**13.07.2022**

## Amendment No. 1

**Sub: Technical Amendment to the referred tender enquiry**

**Ref.: HITES/PCD/AIIMS-IV/55/Radiology/22-23 dated 12-07-2022**

The following changes are being incorporated in the above referred Tender Enquiry Document.

### SECTION VII

### Technical Specification

### Item No 4 MRI 3.0 T (2022_HLL_121185_4)

**Technical Specification for MRI 3.0 T Read as:**

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| | Whole body 3.0 Tesla Magnetic Resonance Imaging system optimized for higher performance in cardiac and neurological examinations with short superconducting magnet, high performance gradients and digital Radio frequency system. The system should have 32 channels RF system. The system should be totally new and should not contain refurbished or having recycled items. Silent scanning (noise level <80dB) to be enabled as standard | | |
| | Added Para :<br>The model should be the latest and launched in or after **2017.**<br>**The undertaking should be submitted from the manufacturer for the same.** | | |
| **1** | **MAGNET** | | |
| a | 3.0T active shielded super conductive magnet with best homogeneity. Field stability over time should be < or equal to 0.2 ppm/hr | | |
| b | Length should be short with at least 70cm bore diameter. | | |
| c | It should have facilities of better illumination ventilation and designed to avoid patient claustrophobia. | | |
| d | The homogeneity of the magnet should be mentioned in relation to 10, 20, 30, 40 cm DSV. Automatic shimming in phantom should be better than 3.5ppm in 40 DSV. | | |
| e | Please specify upto what FOV gradient linearity is maintained. | | |
| f | Magnet should be shielded from external interferences. Smaller fringe field preferred 5 Gauss and 10 Gauss Line in X, Y, Z axis specify yours Quote value for 5 gauss and 10 gauss line. The 5 Gauss line will have to be marked. | | |
| g | Cryogen vessel to be of Helium only with appropriate super thermal shielding and refrigeration facility for minimum Helium boil-off, Specify the Helium tank capacity and boil-off rate. | | |
| h | Helium level monitoring equipment in the magnet and facility for appropriate quick shutdown of the magnet in the event of emergency | | |
| i | Helium refill time should not be not less than 2years. Please mention the helium refill time. | | |
| j | Noise level inside the examination room should be minimum as possible. Specify db level | | |
| k | The vendor should quote model with physiological signal display on gantry if available | | |
| l | Built - in 2 way Intercom facility to communicate with patient is required | | |
| m | Emergency helium release button should be provided at least in two places [inside MR examination room and console room] | | |
| **2** | **Shim system** | | |
| a | High performance and highly stable shim system with global and localized manual and auto-shimming for high homogeneity magnetic field for imaging. Specify time for shimming. Quote the number of shim | | |

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| | coil used | | |
| b | Off-centre shimming should be possible.<br>**Added Para : System must have Second order/high order shimmming.** | | |
| c | Auto shim (global and voxel shim) should take minimum time to shim the magnet with patient in position. | | |
| **3** | **Gradient system** | | |
| a | Activity shielded Gradient System with strength of at least 44 mT/m at slew rate of 200T/m/sec to be achieved simultaneously for the same FOV & preferably low linearity. **The rise time should not be more than 225 micro second** to reach the maximum gradient strength | | |
| b | These true slew rates should be available in each axis independently, for overall better duty cycle performance of the gradient. | | |
| c | The duty cycle should be 100 percent. | | |
| d | The Gradient system should have provision for eddy current compensation. Mention level of Eddy current compensation in % | | |
| e | Field of View should be at least 45 cm in all three axes. | | |
| f | Minimum TE & TR in 2D/3D should be specified in relation to the sequences. | | |
| g | Minimum Slice Thickness in 2D & 3D should be specified in relation to the sequences. | | |
| h | Echo Train length in both Spin echo and Gradient Echo should be at least 255 or more. | | |
| i | The measurement matrix should be from 128x128 to 1024x1024 in both 2D and 3D imaging as well. | | |
| j | **Added Para:**<br>**System must have facility to upgrade the Gradient in Future. (OPTIONAL).** | | |
| **4** | **RF system** | | |
| a | A fully digital RF system capable of transmitting power of at least **30 KW or more**, Dual RF power amplifiers. System should be capable of Multi Transmit with Multi amplifier driving / True shape for better B1 homogeneity | | |
| b | It should also have at least minimum of 32 independent ADC **or channel independent hardware RF channels** with each having bandwidth of 1MHz or more along with necessary hardware to support Quadrature/CP array coils. | | |
| c | It should support Parallel acquisition techniques like ASSET/SENSE/iPAT with a factor of **at least 9.** | | |
| d | **Deleted** | | |
| **5** | **RF Coils** | | |
| | The system body Coil integrated to the magnet must be quadrature /CP. In addition to this coil, following Coils (preferably be with equal number of elements as the channels) be quoted. RF coils in addition to main body coil (Transmit / Receive or receive coils) auto tune, array or no tune coils. Coils for the following applications should be available with the system. Circular polarized (CP) Array coils should included in the offer. Coil / RF design should support compatibility to coils manufactured by other manufacturers. Please specify the measures taken to prevent dielectric artifacts. (Quadrature design & EPI compatible) in addition to main body coil. All array coils should be compatible with parallel imaging techniques. Please specify the number of channels and elements available for each coil. Please mention the true acceleration factor for each of the array coils. | | |
| a | 32 channels or more head coil-capable of multi frequency MR spectroscopy (1H). | | |
| b | **Deleted** | | |
| c | Neurovascular coil of 16 channels or more | | |
| d | Spine phased array coil **for 32 channel or more acquisition with single or combination of coils. (If more than one coil offered against this point, the offered coils will not be considered against any other applications)** | | |
| e | Body phased array coils 32 channels of more (single or in combination) at least 45 cm z-axis coverage for imaging of abdomen, with at least 32 channels acquisition for body parts. | | |

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| f | Dedicated coil/coil combination for peripheral angiography of 32 or more channel with coverage of 80cm or more. Dedicated coil if available with vendor should be quoted. If not available, original product datasheet and an undertaking from OEM should be submitted | | |
| g | Suitable Carotid coil . | | |
| h | Breast coil 16 channel or more . | | |
| i | Shoulder coil:<br>a. Dedicated Shoulder coil – **16 channel or more**- 1 No<br>b. flex coils – 2nos. (One large and one small) | | |
| j | High resolution knee coil **16 channels or more; Tx & Rx.** | | |
| k | High resolution foot/ ankle coil – **16 channels or more.** | | |
| l | Endocavitary Coil - Prostrate Study **(OPTIONAL)** | | |
| **5.a** | The supplier should quote coils or their combinations exclusively for each application. The number of coils should be as per the BOQ . It should be mentioned as independent coils and not having overlapping applications. | | |
| **5.b** | **Added Para :**<br>**The bidder should provide line wise break-up for offered number and name/model of the coil against each coil specified in the technical specification & BOQ.** | | |
| **6** | **Patient Table** | | |
| a | The table should be fully motorized, MRI Compatible computer controlled table movement in vertical and horizontal directions Position accuracy should be +/- 1.0 mm or better. | | |
| b | Should be able to take at least 140 kg load. | | |
| c | **The table should have facility for manual traction in case of emergency.** | | |
| d | Cushions and other patient comfort accessories. All parts of the table should be protected from liquid spill | | |
| e | The table should have patient hand-held alarm system. | | |
| f | The table should deliver the protocols for automatic bolus chasing in peripheral angio with automatic table movement. | | |
| **7** | **COMPUTER SYSTEM IMAGE PROCESSOR / OPERATOR CONSOLE** | | |
| a | Computer should be latest in the industry, fast and efficient | | |
| b | One colour console for acquisition, all calculations, post processing etc Console must have full colour with user define protocols with programmable inter scan delay. Necessary image processor with large RAM for ultra-fast image reconstruction should be provided It should be at least 8 GB RAM. | | |
| c | Computational Speed to match the single shot Echo Planar Imaging (EPI). Interactive angiogram, multi-planar three dimensional (3D) reconstruction, surface rendering, dynamic Imaging, vascular Imaging/angiography. Functional imaging, DTI etc.<br>The main host computer should have at least 18-inch or more TFT/LCD type colour monitor. | | |
| d | The main console should have **integrated** facility for music system for the patient in the magnet room **or dedicated music system should be supplied, if the main console does not have integrated facility for music system** | | |
| e | Filming and adequate storage for images and other applications . | | |
| f | Total hard disk memory to be sufficient to store at least 250,000 images of 256 x 256 matrix data size.. Systems offering higher' storage will be preferred. The system should have CD/DVD archiving facility on the main console and work station. | | |
| g | DVD write/CD Read/Rewrite drive for writing of images, spectra and raw data along with the necessary software for reading the Images and spectra on DVD/CD storing capabilities. Provision for archival of k-space data and raw (unprocessed) images. | | |
| h | There should be a provision of retrieval of the reconstruction data (raw files) in an user friendly manner. | | |
| i | DICOM interface to hook DICOM dry/laser camera capable of storing printing 1024 x 1024 matrix size | | |

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| | images at least in 16 format without loss of digital resolution. | | |
| j | The system should be capable to connect to PACS through RIS/HIS at no extra cost. Highest version of DICOM connectivity to be provided. | | |
| **8** | **Workstation** | | |
| 1 | One server with 2 node with concurrent licenses to be supplied with the system. Licenses: 2 nos Concurrent license here implies the capability to process all the loaded software to be accessible and usable on all the systems simultaneously without any processing delay. The software should also include a reputed antivirus software of a perpetual type or renewed by the supplier.<br><br>Hardware: Node: The vendor has to supply the hardware in the form of CPU and Medical grade monitor 18" or more of 2MP resolution. Hardware<br><br>Server: The server (single/dual configuration) should have image storage capacity of **at least 20 TB minimum 40,000 concurrent slice processing power and at least 128 GB RAM.** The server hardware to be included with 21" or more TFT/LCD monitor with dual processor. DICOM 3.0 compatibility and interfacing with other modalities must be possible. The workstation shall have the resolution, software and all functionality of a stand-alone workstation | | |
| 2 | All necessary software including post-processing software for all offered applications including evaluation for fMRI, perfusion (ASL, T1 perfusion and T2* perfusion), diffusion, DTI with fibre tracking, cardiac evaluation, and other associated post processing like MIP, MPR, surface reconstruction should be provided. | | |
| | The workstation should have the following features:<br>a. Cardiac perfusion analysis, quantitative T1 mapping, with colour metabolite mapping, quantification of the CSF flow data. | | |
| | b. Image Fusion software should be provided for Inter-modality and Intra-modality fusion. | | |
| | c. Software for vascular properties like IAUC, KEP as standard. | | |
| | d. DSA images should be viewable in Subtraction mode. | | |
| | e. Necessary and adequate hardware and software for sending and receiving the patient data {text + images}. Printing of films should be possible from both main console and workstation. | | |
| | f. Workstation should also be able to function independent of the main console.<br>Post processing of the MRS data including for CSI with paramagnetic metabolic mapping | | |
| | g. Capability to calculate colour display of real MTT, real CBV, and real CBF | | |
| | h. Compatibility with data from other MRI system for post processing. | | |
| | i. Output in the form of jpeg, avi / equivalent formats should be possible. | | |
| | **Cardiac Package: Two Licenses:** The workstation should have display of Cardiac cine images in movie mode with rapid avi creation and should have comprehensive cardiac post processing software including for coronary MRA with regular free upgrades in future. Calculation of ventricular area and volume, stroke volume, ejection fraction and relative ejection fraction, Time volume diagram generation, filling rates and myocardial wall motion, Graphic display of output calculation of flow and velocity parameter with colour coded display of velocity parameters. Diffusion tensor Imaging, 3D myocardial tagging should be possible. | | |
| | Cartilage mapping should be quoted as standard | | |
| | **Added Para :**<br>**Myocardial Mapping (T1 & T2, T2* Map) should be provided as standard.** | | |
| **9** | **Data Acquisition** | | |
| a | The system should be capable of 2D and 3D acquisitions in conventional, fast & ultra-fast spin echo and gradient echo modes so that real- time online images can be observed if needed. | | |
| b | 2D multi-slice imaging should be possible in all planes (axial, sagiltal, coronal, oblique arid double oblique). | | |

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| c | Minimum 512 x 512 matrix acquisition for all applications. | | |
| d | Half Fourier or other techniques to reduce scan acquisition time while maintaining adequate SNR | | |
| e | 3D volume, multiple contiguous slabs, multiple interleaved and multiple overlapping slabs | | |
| f | Slice thickness in 2D and partition in 3D to be freely selectable | | |
| g | Dynamic acquisition (serial imaging) with capability to initiate scan sequences either from the magnet panel or from the console. | | |
| h | Dynamic acquisition number of repeat scans with delay time either identical time interval or selectable. | | |
| i | Auto slices positioning from the localizer images. | | |
| j | Maximum -off centre positioning both anterior-posterior and lateral direction and should be selectable. | | |
| k | Gating: physiological signals like ECG, pulse, respiratory, external signal triggering (interface for triggering input pulse from external source). | | |
| l | Simultaneous acquisition, processing and display of image data in 2D multi-slice mode. | | |
| m | Selection of voxel from oblique slices should be possible while doing spectroscopy. | | |
| n | The application software for image smoothing and edge sharpness etc. for improvement in image resolution should be quoted. | | |
| o | Artifact reduction/motion correction techniques/imaging enhancement/image filtering/image subtraction/addition multiplication/division techniques: | | |
| p | Flow 1st and 2nd order flow artifact compensation. | | |
| q | Presentation slabs: a number of relocatable saturation bands to be placed either inside or outside the region of interest. | | |
| r | Magnetization transfer saturation: Off resonance RF pulses to suppress signals from stationary tissue in FOV phase contrast capability in 2D & 3D mode. | | |
| s | Breath Hold Acquisition for Cardiac and Abdominal Imaging must be possible. | | |
| t | Fat saturation techniques: frequency selective RF pulses to suppress fat signal in the measured image FO. ROI selective (regional) fat suppression should also be given. | | |
| u | Magnetization transfer saturation; OFF-resonance RF pulses to suppress signals from stationary issue in FOV. | | |
| v | Phase contrast capability in 2D and 3D mode. | | |
| w | Image intensity correction. | | |
| x | Breath hold acquisition | | |
| **10** | **EPI mode** | | |
| | a. Single and multi shot EPI imaging techniques. | | |
| | b. Data acquisition in all three standard planes (axial, sagittal coronal) and oblique and double oblique planes | | |
| | c. Multi-coil acquisition in order to optimize throughput increase and increased effective FOV. Individual acquisition of every coil should be mentioned. | | |
| | d. Higher matrix acquisition capability in single shot EPI, Acquisition time, TR TE and slice thickness should be clearly mentioned and supported by data sheet reference. | | |
| | e. BOLD, SWI, T2 Perfusion (with all post processing licences as standard) | | |
| | f. Complete Functional MRI of Brain package as standard.<br>**32" size or more LCD/LED based FMRI system should be provided.** | | |
| | **Deleted** | | |
| | g. Susceptibility-weighted Phase Imaging to differentiate calcification & haemorrhage. | | |
| **11** | **Imaging sequences** | | |
| | a. The system should be capable of selecting TR and TEs as per requirement in majority of the pulse sequences. | | |
| | b. Spin echo (SE); multi-slice single echo, multislice multi- echo(B echo or more) with minimum TR and TE.SE with symmetrical and asymmetrical echo intervals: MT-SE imaging sequence. Compress Sensing & Simultaneous Multislice Imaging should be available | | |

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| | c. Inversion recovery (IR) including short TI, modified IRSE, FLAIR, DIR (Double Inversion Recovery) MT and FLAIR. | | |
| | d. Gradient echo (GE) 3D gradient echo with shortest TR and TE, free choice of flip angle selection while maintaining SNR | | |
| | **Fast sequences** | | |
| | a. Fast spin echo in 2D and 3D mode TI, T2 and PD contrast capable of acquiring maximum number of slices with a given TR a minimum TE. echo train should be at least 128 or more in fast spin echo mode. | | |
| | b. Half Fourier acquisition capabilities should be available with/ without diffusion gradients and in combination with fast spin echo. | | |
| | c. Fast inversion recovery with spin echo. | | |
| | d. Fast gradient spin echo, IR multi-slice multi-echo mode with maximum turbo factor Sequences should incorporate RF focusing to acquire ultra fast gradient spin echo. | | |
| | e. Fast gradient echo sequence should be provided to acquire images in ultra-fast 2D and 3D mode. | | |
| | f. Fat and water suppressed imaging sequences including the sequence which should give 4 contrast (in phase, opposed phase. FAT and Water) images in a single acquisition to be quoted as standard. EPI optimized sequences for T1, T2, PD imaging. perfusion, regular diffusion values {5b, 3 directions), EPI-FLAIR. CPI-IR, IPI-FLAIR diffusion tensor. EP1-MT-FLAIR, tensor diffusion (5b values in minimum in six directions) for diffusion studies. Suitable artifact/fat suppression techniques to be incorporated in the sequence to have optimum image quality. There should be capability of generation of ADC map (isotropic and anisotropy from the regular diffusion and tensor data). Facility of online generation of ADC map should be there. Optimized sequence package for special applications. **Small focus DWI should be standard** | | |
| | g. MR angio; 2D/3D TOF, 2D/3D Phase contrast (with and without gating) magnetization transfer saturation, black blood angiography for cerebral, pulmonary, abdominal and peripheral vessel For peripheral angio moving table angiography should be offered so that complete limb can be examined in one go Bolus tracking software package should be offered. Sequences for breath hold angiography with contrast enchainment should also be offered. | | |
| | h. NON Contrast Angiography like Native, Inhance, Trance for whole body applications to be quoted as standard. | | |
| | i. Contrast bolus tracking (including single shot whole body MRA, interactive and automatic, etc. | | |
| | J1. The system should have the Hydrogen, Single Voxel spectroscopy, Multivoxel, multislice 2D, 3D Spectroscopy and also the Chemical shift imaging in 2D/3D. The complete processing / post-processing software including colour metabolite maps should be available.<br>J2. Full comprehensive cardiac sequences which includes, (a) MR cardiology package for evaluation of heart in long and short axis with black blood cardiac imaging, (b) package for-prospective and retrospective gating, etc. Advanced Cardiac Applications: morphology, wall motion, perfusion imaging myocardial viability imaging, Myocardial tagging, Cardiac functions including EF, ED/ES volume, Cardiac output, and wall thickness. This processing can be in workstation and console. | | |
| | k. Sequence package for diffusion study including DTI (tractography) in organs like brain, kidney, muscle, heart etc if available . Unavailable techniques to be provided as and when available without any additional cost. | | |
| | l. Perfusion study in organ systems like kidney, brain, heart etc. Evaluation package for calculating CBV, CBF, MTT, perfusion map etc. Post processing of perfusion should be available in console also. | | |
| | m. Sequences for MRI imaging of joints with Metal implants like WARP/Maverick should be offered | | |
| | p. Hardware and sequences post processing software for MR Elastography of abdomen. | | |

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| | q. Contrast Kinematics like TWIST / TRICKS / 4DTRAK should be offered. | | |
| | r. Image fusion should be offered | | |
| | s. Whole body imaging of 200 cm should be offered | | |
| | t. Programming environment under research agreement should be offered for creating and modifying pulse sequences and working on the system. | | |
| | u. Flow quantification in vessels and CSF, hepatobiliary system. | | |
| | v. MRI neurofunctional imaging sequence including BOLD/ Mosaic etc. | | |
| | w. Optimized breath hold sequences for abdominal studies including angiogram. | | |
| | x. Sequence package for functional mapping of brain. | | |
| | y. Internal ear imaging. 3D acquisitions like CUBE. SPACE, VISTA . | | |
| | aa. Susceptibility Weighted imaging should be provided as essential. | | |
| | bb. High SNR even in small FOV should be available. (Specify the details of the smallest FOV and the technique) | | |
| | cc. Non Contrast perfusion Imaging software like 2D/3D-ASL and its post processing should be offered. | | |
| | dd. MR Cholangiography and Pancreatogram: Both breath-hold and respiratory triggered - Specialized sequences and processing to perform MRCP. | | |
| | ee. Pulmonary 2D/3D MRA sequence, including single breath hold sequence. | | |
| | ff. MR ventriculography and Cisternography, Myelography. | | |
| | gg. Parallel acquisition technique such as SENSE/SMASH/ASSET/ GRAPPA , iPAT, ARC and other new sequences to be quoted as standard | | |
| | hh. Specify the factor by which the acquisition time is reduced for similar acquisition with and with out parallel imaging technique. A scan time reduction factor 4 for head, body, cardiac, angio and ortho application is required | | |
| | ii. Flow quantification packages for CSF with dynamic CSF flow imaging, aqueduct. and spinal canal In-line motion correction for uncooperative' patients/pediatric applications, that is motions/patient movement correction sequence and algorithm ( not just faster scanning or parallel imaging techniques ) for non-cooperative/sick patients/children should be provided. | | |
| | jj. Post contrast free breathing radial k-Space filling sequences. | | |
| **12** | **Imaging sequences** | | |
| | a. MRS: Proton (1H) MRS- Single voxel (SV), Multi-voxel CSI -2D and 3D- in both short and long TE | | |
| | b. Fat and iron quantification of liver: standard | | |
| **13** | **POST PROCESSING AND EVALUATION** | | |
| | a. 3DMultiplanar reconstruction (MPR) in any arbitrary plane including curved planes with freely selectable slice thickness and slice Increments. | | |
| | b. 3D Surface reconstruction and evaluation on reconstructed images with minimum time. | | |
| | c. MIP in 2D and 3D mode, targeted/segmented MIP in any orthogonal axis with minimum processing time and capable of displaying in cine mode. | | |
| | d. Full cardiac evaluation Operator selective or automatic contour mapping and calculation of Cardiac parameters like wall thickness, stroke volume EF, filling rate myocardial wall motion including display of data in label, graph and in cine mode with standard cardiology reporting set in BullsEye method. Blood flow quantification, velocity mapping, pressure gradient quantification shunt quantification, regurgitation calculation, stenosis blood flow, etc. These should be usable on main or on the work station. Evaluation and display of diffusion images, fMRI reference of EPI optimized sequence. | | |
| | e. Full Perfusion imaging with necessary post processing with time intensity graph and other statistical parameters | | |
| | f. Flow quantification and evaluation for vascular (high and low). CSF, bladder outlet and cine display Full Fledged Advanced Functional MRI: Whole brain coverage using high temporal resolution T2* | | |

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| | - weighted BOLD) imaging Single-shot EP1 for multi-slice imaging. Complete fMRI processing software, Automatic real-time processing of functional BOLD MR data sets into functional activation map | | |
| | g. Full post processing for SVS, CSI, metabolic mapping with colour coding for BRAIN , BREAST , LIVER & PROSTRATE. | | |
| | h. Image statistics: measurement of distance, area, volume (2D and 3D), angle, SD, mean, image addition subtraction, multiplication, division, interpolation, segmental, threshold, histogram (ROC) Evaluation features like zoom, rotation, scroll, image synthesis, multi point T1 and T2 calculation (more than 8) window searching, text dialogues graphics. Sorting, searching, archiving, recalling, etc. | | |
| | The CCTV system with LCD display to observe the patient.<br>Two-way communication should be possible with the patient from the console room | | |
| **14** | **Added Points** | | |
| a | **Added Para :**<br>**Sequence optimization using compressed sensing/Hyper Sense/Compressed Sense technique should be offered in Neuro, body, cardiac &MSK imaging for all sequence 2D, 3D Scans.** | | |
| b | Added Para :<br>Multi-slice Simultaneous Sequence to provide Better image quality in **EPI and TSE sequence.** | | |
| c | **Added Para :**<br>**Sequence to provide IRON and FAT quantification.** | | |
| d | Added Para :<br>4D flow Sequence & Strain analysis sequence. **(OPTIONAL)** | | |
| e | Added Para :<br>Multinuclei Spectroscopy to be provided. **(OPTIONAL)** | | |
| f | **Added Para :**<br>**System should have facility of Respiratory Sensors like Vital Eye/Bio matrix sensors or equivalent technology.**<br>**(OPTIONAL)** | | |
| g | **Added Para:**<br>**Sequence to Provide tumor grading by using endogenous cellular proteins to produce an MR signal that directly correlates with cell proliferation, a marker of tumor activity. (OPTIONAL).** | | |
| h | **Added Para:**<br>**1. Lobe segmentation and volume -MR liver health. (OPTIONAL)**<br>**2. Liver and prostate spectroscopy should be offered as OPTIONAL.** | | |
| **15** | **UPS** | | |
| | The system should be provided with the suitable UPS system for the complete system (MR + accessories except Chiller) with at least 30 minutes back up. | | |
| **16** | **DOCUMENTATION** | | |
| | a. The dry imager system should have digital DICOM 3.0 dry chemistry camera with resolution of 16 bits/ 500 dpi or more. The system must have at least three online film sizes, and should be capable to print on any of the 8 x 10, 10 x 12, 14 x 17 sizes. The system should be freely configurable by the user, to use any of the above mentioned size. should be supplied with 500 films of each size. | | |
| | b. A colour laser printer for printing colour images and protocols on plane in 1200 dpi resolution and more than 20 ppm | | |
| **17** | **ACCESSORIES** | | |
| | 1. Storage cabinet for all coils | | |
| | 2. (i) MRI Compatible Dual Syringe Pressure injector : Independent dual-Syringe Pressure injector with following Features; Non-ferrous, automatic syringe size detection, performs single and dual phase contrast injections, provides Saline flush delivery and allows timed contrast delivery Must be compatible | | |

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| | with 5, 7.5 &10ml pre-filled contrast syringes and 50 ml syringes for both saline & contrast (20 Nos of 50 ml Syringes with 100 nos. of tube connectors should be provided) Must be able to observe progress of injection and view injection result<br><br>(ii) (Optional) - MRI Compatible Dual Syringeless Pressure injectors with pump hose : Independent Dual Syringeless Pressure injector with following Features;<br>5000 gauss Compliant, Non-ferrous, performs single and dual phase contrast injections, provides Saline flush delivery and allows timed contrast delivery.<br>Must be able to observe progress of injection and view injection result.<br>100 nos. of tube connectors should be provided | | |
| | 3. MRI Compatible ECG electrodes (100 no.s Disposable Electrodes for MRI Image gating) | | |
| | **5. MRI Compatible ( upto 3 Tesla ) Anaesthesia Machine with atleast 8 inch screen and integrated electronic ventilator, 2 vaporiser, inbuilt suction and circle absorber** | | |
| | a) Capable of ventilating adult, pediatric and neonates. | | |
| | **b) Software for ventilation should support Volume control, Pressure control and Pressure support modes and advanced modes (SIMV,PSV and PRVT) along with inbuilt suction** | | |
| | c) Should have oxygen, nitrous oxide and air flow meters | | |
| | d) Isoflurane and sevoflurane vaporisers | | |
| | e) All safety alarms | | |
| | **f) All consumables required for installation & commissioning of the system should be supplied. Additionally patient circuits should also be supplied as below :<br>Adult size -10 Sets, Pediatric size -3 Sets & Neonate size -02 Sets** | | |
| | 6. One MRI compatible Multiparameter Vital Signs Patient Monitor of 5000 Gauss Compliance / 1.5 meter from isocentre compliance in MRI Room and One Slave monitor in console room with following modules provision to monitor the following | | |
| | a. Heart rate | | |
| | b. wireless ECG | | |
| | c. NIBP – Size of Cuffs (adult & pediatric neonatal) | | |
| | d. Respiration (Capnograph) | | |
| | e. Oxygen Saturation- wireless Pulse oximeter with adult, pediatric probe, and neonatal probes - 2 sets (with the spare probes), Should have plethysmograph perfusion factor | | |
| | f. ETCO2 and ETAA (end tidal anesthetic agents) | | |
| | g. **Dual** Temperature (adult and pediatric) | | |
| | **h. All consumables required for installation & commissioning of the system should be supplied.** | | |
| | i. IBP module - 2nos | | |
| | 7. 3.0T MRI compatible syringe pump – 2 Nos | | |
| | 8. Arrangement of Gas lines in recovery room and magnet room – MRI compatible high pressure gas outlet for : | | |
| | a. Oxygen | | |
| | b. Air | | |
| | c. Nitrous Oxide with MRI compatible indexed system. | | |
| | d. Vacuum suction | | |
| | 9. MRI Compatible 1 set of Laryngoscope :4 sizes blades- Neonatal, paediatrics, adult, extra | | |
| | 10. MRI compatible Magill forceps : Adult & paediatric size- Two each. | | |
| | 11. Stylet for endotracheal tube : Ault, paediatric size- Three each | | |
| | 12. MRI compatible Clamps 2 Nos : Either towel clip or artery forceps. | | |
| | 13. MRI Compatible two IV stands. (if not provided already) | | |
| | 14. Two non-magnetic **height adjustable** patient transfer trolleys should be provided | | |
| | 15. Two Anaesthesia bed/trolley for recovery room | | |

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| | **16. Walk through Metal detector with multiple fluxgate sensor to help detect approaching ferro magnetic hazards and with door ignore function to be installed at entry door of MRI Scanner Room (Zone III type) - 01 no. Must have continuous detection or alert capability following MRI door opening, or following preceding alert. Must allow passage of patient trolley.** | | |
| | 17. Phantoms to be provided for regular QA studies. | | |
| | 18. Complete manuals and other necessary documentation's should be provided. | | |
| | 19.MRI compatible Suction Apparatus - 2 nos | | |
| | 20. MRI room Oxygen deficiency level monitor 1 no (price to be quoted separately) | | |
| | 21. MRI compatible transport ventilator 1 no (Price to be quoted separately) | | |
| | 22. MRI compatible wheel chair 1 no (Price to be quoted separately) | | |
| **18** | **TRAINING** | | |
| | **On site Training for a period of 4 Weeks** | | |
| **19** | **STANDARD AND SAFETY** | | |
| **a)** | Should have import/manufacturing license from Central licensing Authority or State licensing authority of CDSCO for Medical Devices and copy of valid license should be submitted for the quoted model.<br><br>In case the vendor has not yet obtained import/manufacturing license from CDSCO for the quoted model, proof of application for CDSCO medical device license to be submitted in the bid document and valid CDSCO license to be produced at the time of supply/ NOA for the quoted model | | |
| **20** | **SITE MODIFICATION WORK** | | |
| | a. The system should be installed and handed over in working condition with all necessary electrical, air conditioning and civil work undertaken by the vendor in consultation with the user dept. | | |
| | b. All necessary interconnecting interfaces, cable, modules, and other hardware and software to fully integrate the system for full operational status. | | |
| | The Site-Modification Scope of Work - MRI<br>The scope of work includes complete Civil work, Electrical, Plumbing, Furnishing, Airconditioning, **Fire detection system** for the construction of MRI Scan Centre. While preparing the plan, the following aspects have to be addressed | | |
| | a. The MRI should be sited in such a manner; in order to minimise the effect of fringe magnetic field on surrounding areas. The areas lying within 5 Gauss line should be clearly demarcated and cordoned off with adequate warning. | | |
| | b. Care should be taken to provide easy negotiation of the patient stretchers/ trolleys through corridors and doors. | | |
| | c. RF shielding for doors, walls, glass viewer etc. | | |
| | d. Furniture like desk, chairs, shelves etc. | | |
| | e. Patient stretcher and other furniture/ accessory to make the scan centre functional. | | |
| | The cost of Site Modification Work for the area of **1500sq.ft** and Air-conditioning of **Tonnage 25 TR (including standby unit/s)** will be considered for Ranking / Evaluation purpose | | |
| | Moreover Bidders will have to quote the Unit Rates of the following components of Site Modification Work and detailed BOQ should be mentioned. | | |
| | a. Civil works (in units like sq.m / cubic m , kg etc) | | |
| | b. Electrical work (in unit s like per metre price , unit price for panel , isolation etc) | | |
| | c. Public health (plumbing and sanitary fittings like per metre of pipe, number of points etc.) | | |
| | d. Air Conditioning (HVAC)-rate of tonnage, type of false ceiling and sq.m rate etc | | |
| | e. Interior Furnishing & Furniture | | |
| | f. Miscellaneous | | |
| | Fire Detection system(consisting fire panel, smoke &heat detectors, hooters, response indicators etc.) for the entire MRI area | | |

| | | | |
|---|---|---|---|
| | Scope of work for Site Modification MRI unit works:-<br>The supplier should inspect the proposed site and submit all the detailed structural and architectural drawings and BOQ for the proposed MRI Scan Centres along with technical bid of the tender.<br>The MRI SCAN CENTRE shall consist of the following rooms: | | |
| | a. MRI Room | | |
| | b. Console room | | |
| | c. Equipment room | | |
| | d. Patient preparation room cum patient change room | | |
| | e. Radiologist room | | |
| | The actual area of Site Modification works done will be considered for payment, based on the unit rates and site measurements and as per the area available. | | |
| | Civil work<br>Any ab initio new construction or demolition of **existing walls** etc and reconstruction is unambiguously included in the Site Modification scope of work. This includes, but is not limited to expanding the area of MRI gantry room so as to make it compliant for installation of a 3T strength magnet | | |
| | a) Civil construction work including construction of brick wall, plastering, flooring as per the approved plan and equipment layout plan. | | |
| | b) Concrete bed at MRI equipment area. | | |
| | c) Platform for unloading and shifting the MRI should be provided if necessary. | | |
| | d) Platform for Chiller unit would be provided. Fencing and weather protection facility should be provided for the Chiller unit. | | |
| | e) Cable tray, trench & channel – necessary trenches, cable tray and channels at required location would be provided. | | |
| | f) All the construction work to be done as per the final plan approved by the purchaser. | | |
| | g) Active and passive room shielding for magnetic, fringe field should be provided as per the requirement of the equipment. | | |
| | h) The entire complex will be made rodent/pest proof. | | |
| **a)** | **Flooring** | | |
| | Anti static Vinyl flooring within the Magnet room Providing and laying approved quality , colour, design and shade fully homogeneous 600 x 600 mm(thickness to be specified by the manufacturer) vitrified tile flooring (Marbonite or Granamite, confirming to IS code 15622 with water absorption less than 0.08%) flooring in pattern as detailed in drawing or as directed by the EIC and grouted with matching colour approved quality readymade grout, curing, cleaning etc to required line level etc. all complete at all leads, lifts and heights to the entire satisfaction of the EIC. Providing and fixing 2-3mm thick POP protection over polythene covering sheet to flooring areas till handed over and cleaning, etc all complete as per drawings & specification and as directed by EIC with **100mm tile skirting to match in console room** , equipment room , patient preparation room, reporting room , patient waiting area and radiologist room. Note: Mode of measurement (Finished surface area of the tiles shall be measured and paid. Rate shall be inclusive of providing and laying leveling course, PVC spacers, providing and applying epoxy grout and no additional payment shall be made for wastages) | | |
| | 50 mm thick cement concrete flooring at all heights and locations including scaffolding , preparing the surfaces , neat cement finished to correct line or as required to receive architectural finish , level and plumb , curing wherever required complete as per requirements and drawings , with Vinyl flooring in MRI equipment / UPS room. | | |
| **b)** | **Painting** | | |
| | Two coats Plastic Emulsion Paint over 2 coats of wall putty including primer in patient preparation area, Lobby area, console room, MRI equipment room etc. Pre laminated particleboard wall paneling in MRI examination room. | | |

| | | | |
|---|---|---|---|
| **c)** | **False Ceiling** | | |
| | 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. | | |
| **d)** | **Plumbing work** | | |
| | 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. **However, the water supply line and drain line will be provided by consignee upto MRI complex under scope of vendor.** | | |
| | II. Copper pipes to be used for plumbing the Chiller to the MRI | | |
| | **Note:** | | |
| 1 | All sanitary wares & CP brass fitting & fixtures shall be of first quality with ISI mark (unless otherwise specified) and shall be of the make as per the latest approved list of materials as per list of approved make/model, if any. They shall be got approved by the Engineer-in-charge before incorporating in the work | | |
| 2 | All the items include testing after completion of the work. Concealed/underground GI pipe line is to be wrapped with hessian cloth and painted with two coats of anticorrosive paint.<br>Disposing off: The surplus excavated materials by mechanical transport lead up to 2KM to the nearby dumping pits/dumping areas within institute campus<br>identified by Engineer in charge, including all lifts, loading, unloading, stacking etc. complete as per specifications & as directed by the EIC. | | |
| **e)** | **Electric work** | | |
| | The supplier shall be required to specify the total load requirements for the MRI 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 MRI Scan centre 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. 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 – LED light fittings with 500 Lux Illumination | | |
| | d. MRI compatible lights for MRI examination room. The bulbs used within the RF cage should be easy replaceable and locally available. | | |
| | e. All wires used must be FRLS (Fire Retardant with low smoke) type only | | |
| | **Added Para :**<br>**Adequate number of earthing required for equipment and accessories should be provided by the equipment vendor.** | | |
| **f)** | **AIR CONDITIONING:** | | |
| | i. Total capacity of the Air-Conditioning for the entire MRI scan centre area should be at least 25 TR.(incl. standby airconditioning). However, if the installed system requires more capacity, it will be the responsibility of the supplier. | | |
| | ii. **Ductable Split / Ductable package air conditioners** may be used according to room requirement and suitability. | | |
| | iii. The outdoor units of AC should have grill coverings to prevent theft and damage. | | |
| | iv. Ventilation is required in toilet. | | |
| | **Added Para :**<br>**Dehumidifier of 110 Liter - 2 Nos. to be provided.** | | |
| **g)** | **Environment specifications:** | | |

| | | | |
|---|---|---|---|
| | I.Relative Humidity range: To be maintained between 60% and 80% in all areas except equipment room which shall be as per requirement of the equipment. | | |
| | ii. Temperature ranges: 22 ± 2° C in all areas except equipment room which shall be as per requirement of the equipment. | | |
| | iii. Air conditioning load: The heat load calculations and maintaining the desired temperature and humidity shall be the responsibility of the bidder | | |
| **h)** | **Furniture:** | | |
| | i. Revolving chairs height adjustable, medium-back with hand-rest . – 8 NO.S | | |
| | ii. Cupboard with laminate door shutters for storage of spare parts and accessories and records as per requirement. – 3 NO.S | | |
| | iii. Drug trolleys for patient preparation area.- 1 NO. | | |
| | iv. Patient trolley with rubber foam mattress to be kept in the patient preparation room. | | |
| | v. Tables for Workstation nodes- 2 NO.S | | |
| | vi. Changing rooms should have change lockers and dressing table. | | |
| | vii. Dustbins (plastic with lid) : 10 no.s. | | |
| | viii. All the rooms in the complex will be signposted. Sun film & ventilation blinds / curtain will be put up in all windows. | | |
| | All furniture items should be of standard make as mentioned in the table below. | | |
| **i)** | **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 | | |
| | **Deleted** | | |
| | 4. **Fire extinguisher ABC type of 2kg each as required for the building safety - 5 nos.**, with initial filling in brand new cylinder with power coated finish, fitted with Gun metal union, high pressure CO2 gas cartridge, discharge hose, wall mounting bracket etc. complete, confirming t IS:2171 of approved make & complete as directed by EIC.<br>**4.5 kg** MRI compatible fire Extinguisher - 2 nos to be also supplied | | |
| | **LIST OF ITEMS AND SUGGESTED MANUFACTURERS.** | | |
| **SL NO** | **ITEMS** **PREFERRED MAKES** | | |
| A | **FLOORING VITRIFIED TILES** -Somany, Kajaria , H&R Johnson, RAK India | | |
| B | **PAINT** - Dulux, Asian Paints , Nerolac | | |
| C | **PLUMBING** - Kohler, Jaguar , Grohe , Roca | | |
| D | **SANITARY ITEMS** - CERA, Hindware, Parryware | | |
| E | **ELECTRICAL** | | |
| 1 | **CABLES** - Finolex, Havells ,V-Guard | | |
| 2 | **SWITCHES** - Legrand, L&T, Crabtree , Roma | | |
| 3 | **DISTRIBUTION BOX , MCB** - Legrand, L&T, Siemens, Havels | | |
| 4 | **LIGHT FITTINGS** - Philips / Crompton / Wipro/Syska | | |
| F | **AIR CONDINTIONING** - Daikin, Hitachi, Blue Star, Voltas, | | |
| G | **FURNITURE** - Hermen Miller , Godrej , Featherlite,Geeken | | |
| | **BILL OF QUANTITY** | | |
| **S.No** | **ITEM** | **Qty** | **UOM** |
| 1 | Whole body 3.0 Tesla Magnetic Resonance Imaging system - 32 channels RF system ; as specified | 1 | No |
| 2 | System Body Coil - Quadrature | 1 | No |
| 3 | 32 channels or more HEAD coil-capable of multi frequency MR spectroscopy (H1). | 1 | No |
| 4 | NEUROVASCULAR coil - 16 channels or more | 1 | No |

| | | | |
|---|---|---|---|
| 5 | SPINE: Phased array coil 32 channels or more acquisition (single or combination) | 1 | No |
| 6 | BODY : Phased array coils 32 channels or more (single or in combination) | 1 | No |
| 7 | Dedicated coil/coil combination for peripheral angiography of 32 or more channel with coverage of 80cm or more | 1 | No |
| 8 | BREAST coil - 16 channel or more | 1 | No |
| 9 | Shoulder coil: a. Dedicated Shoulder coil – **16 channel or more** | 1 | No |
| 10 | Shoulder coil: Flex coils (Large) **- 16 Channel or more** | 1 | No |
| 11 | Shoulder coil: Flex coils (Small) **- 16 Channel or more** | 1 | No |
| 12 | High resolution foot/ ankle coil **– 16 channels or more** | 1 | No |
| 13 | **High resolution knee coil 16 channels or more; Tx & Rx.** | 1 | No |
| 14 | Suitable Carotid coil . | 1 | No |
| 15 | Server : Thin-client server as per specification | 1 | No |
| 16 | Concurrent licenses for Server | 2 | No |
| 17 | Node Hardware: CPU and Medical grade monitor | 2 | No |
| 18 | Antivirus software for Server / Node | 2 | No |
| 19 | Cardiac Package – License | **2** | **No** |
| | **ACCESSORIES** | | |
| 1 | Storage box for all coils | 1 | No |
| 2 | Dual Syringe Pressure injector | 1 | No |
| 3 | Dual Syringe Pressure injector syringes | 20 | No |
| 4 | Dual Syringe Pressure injector syringe connector | 100 | No |
| 5 | MRI Compatible ECG electrodes (disposable) | 100 | No |
| 6 | MRI Compatible Anaesthesia as per specification | 1 | No |
| 7 | MRI compatible Multiparameter Vital Signs Patient Monitor and One Slave monitor, as per specification -qty 1 set | 1 | No |
| 8 | 3.0T MRI compatible syringe pump | **2** | No |
| 9 | MRI Compatible sets of Laryngoscope : 4 sizes blades- Neonatal, paediatrics, adult, extra large | 1 | No |
| 10 | MRI compatible Magill forceps : Adult size- | 2 | No |
| 11 | MRI compatible Magill forceps : Paediatric size- | 2 | No |
| 12 | Stylet for endotracheal tube : Adult size | 3 | No |
| 13 | Stylet for endotracheal tube : Paediatric size | 3 | No |
| 14 | MRI compatible Clamps : Either towel clip or artery forceps. | 2 | No |
| 15 | MRI Compatible IV stands | 2 | No |
| 16 | MRI compatible suction apparatus | 2 | No |
| 17 | Non-magnetic patient transfer trolleys | 2 | No |
| 18 | Metal detectors : Handheld | 2 | No |
| 19 | Metal detector: Walk-through | 1 | No |
| 20 | Phantoms to be provided for regular QA studies. | 1 | LS |
| 21 | Endocavitary Coil - Prostrate Study | 1 | No |
| 22 | MRI Compatible Dual Syringeless Pressure injectors (Optional) | 1 | No |
| 23 | Tube connectors for Syringeless Pressure injector (Optional) | 100 | No |
| 24 | Walk through Metal detector with multiple sensor and multiple location LED (Zone IV type) | 1 | No |
| 25 | Dry Chemistry laser camera as specified | 1 | No |
| | Components of Site Modification Work : | | |
| 1 | Civil works | 1200 | $ft^2$ |
| 2 | Electrical work | 1200 | $ft^2$ |
| 3 | Public health (plumbing and sanitary fittings). | 1200 | $ft^2$ |
| 4 | Air Conditioning **(including standby unit/s)** | **25** | **TR** |

| | | | |
|---|---|---|---|
| | **Furniture:** | | |
| 1 | Revolving chairs height adjustable, medium-back with hand-rest in the Control room, Radiologist room and viewing area | 8 | No |
| 2 | Cupboard with laminate door shutters for storage of spare parts and accessories and records as per requirement. | 3 | No |
| 3 | Drug trolleys for patient preparation area. | 1 | No |
| 4 | Patient trolley with rubber foam mattress to be kept in the patient preparation room. | 2 | No |
| 5 | Tables for Workstation Nodes. | 2 | No |
| 6 | Changing rooms (with change lockers and dressing table). | 1 | set |
| 7 | Dustbins (plastic with lid) to be provided as required. | 10 | No |
| 8 | Room Signage | 1 | LS |
| 9 | Venetian Blinds | 1 | LS |
| | **Miscellaneous:** | | |
| 1 | LED X-ray Film viewer with adjustable brightness; capable of holding 3 films of 14"x17" size. | 2 | No |
| 2 | Cabling of Network (LAN) connectivity for camera system, console system, workstation and computers etc | 1 | LS |
| 3 | **Fire extinguisher ABC type of 2kg each as required for the building safety** | **5** | **No** |
| 4 | **4.5 kg** MRI compatible fire Extinguisher | 2 | No |
| 5 | MRI room Oxygen deficiency level monitor (price to be quoted separately) | 1 | No |
| 6 | MRI compatible transport ventilator (Price to be quoted separately) | 1 | No |
| 7 | MRI compatible wheel chair (Price to be quoted separately) | 1 | No |
| 8 | **Added Para :**<br>**Dehumidifier of 110 Liter** | 2 | No |
| | **Added Para :**<br>**All the Optional items offered should be quoted separately and the price should be valid for warranty period** | | |

**All other contents of the Tender enquiry including terms & conditions remain unaltered.**

**Note:**

I. **Prospective Bidders are also advised to check the website regularly prior to the closing date and time of online submission of bids**