the maximum dose for all energies specified previously.
	5.6 Electronic Portal Imaging System 5.6.1 The imager shall utilize amorphous silicon (a-Si) with higher resolution shall be		**5.6 Electronic Portal Imaging System** **6mV Low Energy Linear Accelerator having features and capability of amorphous silicon**

	provided.		**(a-Si) based high resolution EPID & VMAT/Rapid Arc Capability along with 5 or more electron energies should be quoted.**
	5.6.14 Vendor state and provide any value-added features such as IMRT portal dosimetry and verification system of EPID (it must be quoted as optional items separately).		To delete
	6. Optional Features (Price must be quoted separately) 6.2 It should be possible to upgrade to perform the intensity modulated Radiotherapy and image-guided radiotherapy treatment and all other necessary phantom and quality assurance tools should be provided.		**6. Optional Features (Price must be quoted separately)** **6.2 Deleted**
	8. Equipment Warranty and After-Sales Services 8.1 The vendor shall give mandatory on-site warranty for first five years from the date of commissioning of the entire Linac system (including for all locally supplied items including consumables like batteries of the UPS, printer cartridges etc) from the Principals, except for the wave-guide, beam-bending magnet assembly, electron gun, X-ray tube & RF system, which shall carry guarantee for 10 years. Pro-rata warranty is not acceptable.		**8. Equipment Warranty and After-Sales Services** 8.1 The vendor shall give mandatory on-site warranty for first five years from the date of commissioning of the entire Linac system (including for all locally supplied items including consumables like batteries of the UPS, printer cartridges etc) from the Principals, **including** for the wave-guide, beam-bending magnet assembly, electron gun, X-ray tube & RF system. Pro-rata warranty is not acceptable.
	10. Staff Training and Documentation 10.2 On-site application training should be provided for minimum four weeks for all staff members in the department.		**10. Staff Training and Documentation** 10.2 On-site application training should be provided for minimum **two** weeks for all staff members in the department.
	Turnkey for Site Preparation (ILBS Tender): For High Energy		**Turnkey for Site Preparation at LHMC : For High Energy and Low**

	and Low Energy Linear Accelerator		**Energy Linear Accelerator is as follows:** **<u>INSTALLATION:</u>** Installation of all these equipments/accessories shall be free of cost and should be completed in the specified time-frame manner. The vendor shall demonstrate all the acceptance and calibration tests, to the satisfaction of the user as well as of the Regulatory Authorities, as required for the safe use of the equipments. **<u>TURNKEY:</u>** Room, complete with all the civil/electrical/air-conditioning modification along with the accessories as required for safe *(including radiation dosimetry, calibration,beam quality assurance and radiation safety aspects)*, proper and smooth functioning of the equipment shall be the responsibility of the supplier, on turnkey basis from the state existing at the site at the time of finalizing the tender. Time frame for this work shall be specified and strictly adhered to, with penalty clause for delays in the work. The vendors shall inspect the site in detail before quoting for the turnkey job. All the materials and workmanship for the turnkey shall conform to the ISI/CPWD standards and shall be carried out under the overall supervision of the client. The vendor shall coordinate the shipment of the equipments with the pace of work at site. Scope of the turnkey shall consist of the following salient components: i) The rooms for the proposed LINAC (Low Energy as well as High Energy) along with other supporting systems viz. rooms for TPSs etc. shall

			be provided in raw, unfinished state to the vendor. The vendor shall complete the job, as per the AERB requirements, from 'as is where is' basis at the time of finalizing the tender. It shall be the responsibility of the vendor to facilitate LHMC for the necessary requirements for this purpose and obtain the AERB/BARC clearance for these rooms for installing/operating the proposed equipments in these rooms. ii) The vendor shall finish the rooms according to the international standards of aesthetics and functional requirements and matching with the existing décor at LHMC, as detailed below: *a)* Flooring of the rooms shall have first quality vitrified tiles of reputed firms in matching colour, in size of at least 900mmx900mm or any other similarly suitable substitute. The walls should have wall panelling and cupboards of suitably matching material with granite workbenches, to keep the accessories as required for patient treatment and equipment maintenance. Handrails should be provided in the maize corridor. *b)* False ceiling *(preferably with acoustic lining – without perforations)* in the equipment rooms consisting of removable 2'x2' panels of powder coated aluminium sheet panels. Electrical work including copper wiring, lighting, switches and fixtures, keeping in view the needs and ambience in the mentioned areas. Decorative wall panels (paintings) with light effect matching with the decor of the equipment should be

			provided. iii) PA *(patient call)* system from the console area to the patient waiting area and between the console area & the equipment room. iv) CCTV with cameras in the equipment room, the console and other area with additional monitors installed in the rooms of the HOD, Oncology, LHMC and Head Physicist. v) Internal telephone systems between various equipment rooms, doctors'/physicists' rooms and other services. vi) On-line UPS for the entire system with at least thirty minutes back up supply. In addition to this main UPS, additional UPS systems shall be supplied along with all other computer terminals/workstations/ accessories, wherever applicable. The batteries for the UPS systems shall be maintenance free and shall be looked after/replaced *(whenever required)* by the linear accelerator vendor throughout the warranty period of the main equipments. vii) All safety and warning gadgets like voltage stabilisers, fire fighting systems, smoke detectors, fire alarms, electrical safety devices, radiation alarms, glow signs, signages, air/fumes exhaust, waterproofing, waterlogging protection *etc*, as may be necessary for the safety of the equipment, patients and personnel handling the equipment shall be provided. viii) The vendor shall ensure the radiation safety aspect of the room, as per the AERB guidelines

			and shall get the necessary 'NOC' from AERB for operating the unit after installation. ix) Water-cooling system for the linear accelerator should be compact, effective and supplied from the country of origin of the main equipment. Local units shall not be accepted. x) Air-conditioning system and ducts for energy and temperature requirements shall be provided and installed and maintained by the vendor. xi) A closed-circuit color TV system with 3 TV monitors and 2 cameras each in the LINAC and TPSs rooms shall be supplied. **<u>TURN KEY FOR SITE PREPARATION</u>** The prospective bidders for the main equipment shall inspect the site before submission of tender and give the certificate to the effect that the site is suitable for the installation of the installation of equipment to be procured for Radiotherapy. Linac room, Chiller room, Server Room, CT Simulator room and the whole radiation area. <u>1. CIVIL WORK :</u> 1.1 The civil work need to be undertaken in a skeleton structure built by hospital contractor after AERB certification and approval. 1.2 Flooring – High density Vitrified tiles only in all the areas. 1.3 Walls – High density vitrified tiles only all the

			walls up to false ceiling in all the areas. 1.4 All the doors should be aluminium glazed door of thickness 10 gauge with 20 micron anodizing and with 5.5 thick wired glass / 12mm thick pre-laminated board wherever specified. 1.5 All the door should be provided with Hydraulic type door closures. 1.6 All the doors should be provided with mortise locks of GODREJ/LINK/Harrison make except that of the main doors, which should be provided with link locks. 1.7 False ceiling – Powder quoted Armstrong Metallic. <u>2. PLUMBING WORK</u> Plumbing work has to be carried out as per the requirement. The waste pipes and accessories should be of centrifugally cost iron and the connection of existing main hole in the public shafts shall be done. All water pits and fitting shall be galvanized iron of Tata make. The gratings shall be brass chrome plates. <u>3. ELECTRICAL WORK</u> The firms shall be required to specify the total load requirement for the entire equipment the air-conditioning units, room lighting and for the accessories, if an. The institute up to the distribution panel will provide the load. The distribution panel should give switchgear of SIEMENS/ l & T makes and shall be provided by

			the vendor. The electrical work will include wring, lighting and main switch fittings. Special roof light will be required particularly in the machine room which should have long life and should not be affected by frequent to on the off. THE ELECTRICAL WORK SHALL INCLUDE THE FOLLOWING: 3.1 Wring the wire shall be of copper of different capacity as per the load and should be renowned make like: FINOLEX, BATRA, HENELEY, HAVELUS. 3.2 SWITCHES, Light and power point should be modular type of MK, North West ACHORE (Roma) / CCIPSL/SSK brands. 3.3 General Lights: Mirror optic type 1x40 w or 2x40 w PHILIPS/CROMPTON/KESSELECSCHREDER/ WIPRA/BAJAJ Brands. 3.4 The underground cables: supplying the electricity load should be of CCI/FORT GLOSTER, HAVELLS and ECKO Brands. 3.5 MCBs/ACBs/MCCBs should be MBS/SIEMENS/GE/ABB. 3.6 Roof light ; CFL down lighters of PHILIPS/OSRAM/WIPRO. 3.7 Main switchgears, fuse units should be L &T / SIEMENS/ GE. 3.8 Telephone cables should be of FINOLEX,

			HAVELLS & ECKO Brands. 3.9 Electrical load of the linear accelerator machine to be added as per the tender / brand of the equipment. 3.10 Main Electrical panel should be supplied. 3.11 Appropriate cable from substation to main panel is also to be provided. <u>4. AIR CONDITIONING</u> Whole area needed to be air-conditioned. Use of fresh air system and no recycling system. Head exchanger to save energy will be preferred. Six air changes per hour are required, as per the size of the area and circulation efficiency. Ventilation of remove air dissipated from the room as per requirement. 4.1 Environmental Specification Humidity range: 40% to 80% relative humidity, non – condensing. Temperature Ranges 19 deg. C to 27 deg. C through the year. Detail for the ducting diffuser, grills etc to be supplied by Engg. Deptt. 4.2 Provide ventilation sufficient for removal of equipment air heal load as per requirement of the accelerator. 4.3 Provide ventilation sufficient for removal of equipment air heat load as per requirement of the accelerator. 4.4 Air-conditioning load : Air conditioning load

			for the new liner accelerator area shall be 30 TR. To provide HVAC system 4x TR of air cool package units are to provided (3 nos. working & 1 no stand by) of the following approved makes. (i) VOLTAS (ii) BLUSTAR (iii) ETA (iv) CARRIER However, the halting load calculation and maintenance temperature and humidity shall be the responsibility of the agency and offered as option. 4.5 Double earthling with copper plate is to provide separately for the air conditioning equipment as per (S) specifications in addition to the double earthling of the medical equipment <u>5. FIRE PROTECTION</u> The fire protection is to be integrated as per the requirement heat deflector / Hooters/ Photoelectric smoke deflector shall be provided as per the requirements of IS/BIS code. The ionization detector should not be used. The fire alarm panel shall be linked the main panel of the institute. <u>6. ELECTRIC PROTECTION OF THE INSTALLATION:</u> The use of earth leakage circuit breaker will be required. Emergency switches interlock devices and warning lights have to be integrated into the planning.

			7. EMERGENCY LIGHT Provide a battery backup emergency lights both in machine room and console control area. 7. FURNITURE: 7.1 Control console and computer plate forms should include: -Key board drawer – 3nos. -Self or base for computer table – 6nos. -Wall side board in machine rooms: a). For Block storage, wedges storage, applicators storage and compensators storage – 6nos. b).For storage of patient position accessories and mask etc. – 4nos. 8. Time period and payment for turnkey: Turnkey work, installation & commissioning should be completed strictly as per the schedule. NOTE: 1. Irrespective of specification mentioned, it is the responsibility of the firm quoting for STATE-OF-THE-ART EQUIPMENT to physically inspect in detail, the pending job to be done at the site where above systems are to be Installed as per regulatory guide lines. It is also the responsibility of the same vendor, to avoid duplication of work as the construction of the bunkers have already reached near completion. 2. In case the successful bidder proposes to use material other than specified brand then approval

			of the client is mandatory. 3. It shall be the sole responsibility of the bidder to interact with LHMC, New Delhi for optimal utilization of resources without any duplicacy of work.
	<u>High Dose Rate Brachytherapy</u>		
	5. Applicators for HDR Unit 5.2 Gynecological applicator – 6 sets 5.3 CT / MRI compatible gynecological applicators – 2 sets	**<u>M/s. Varian Medical System</u>** **5. Applicators for HDR Unit** 5.2 Gynecological Fletchers applicator – 6 sets 5.3 CT / MRI compatible gynecological Fletchers applicators – 2 sets	**<u>M/s. Varian Medical System</u>** **5. Applicators for HDR Unit** 5.2 Gynecological **Fletchers** applicator – 6 sets 5.3 CT / MRI compatible gynecological **Fletchers** applicators – 2 sets
	1. Brachytherapy Treatment Unit: 1.3 The system should have minimum 20 channels or more for all types of brachytherapy treatments.		**1. Brachytherapy Treatment Unit:** 1.3 The system should have minimum **18** channels or more for all types of brachytherapy treatments.
	7. Equipment Warranty and Service: 7.4 Source: (i) If Ir -192 sources is offered in that case minimum 30 sources should be supplied in 10 years.		**7. Equipment Warranty and Service:** 7.4 Source: (i) If Ir -192 sources is offered in that case minimum **20** sources should be supplied in 10 years.
	<u>CT Simulator</u>		
	The CT simulator should be of spiral multislice, large-bore 64 slices per rotation model.		The CT simulator should be of spiral multislice, large-bore **16** slices per rotation model.
	CT Simulator system 1.1 The system should be of latest slip-ring technology allowing acquisition of 64 slices per rotation with true isotropic volume acquisition and sub millimeter resolution of an at least 0.4mm.		**CT Simulator system** 1.1 The system should be of latest slip-ring technology allowing acquisition of **16** slices per rotation with true isotropic volume acquisition and sub millimeter resolution of 0.4mm **or more**.
	3.X-ray Tube		**3.X-ray Tube**

	3.4 The x-ray tube should have anode heat storage capacity of 5 MHU or more.		3.4 The x-ray tube should have anode heat storage capacity of 5 MHU or more.
	11.CT Control Console 11.1 It should have 20" or more TFT flat screen LCD colour monitor for display of 1024 x 1024 matrix or more.		**11.CT Control Console** 11.1 It should have 19" or more TFT flat screen LCD colour monitor for display of 1024 x 1024 matrix or more.
	11.5 At least one high resolution medical grade laser color printer with latest model should be provided.		11.5 At least one imported high resolution 1200 dpi or more (Canon/HP/Epson/ Techtronix) laser color printer with latest model should be provided.
	12. Laser System 12.1 The CT Simulator laser systems should have at least four computer controlled moving lasers for marking the osicentric without the table top.		**12. Laser System** 12.1 The CT Simulator laser systems should have at least **three** computer controlled moving lasers for marking the osicentric without the table top.
	13.CT-Simulation/Virtual Simulation System 13.7 Three CT simulation workstation must be provided in addition to the CT workstation.		**13.CT-Simulation/Virtual Simulation System** 13.7 **Two** CT simulation workstation must be provided in addition to the CT workstation.
	20. Equipment Warranty and Service Facilities 20.3 98% uptime warranty/guarantee during warranty and CMC period.		**20. Equipment Warranty and Service Facilities** 20.3 **95%** uptime warranty/guarantee during warranty and CMC period.
			<u>Scope of work for turnkey CT Simulator-</u> The supplier should inspect the proposed site and submit all the detailed structural and architectural drawings and BOQ for the proposed CT Scan Centres along with technical bid of the tender. The CT SCAN CENTRE shall consist of the following rooms: a. CT Gantry Room b. Console room

			c. Equipment room d. Patient preparation room e. Reporting room f. Patient waiting area g. Radiologist room The actual area of turnkey works done will be considered for payment, based on the site measurements. **Civil work** a) Civil construction work including construction of brick wall if any, plastering, flooring as per the approved plan and equipment layout plan. b) Concrete bed at CT equipment area. c) Platform for unloading and shifting the CT should be provided if necessary. d) Cable tray, trench & channel – necessary trenches, cable tray and channels at required location would be provided. e) All the construction work to be done as per the final plan approved by the Consignee. f) Active and passive room shielding for magnetic, fringe field should be provided as per the requirement of the equipment. **a) Flooring** 1. 600 x 600 mm vitrified tiles with 100mm tile skirting to match in console room, lobby and patient preparation areas, Radiologist room etc. 2. 50 mm thick cement concrete flooring with Vinyl flooring in CT equipment / UPS room. **b) Painting** 1. Two coats Plastic Emulsion Paint over 2 coats of wall putty including primer in patient preparation area, Lobby area, console room, CT

			Gantry & Equipment room etc. **c) False Ceiling** 1. Acoustical tile for ceiling with light weight insulating material of high quality supported on grid or finished seamless with support above ceiling. Finished with white paint or powder coated with white paint, if metallic.Ceiling height to suit the equipment mount and clearances. **Plumbing work** 1. All water pipes and fittings shall be of high density polythene of approved and standard make. The gratings shall be brass chrome plated. All plumbing accessories should be of standard make. 2. Hot water service to be provided if required. **Electrical work** 1. The supplier shall be required to specify the total load requirements for the CT scan centre including the load of air conditioning , room lighting and for the accessories if any. The supply line will be provided by the Institute up to one point within the CT Scancentre area. The distribution panel shall be provided by the vendor. Few lights in each room shall be connected to the UPS to provide emergency lighting. 2. The electrical work shall include the following: a. Wiring – All interior electrical wiring- with main distribution panel board, necessary MCBs, DB, joint box, switch box etc. the wires shall be of copper of different capacity as per the load and should be renowned make as listed below. b. Switches light and power points should be of modular type and of standard make as listed below.

			c. General lights – Mirror optical type 1X28 W or 2X28 W/CFL fittings 2X36, 3X36 W with electronic ballasts **2.AIR CONDITIONING:** Ductable package air conditioners and split AC units may be used according to room requirement and suitability. Humidity control should be effective to eliminate moisture condensation on equipment surface. The Air conditioning should be designed with standby provision to function 24 hours a day. The outdoor units of AC should have grill coverings to prevent theft and damage. Ventilation is required in toilet. **2. Environment specifications:** a) a) Humidity range: Relative humidity 60% and 80% in all areas except equipment room which shall be as per requirement of the equipment. b) b) Temperature ranges: 22± 2° C in all areas except equipment room which shall be as per requirement of the equipment. c) Air conditioning load: The heat load calculations and maintaining the desired temperature and humidity shall be the responsibility of the bidder. **Furniture:** a) Revolving chairs height adjustable, medium-back with hand-rest in the Control room, Radiologist room and viewing area. – 4 NO.S b) Chairs for patient waiting area – Three seater (chrome plated). - 10 NO.S c) Cupboard with laminate door shutters for

			storage of spare parts and accessories and records as per requirement. – 3 NO.S d) Drug trolleys 1 numbers for patient preparation area. e) Patient trolley with rubber foam mattress to be kept in the patient preparation room. f) Name boards for all rooms g) Tables for Workstation and Radiologist in reporting room.- 2 NO.S h) Changing rooms should have change lockers and dressing table. i) Dustbins (plastic with lid) to be provided as required. j) Any other furniture item as per requirement. All furniture items should be of standard make as mentioned in the table below. **Miscellaneous:** 1. Reporting room should have LED X-ray Film viewer with adjustable brightness ; capable of holding 3 films of 14”x17” size. – 2 no.s 2. Cabling of Network (LAN) connectivity for camera system, console system, workstation and computers etc. 3. Broadband connection: for REMOTE SERVICE of CT system. 4. Fire extinguisher Dry CO2 type as required for the building safety.
			Items & Makes Flooring-Vitrified Tiles- Somany, Kajaria, H&R Johnson, RAK India Electrical- Cables-Finolex, Havells, V-Guard Switches-Legrand, L&T, Crabtree, Roma Distribution Box, MCB-Legrand, L&T, Siemens, Havels

			Light Switches-Philips, Crompton, Wipro, Kesselec-Schreder Air-conditioning-Daikin, Hitachi, Blue Star, Voltas Furniture-Herman Miler, Godrej, Featherlite
			Accessories a). Multi size Dry Laser Imager of any reputed make with 600 dpi or more. b). Color Laser Printer. c). Lead Glass of recommended size & thickness d). UPS with half an hour back-up of suitable capacity to handle CT Scanner System. e). Laser Color Printer. f). Dual Head Pressure Injector of reputed make with 100 no. syringes & tubings. g). Suitable ECG Monitor.
	Commercial Amendments		
	Part II: Required Delivery Schedule: **a) For Indigenous goods or for imported goods if supplied from India:** 90 days from date of Notification of Award except, CT 64 Slice, MRI Unit and CT Simulator for which the delivery period will be 180 days, to delivery at consignee site. The date of delivery will be the date of delivery at consignee site (Tenderers may quote earliest delivery period). **b) For Imported goods directly from foreign:** 90 days from the date of opening of L/C except CT 64 Slice, MRI Unit and CT Simulator for which the delivery period will be 180 days. The date of delivery will be the		**Part II: Required Delivery Schedule:** **a) For Indigenous goods or for imported goods if supplied from India:** 120 days for delivery period at consignee site from date of Notification of Award. The date of delivery will be the date of delivery at consignee site. 60 days thereafter for testing, installation and commissioning. (Tenderers may quote earliest delivery period). **b) For Imported goods directly from foreign:** 120 days for delivery period at consignee site from date of Letter of Credit (LC). The date of delivery will be the date of delivery at consignee site. 60 days thereafter for testing, installation and commissioning. (Tenderers may quote earliest delivery period)..

	date of Bill of Lading/Airway bill. (Tenderers may quote the earliest delivery period).		
	TECHNICAL SPECIFICATIONS GENERAL TECHNICAL SPECIFICATIONS GENERAL POINTS: 1. Warranty: b) 98% up time Warranty of complete equipment with extension of Warranty period by double the downtime period on 24 (hrs) X 7 (days) X 365 (days) basis.		TECHNICAL SPECIFICATIONS GENERAL TECHNICAL SPECIFICATIONS GENERAL POINTS: 1. Warranty: b) **95%** up time Warranty of complete equipment with extension of Warranty period by double the downtime period on 24 (hrs) X 7 (days) X 365 (days) basis.
	4. Annual Comprehensive Maintenance Contract (CMC) of subject equipment with Turnkey: e) There will be 98% uptime warranty during CMC period on 24 (hrs) X 7 (days) X 365 (days) basis, with penalty, to extend CMC period by double the downtime period.		4. Annual Comprehensive Maintenance Contract (CMC) of subject equipment with Turnkey: e) There will be **95%** uptime warranty during CMC period on 24 (hrs) X 7 (days) X 365 (days) basis, with penalty, to extend CMC period by double the downtime period.
			Tender Fee of Rs.5000/- is one time fee. Bidder can quote for any or all equipment on submission of Tender Fee.
			Bidders to submit Technical Bid Off-line only. The Technical Bid shall comprise of: A). Technical Compliance w.r.t. Tendered Specifications B). Technical Offer having technical description of all items & accessories with their Models AND Makes. C). Technical Data Sheet, Catalogues, Brochures, Valid Quality Certificates, valid AERB Type Approvals/NOC. D) Bidders must ensure that Price Bid is

			uploaded separately from their Techno-commercial Bids so that only Techno-commercial bids are opened first.
	The bidders who can provide the Radiotherapy Equipment meeting the tender conditions, tender specifications requirements including Amendments considering the estimated cost mentioned are eligible to participate. The representation of M/s. Accuray was examined by the Committee and was found that they were not fulfilling the tender requirements.		

Scope of Turn Key Activities for HDR Brachytherapy Unit at LHMC:

S#	Description of the Item or Work - INTERIOR WORKS	Qty	Unit
A	**EARTH, BRICK/ CONCRETE WORKS**		
1	Dismantling or cleaning Work from the existing site	1	L/S
2	Carting away the debries from site as per local municipal laws	4	Cum
B	**METAL DOORS & WINDOWS**		
1	Providing & fixing Powder Coated aluminum work for doors, windows ventilators and partitions with extruded built up standard tubular sections of approved make conforming to IS:733 and IS:1285, powder coated fixed with rawl plugs and screws & screws or with fixing clips, or with expansion hold fastners I/c necessary filling up of gaps at junction, at top, bottom and sides with required PVC/neoprene felt etc. Aluminium section shall be smooth, rust free, straight, mitred and jointed mechanically wherever required I/c cleat angle, Aluminium snapbeading for glazing/panelling, C.P. brass / SS screws, all complete as per drawings and the directions of the Engineer-in-charge (Guage - 14).		
a)	For Glazed Doors I/c same colour powder coated frame, bolts, tower bolts, C - type handles, door closer, stopper, locks etc. Beeding with gaskets, dust barrier, 12 mm Prelaminate board for lower panel of approved shade complete as approved by the architect.	6	No.s
2	Providing and Fixing SS Design Signages size (12"x4") for Room Names	4	No.
3	Providing and Fixing Backlit Signage for HDR Room (size: 4'-0" x 1'-3") words in acrylic and board finished acp sheet of approved shade.	1	No.
N	All aluminum doors and windows except toilet windows are to be installed with plain float glass. All these glasses will be fixed with sunfilm of approved shade. The rates are quoted accordingly.		
C	**WALLS FINISHING WORKS**		

1	Providing & applying 15mm thick wall plaster in CM 1:6 (1 cement : 6 sand using 25% coarse sand and 75% fine sand) at all heights and levels including scaffolding, curing etc. complete.	50	Sqm.
2	POP punning over new plastered surface 10-12 mm thikness & Plastic Acrylic Emulsion completed in all respect.	50	Sqm
3	Providing and fixing 300x450 mm thick ceramic tiles on walls; of approved shade confirming to IS light shades laid on 20mm th. Cement mortar 1:4 (1 cement :4 coarse sand) including grouting the joints with white cement & matching pigments etc I/c 100mm high skirting. (Basic cost: 60/- per sq.ft.+taxes)	50	Sqm.
D	**FLOORING WORKS**		
1	Providing and fixing 600x600 mm Vitrified tile floor & skirting of approved shade confirming to IS light shades laid on 20mm th. Cement mortar 1:4 (1 cement :4 coarse sand) including grouting the joints with white cement & matching pigments etc I/c 100mm high skirting. (Basic cost: 80/- per sq.ft.+taxes)	50	Sqm.
E	**FALSE CEILING WORKS**		
1	Providing and fixing Mineral Panel Tiles (600x600 mm) including recommended suspension system with 4 mm dia. GI suspender @ 1.8m c/c fixed to ceiling with all trims, angles, recessed edge profile (20 x 20 mm) screwed to panel and plastered wall surface, Al. panel carrier @ 1600 c/c making opening for light fittings A.C. diffusers etc. wherever required all complete as / manufacturer's printed instructions and as shown in drawing,specified and directed.	40	Sqm
2	Providing and fixing Gyp-board false ceiling for making homegenic borders to support meta panel false ceiling at desired height with intermediate channels, main runners and perifery channels with hangers @ 1200mm c/c max. including joint filler, joint tape, 25mm drywell screws etc. all complete.	10	Sqm.
3	Providing and fixing Trap doors in false ceiling for AC units.	1	No.s
S#	**Description of the Item or Work - ELECTRICAL WORKS**	**Qty**	**Unit**
A	**L.T. PANEL & DISTRIBUTION BOARDS**		
1	DISTRIBUTION BOARDS:- 8 way TPN Distribution board with 63Amp MCB Supply & Fixing of following sizes of double door /recess type metal clad triple pole and neutral distribution board with MCBs of 6 to 32 Amp per way complete with incoming MCB conforming with relevant specs & drawing.	1	No.

B	**SUB MAIN & POINT WIRING**		
1	Wiring for circuit with 3x10.0+1x6.0sq.mm. insulated stranded copper conductor wires in recessed/surface MS conduit with earth wire complete as required.	25	Mt.
2	Wiring for circuit with 3x6.0+1x4.0sq.mm. insulated stranded copper conductor wires in recessed/surface MS conduit with earth wire complete as required.	20	Mt.
3	Wiring for circuit with 3x4.0+1x2.5sq.mm. insulated stranded copper conductor wires in recessed/surface MS conduit with earth wire complete as required.	60	Mt.
4	Wiring for light points with 1.5 sqmm. PVC insulated stranded copper conductor wires in recessed/surface MS conduit complete with circuit wiring, earth wire etc. complete as required.		
i)	One light controlled by 1 point	5	Nos.
ii)	Two lights contld by 1 point	4	Nos.
iii)	One light contld by 1 dimmer	1	Nos.
iv)	One switch socket plate of 5Amp	4	Nos.
5	Wiring for 5/15Amp plug point with 2.5 & 4.0 sqmm. PVC insulated wires in recessed/surface MS conduit from DB complete with earth wire etc. as required.	15	Nos.
6	Raceway for laying the cales in the examination room	50	RM
7	Supply and fixing in position RJ - 11 / 45 Telephone / LAN points i/c wall recessed GI box for Phone / LAN of approved make.	2	No.
8	Wiring for RJ - 11 / 45 (CAT-6) Telephone / LAN points completed in all respect.	100	Mt.
N	2. In case of light points max. of 6 nos. of light points and in case of power points max. of 2 no. power points shall be taken on one circuit.		
D	**LIGHT AND ELECTRICAL FIXTURES**		
1	Supply and installation of indoor decorative recess type mirror optics fluorescent light fixture size (600x600mm) with philips catalouge no:- FBS 450/236 M2 FA HPF 2 x PL-L 36W all necessary accessories complete in all respect of approved make.	8	No.
2	Supply and installation of decorative type wall bracket light fixture with clear glass complete of approved make. - FMS 200/111 1x PL-S 9W / 11W OR FMS 600/136 1 x PL-L 36W all necessary accessories complete in all respect of approved make.	2	No.

3	Supply and installation of Round (dia 200mm) recess type down light fixture in white colour finish complete with holder, lamp etc. complete of philips make. - FBS 085/218 RG-FR 2 x PL-C 18 W all necessary accessories complete in all respect.	4	No.
E	**EARTHING & CCTV WORKS**		
1	CCTV system for the HDR Rooms monitoring.	1	No.
2	Providing and making chemical Earthing pits using chemical earth enhancing compound of approved make / Kit with Chemical rod complete with 6 sq. mm. cable terminated terminated in Electrical room.	2	Set
A	**FURNITURE WORKS**		
1	Workstation Tables for Console	1	Each
2	Chairs with Armrest on costers	2	Each
3	Wall Mount Storage Cupboard (4'x2'x1.5')	2	No.
4	Cup-Boards - Wooden (For Storage)	1	Each

Supply and installation of Ductable split units (Ceiling Suspended type) with stablizer total insulation, supply return air grills, diffusers collar, damper, fire damper, ms base frame for ODU's with complete circuit wiring and Completed in all respect.

Format For Radiotherapy Equipment Quoted – To provide the following details in Price Bid

S. No.	List of Consumables Recommended/Necessary	Unit Rates (valid for 5 years after 5 years warranty period) – (INR)
1		
2		
3		

Bidders shall be entirely responsible for complete installation, testing & commissioning of the equipment, in case any items are not mentioned inadvertently in the Bid Document including Amendments.

Rest all remains unchanged as per the Bid Document.

Director,
LHMC, New Delhi