MINIMUM TECHNICAL SPECIFICATION FOR THE LATEST WHOLE BODY STATE OF THE ART 1.5T MRI SYSTEM

TechnicalSpecifications: Minimumtechnicalspecificationstoadhereto as mentioned below:

DESCRIPTION	
Whole-body NEW1.5 Tesla MRI system with state-of-the-art latest features with superconducting magnet, high-performance gradients, and digital Radio Frequency System commercially available at the time of supply should be quoted. The model should be launched in RSNA 2017 or later. The bidder should submitanundertakingthatthe systemandanyparttherеofisnotrecycled/refurbished.The system should be BIS (Bureau of Indian Standard). The system should be FDA and European CE-approved product andcertificate to be submitted. The system should be based on a user-friendly platform, reliable, and capable ofproviding excellent performance for clinical Imaging andresearch.The detailed specification thatfollowsshallbeunderstoodtobea minimumrequirement	
SR.NO.	**TECHNICAL SPECIFICATION**
1	**MAGNET**
A	Whole Body 1.5Tesla Magnetic Resonance Imaging System optimized for higher performance in Whole Body and neuro & Cardiovascular examinations with superconducting magnet, high-performance gradients, and digital Radio Frequency System.
B	1.5Tactiveshieldedsuperconductivemagnetshouldbea shortboreandnon-claustrophobic.
C	Itshouldhaveatleasta 70cmpatientborediameter.
	TotalMagnetlengthincludingflaredend should be lessthan 200cm.
D	Homogeneityofthe magnetshouldbeequaltoorlessthan0.80ppmover40cm DSV. Also, provide the datasheet for the same.
E	Themagnetshouldbewellventilatedandilluminatedwitha built-in2-way intercom for communication with patients.
F	Cryogen vessel to be of Helium only with appropriate super thermal shielding andrefrigerationfacilityforZeroHeliumboil-off,SpecifytheHeliumtank capacity and boil-off rate if any (should not exceed 0.03 lit/hr).

Prof. Avinash Agrawal
MD, DCC, FCCM, FICCM, FIACCM, FCCP (USA)
Head, Department of Crit... Care
King George's Medical Univ... UP, Lko.

G	Emergency helium release button should be provided at least In two places [inside MR examination room and console room]. Heliumlevelmonitoringequipmentinthemagnetandfacilityforthe appropriate quick shutdown of the magnet in the event of an emergency.
H	Heliumrefilltimeshouldnotbelessthan2years.Pleasementionthehelium refill time & should be covered under the warranty & CMC period
I	The magnetshouldhavea DigitalDisplayofpatientDemography&Coilconnectivity.
J	ECG triggering,peripheraltriggering,andrespiratorytriggeringgatingbe provided with wired, Bluetooth, or wireless sensors for the same.
2	**SHIMSYSTEM**
A	High performance and highly stable shim system with global and localized automatedshimmingforhighhomogeneitymagneticfieldforimagingand spectroscopy.Both active &passive Shimming should be offered as standard.
B	Autoshim (global and voxel shim)shouldbe available toshimthe magnetwiththe patientin position
3	**GRADIENTSYSTEM**
A	The activelyshieldedGradientsystem
B	Thegradientshouldbeactivelyshieldedwitheachaxis having a slewrateofatleast200T/m/sandapeakamplitude of 44mT/m, please specify the minimum rise time.
	The Max Gradient Amplitude & Max Slew Rate should be achievable simultaneously in all three axes.
C	Thesystemshouldhave efficientandadequate Eddycurrentcompensation
D	Effectivecoolingsystemforgradientcoilandpowersupply -100%dutycycle
4	**RF SYSTEM**
A	AfullydigitalRFsystemcapable oftransmittingpowerofatleast18kw.
B	ItshouldalsohaveatleastindependentRFreceivechannelswitheachhaving bandwidth of 1 MHz or more along with necessary hardware to support

Prof. Avinash Agrawal
MD, IDCC, IECCM, FICCM, FIACCM, FCCP (USA)
Head, Department of Critical care,
King George's Medical University, U.P, Lko.

	quadrature ICP array/Matrix coils. The system should also have an analog to digital convertor right at the source.
C	It should support Parallelacquisitiontechniqueswithafactorofat least4in2D and should allow remote selection of coils and/or coil elements.
5	**PATENT TABLE**
A	Thetableshouldbefullymotorized,MRICompatiblewith computer-controlledtable movement in vertical and horizontal directions Position accuracy should be +/-1.0Cmmorbetter.
B	Itshouldbeabletotakea minimum loadof160kg or more.
C	The tableshould havea facilityformanualtractionincaseofemergency
D	Cushionsandotherpatientcomfortaccessories.Allpartsofthe table shouldbe protected from liquid spill
E	The tableshouldhavea patienthand-heldalarmsystem.
F	Thetableshoulddelivertheprotocolsforautomaticboluschasinginperipheralangio with automatic table movement.
G	The system must be suppliedwithOEMmake dockable patienttrolley/table–2nos.
H	Offered System must have the facility of a 12-inchTouch-based Display on Both Sides of the Gantry for patient data, coil setup, and isocenter positioning. The system must have the latest AI-basedor equivalent touch-less respiratory sensors for sensing patient motion sensing.
6	**COMPUTERSYSTEM/IMAGEPROCESSOR/ OPERATOR CONSOLE**
A	ThemainHostcomputershouldhavea 21inchesormorehighresolutionLCD TFT color monitor with a minimum 2 MP matrix display.
B	Thesystemshouldhave an imagestoragecapacityofatleast6,00,000imagesin a 256x256 matrix.
C	The main console shouldhave a facilityfora music systemforthe patient inthe magnet room.ThesystemshouldhaveDVD/CD/Flashdrivearchivingfacility.Supply 500 DVDs along with the system.There should be a provision for retrieval of the reconstruction data (raw files) in a user-friendly manner.
D	Two-wayIntercomsystemforpatientcommunication.
E	The system should be capable to connect to PACS through RIS/HIS at no

Prof. Avinash Agrawal
MD, DNB, FICCM, FICCM, FCCP (USA)
Head, Department of
King George's Medical
, UP, Lko.

	extra cost. The highest version of DICOM connectivity is to be provided.
F	A necessary image processor with large RAM for ultra-fast image reconstruction should be provided it should be at least 32 GB RAM.
7	**MEASUREMENT SYSTEM**
A	The largestFieldofViewshouldbe at least45cminallthreeaxis.
B	Themeasurementmatrixshouldbefrom128x128to1024x1024.
	The system including all components, all accessories, and entire turnkey work should be undera complete replacement warranty for five years from the date of issue if the installation certificate.
	A comprehensiveMaintenance Contract(CMC)forthewholesystem, includingallcomponents, all accessories, and entire turnkey work for 5 years should be quoted after the warranty. The post-warranty (after 5 years) CMC should be comprehensive (repair and/ or replacement) + labor + spares for the complete system which includes all the accessories supplied such as UPS, Generator, AC, etc. (Including batteries for UPS). This CMC should be quoted in Indian Rupees. Also,the company should provide a written document that the company will be able to provide all the parts of the machine for at least 10 years.

Prof. Avinash Agrawal
MD, DCC, IFCCM, FICCM, FIACCM, FCCP (USA)
Head, Department of Critical care,
King George's Medical University, UP, Lko.

C	Minimum Slice Thickness in 2D & 3D should be specified in 'relation to the sequences.Preferably for 2D 0.5mm or better and for 3D, 0.2 mm or better.
D	Able to perform ultrashort TE or less
8	**COIL SYSTEM**
A	The system body Coil integrated into the magnet must be quadrature/CP. All array coils should be compatible with parallel imaging techniques. RF coils in addition to the main body coil (Transmit / Receive or receive coils) autotune, array, or no tune coils.Please specify the number of channels and elements available for each coil. Please mention the true acceleration factor for each of the array coils. All coils must be lightweight for ease of work. In addition to this-following coils should quote.
B	The modeofcoilattachmenttothescannersystemiswiredasstandard,atleastthree cable connectors are to be provided on the patient table or magnet.
C	NeurovascularorHeadand neckcoilcapableof resolution brain&Neurovascular Imaging with 20or more channels.
C	SpineArray/MatrixCoilswithat least32channelsforthoracicandlumbarspine Imaging.
D	BodyArray/Matrixcoil32channels or more. Coverage of the Body coil should not be less than 45 CM enabling whole abdomen imaging if any vendor does not have a single-coilthenthe combination of two body coils should be offered to cover 45 CM Z-Axis FOV for imaging of the abdomen, angiograms, and heart
F	Loop flex coils (large and small) - 4 channels or more for imaging of large regions such as large shoulder, hip, and knee & small regions such as small to medium shoulder, wrist, elbow, and ankle.
G	The system should continuously monitor the RF coils used during scanning to detect failure modes. RF coils should not require either set up time or coil tuning;Multicoilconnectionforup to2ormorecoilssimultaneouslyscanning without patient repositioning i.e like 4GTIM/GEM/D stream coil combination should be quoted as standard.
H	Suitable CoilStorage Cartshouldbe suppliedforkeepingallsupplied coils.

Prof. Avinash Agrawal
MD, IDCC, IFCCM, FICCM, [illegible] FCCP (USA)
Head, Department of Critical Care,
King George's Medical University, UP, Lko.

K	a. Dedicated shoulder Coil– 16channelor more should be offered b. Suitable Cardiac Coil/ equivalent with at least 22 channels with the combination. c. Dedicated coil for the scanning of Carotids should be quoted. d. Dedicated coil for the scanning of the lower limb for peripheral vascular study.
L	Dedicated Kneecoil– 16 channelsormore should be offered
N	Foot/anklecoil–16channelsor more should be offered
O	Atleastthreecableconnectorsare tobe providedonthepatienttableormagnet. Suitable structured Coil for Ear, Eye, and TM joints,
P	Dedicated Breastcoil-16channel or more should be offered.
Q	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 have overlapping applications.
9	**APPLICATIONSEQUENCES**
A	Thesystemshouldhavea basicsequencespackagewithSpinEcho,Inversion Recovery,TurboSpinEchowitha highturbofactor of 256or more,Gradient Echo with ETL of 255 or more, FLAIR. 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.
B	Singleslice,multiplesingleslices,multiple slices,multiplestacks,radialstacks, and 3D acquisitions for all applications.
C	SingleandMulti-shotEPIImagingtechniqueswithan ETLfactorof255ormore
D	Fatsuppressionforhigh-qualityimagesbothSTIRand SPIR.
E	Thesystemshouldacquiremotionartifact-freeimagesinT2studiesofthe brainin restless patients (PropellMulti vane vane, Blade,etc)
F	Dynamicstudyforpreandpost-contrastscansandtime-intensity studies
G	MRangioImaging:Shouldhave2D/3DTOF,2D/3DPC,MTSandTONE, ceMRA, Facilities for Accelerated time-resolved vascular imaging with

Prof. Avinash Agarwal
MD, DDC, IFCCM, FICC... FCCP (USA)
Head, Department ... al care,
King George's Medic... ity, UP, Lko.

	applications like Treasts/Tracks/Tricks sequences or similar. Appropriate software packages should be offered.
H	Fat and water excitation package. Diffusion-Weighted imaging, b-value of10000ormoreinatleast32directions
I	Boluschasingwithautomaticandmanualtriggeringfromfluromodeto3D acquisition mode with moving table facility.
J	Noncontrastenhancedperipheralangiographyforarterialflowwith Native/Trance/enhance sequences, and Time-Resolved Angio 4D TRAK, TWIST and TRICS
K	Whole-bodyMRI screeningimagingstudiesformetastasis
L	High-resolutionAbdominalandLiverimaginginbreath-holdandfree-breathing modes with respirator triggered volume acquisitions.
M	Thesystemshouldhavebasicandadvanced MRCPpackagesincludingfree-breathing and 3D techniques.
N	Thesystemshouldhavea facilityforautomatedflowquantificationofCSFand vessel flow.
O	The systemshouldhave the Hydrogen,Single VoxelSpectroscopy,Multivoxel, Multislice& Multiangle 2D, 3D. The complete processing/post-processing softwareincludingcolormetabolitemapsshouldbeavailableonthe mainconsole. Complete prostate spectroscopy hardwareand applications should be provided. The complete processinPost-processing using software including color metabolite maps should be available onthe main console and the workstation
P	PerfusionImagingofthe brain(2D&3DASLwithcompleteautomatedpast processing software).
Q	Susceptibilityweightedimaging(i.e.SWI)/VenousBOLDimaging.
R	Multi-DirectionDWIandDTIwitha minimum of128directions(complete package including quantification and tractography software).
S	High-resolutionimagingforthe innerear. 3D acquisitions like CUBE, SPACE, VISTA or similar.
T	MRneurographysoftware/3DSpaceNeurogram/3DCube STIR/3DVISTA

Prof. Avinash Agrawal
MD, DNB, FCCP (USA)
Head, Department of Critical care,
King George's Medical University, UP, Lko.

U	The system should have Silent MRI scans for protocols including T1W, and T2W imagingwithoutanylossofimagequalityonallsequenceswithnoiselessthan 80dB.The quiet scanning should be without loss of SNR.
V	Compensationforimagingmetalimplant
W	The system should have a basic sequences package with Spin Echo, Inversion Recovery, Fast Spin Echo wita a high turbo factor of 256 or more, Gradient EchowithETLof255ormore,singleandMulti-shotEPIimagingtechniques with ETL factor of 255 or more
	Singleslice,multiplesingleslices,multipleslicese,multiplestacks,radialstack ,s and 3D acquisitions for all applications
	Fat suppression for high quality images both inversion recovery and Dixon methodwithvariableTEandfourcontrastsinoneacquisitionvizwater-only, fat-only, in-phase and opposed-phase
	MagnetizationTransferSaturation
	Thesystemshouldacquiremotionartifactfreeimages inT2studiesofbrainin restless patients using latest technique
	Dynamicstudyforpreandpostcontrastscansandtime- intensity studies
	Whole body diffusion imaging
	All basic and advanced sequences in 2D and 3D and all its variants should be offered.
10	**Workstation**: Advanced post-processing offered application including perfusion quantification advanced diffusion , DTI, including perfusion analysis, processing of 2D/3D CSI data with color metabolite mapping , fMRI Postprocessing (optional), CSF Flow quantification, Ejection fraction, cardiac flow measurement and Image fusion. SequencesandApplicationsPackage—all processing workstationalso, System Should be provided with **two**Independent workstations with All applications on each workstations, Server based workstation can also be quoted with two clients and concurrent two licenses of each applications. The workstation should enable printing in laser film camera and color printers. It should have at least 21 inch LCD TFT color monitor, with hard disk of at least 1TB for at least 250,000 image storage in 512 matrix, and 32GB

Prof. Avinash Agrawal
MD, IDCC, IFCCM, FICC... FCCP (USA)
Head, Department of ... care,
King George's Medical ... UP, Lko.

		RAM or more capacity or more, with self-playing DVD/CD archiving facility.
A		The system should have basic sequences package with Spin Echo, Inversion Recovery, Turbo Spin Echo with high turbo factor of 256 or more, Gradient EchowithETLof255ormore,singleandmulti-shotEPIimagingtechniques with ETL factor of 255 or more
B		Single slice,multiplesingleslice,multipleslice,multiplestacks,radialstacks and 3D acquisitions for all applications
C		Thecompleteprocessing/post-processingsoftwareincludingcolormetabolite maps should be available on main console.
D		Fatsuppressionforhighqualityimagesbothinversionrecoveryand Dixon method with variable
E		TEandfourcontrastsinoneacquisitionvizwater-only,fat-only,in-phaseand opposed-phase
F		MagnetizationTransferSaturation
G		Thesystemshouldacquiremotionartifactfreeimages inT2studiesofbrainin restless patients using latest technique
H		Dynamicstudyforpreandpost contrastscansandtimeintensity studies
I		**Neuro Applications**
	i.	2D/3DArterialSpinlabeling
	ii.	T1PermeabilitywithiAUC,kTRANSetcandT2*Perfusionimagingofbrain and other body parts with software for rCBV/rCBFetc analysis.Evaluation package for calculating CBV, CBF, MTT, perfusion map etc. Post processing of perfusion should be available in console also.
	iii.	Susceptibility weighted imaging with phase contrast information to be provided
	iv.	MultiDirectionDTIwitha minimumof128directions(Completepackage including DTI Quantification and tractography software).
	v.	T2Relaxometry and volumetryforHippocampus
	vi.	QuantitativeBrainimageanalysissoftwareforvolumetryofdifferentbrain structures based on tissue segmentation

Prof. Avinash Agrawal
MD, IDCC, IFCCM, FICCM, FIACCM, FCCP (USA)
Head, Department of Critical care,
King George's Medical University, UP, Lko.

	vii.	AdvancedSpineApplicationspackagefornerverootanalysis-nerve-sense
	viii.	High-resolutionimagingforthe innerear.
	ix.	Thesystemshouldhavea facilityforflowquantificationofCSF,and vesselflow. Both retrospective and prospective gating should be possible.
	x.	Wholespineimagingwithfusionsoftware.
	xi.	Real-timeBrainWave,PreAcquisitionandpost-processingorInlineBOLDor BOLD Specialist.
J		**Cardiacapplications**
	i.	VCGgating with arrhythmiarejectiontechniques
	ii.	Morphology/wallmotion
	iii.	CineperfusionimagingandMyocardialviabilityimaging
	iv.	AdvancedCardiacVentricularMeasurementAnalysis
	v.	CineCardiacTagging Techniques
	vi.	Coronary arterytechniques
	vii.	2D/3Dfastfieldecho/balanced/steady-statetechniques
	viii.	Completecardiacevaluationpackagetobeincludedintheworkstation. WithT1, T2 AND T2* MAPPING
K		**Musculoskeletal**
	i.	High-resolutionimagingforcartilageand musculoskeletal imaging. Parametric mapping techniques like MAPit / Cartigram / Cartilage assessment of cartilage to be offered
	ii.	The systemshouldhavea software packageforthe evaluationofbone marrow
	iii.	Metal-implantartifactreductiontechniquetobeavailableequivalentto Advanced WARP/SEMAC/ MAVRIC/OMAR XD should be offered
	iv.	Whole-bodyscreeningimagingstudiesformetastasiswithatleast180cm coverage.
L		**Hepatobiliaryandabdominalsystem**
	i.	High-resolutionAbdominalandLiverimaginginbreath-holdandfree-breathing modes with respiratory triggered volume acquisitions
	ii.	ThesystemshouldhavebasicandadvancedMRCPpackagesincludingfree-breathing and 3D techniques

Prof. Avinash Agrawal
MD, IDCC, IFCCM, FICCM, FIACCM, FCCP (USA)
Head, Department of Critical care,
King George's Medical University, UP, Lko.

	iii.	Sequences and evaluation software for Fat and Iron Quantification in Liver tobeprovided.Such as Liver LAB, IDEAL IQ , or mDIXON Body FAT Quant
M		**BreastImaging**
	i.	Advancepackageincludingdiffusion,spectroscopyandperfusionwithtime-intensity curve. Techniques for bilateral breast imaging including axillary coverage (VIBRANT XV / BLISS / VIEWS) with suitable coils should be offered with parallel imaging capability and parallel imaging factor 4 or higher.
N		**Diffusion-WeightedImaging**
	i.	Bvalueof10000 ormoreinatleast32 directions
	ii.	Whole-bodydiffusion-weighted imaging withbackgroundsuppression (DWIBS) or a similar method
	iii.	DTIwithcolor-codedTractographyandFAmaps
O		**Spectroscopy**
	i.	ThesystemshouldhaveHydrogenProtonSpectroscopyasstandard. Full post-processing for SVS, CSI, metabolic mapping with color-coding for brain, breast, liver & prostate.
	ii.	SingleandMulti-VoxelspectroscopywithMulti-slice&Multiangle2D,3D Spectroscopy, and Chemical Shift imaging in 2D / 3D.
	iii.	Thecompleteprocessing/Postprocessingsoftwareincludingcolormetabolite maps should be available on the main console and the workstation
	iv.	Completeprostatespectroscopyhardwareandapplicationsshouldbeprovided
11		**SAFETYFEATURES**
		TheSystemshouldhavethe followingsafetyfeatures: -
A		ThemagnetsystemshouldincludeanEmergencyRampDownunit(ERDU)for fast reduction of the magnetic field with ramp Downtime below 3 minutes
B		Themagnetshouldhavequenchbandsthatcontainthefringefieldstorage specified value in the event of a magnet quench
C		Real-time SAR calculation should be performed by the software to ensure that RF powerlevelscomplywithregulatoryguidelinesandaredisplayedoneachimage
D		Thesystemshallhavea manualoverrideofthemotordriveforquickdisplayof the patients for the magnet bore

E	A temperaturesensor(builtin)formagnetrefrigerationefficiencymustbe provided
F	ACCTVsystemwitha colorLCD/LEDdisplaytoobservethepatienttransfer should be provided.
12	**DOCUMENTATION**
A	DICOMcompatibleDryChemistryDigitalCamera and color printerwithan integratedprocessorfor filming from the main console & workstation.
B	Printing on films of 8 X10, 10 x 12, 14 x 17 sizesin a resolution of 500ofmoredpi.Itshouldbepossibletoconnectotherimagingmodalitiestothe printer. 500 nos of each-size films to be provided**(please specify themake as per your schedule rate contract)**
13	**UPS**
A	Thesystemshouldbeprovidedwitha suitable 120KVAUPSsystemfortheMainsystem, chiller with at least 30 minutes back up with + 40 KVa UPS with 30 mins backup for the other local supply items/equipment.
14	**SUITABLERFENCLOSURE, TRAINING, and UPGRADE**
A	RF Cabin: The system should be supplied with the RF cabin with RF room shielding,RFDoor,RFwindow,andInteriorsforthesameshouldbecarriedoutsuitably.
B	Application support engineers should be assigned for at least 30 days in a quantum of 6 months to train the staff/clinicians in the department.
C	The MR system should be regularly maintained in the latest version of computing software, including software platform upgrades released for the respective system that can prepare it for future enhancements. If a hardware (HW) upgrade is required to run the latest software version to its normal performance, the respective HW should be upgraded at no additional costs during the complete life of the system.
D	The MR computing software system should offer built-in security controls to protect the system from vulnerabilities that can result in cyberattacks or inappropriate access to patient data. The built-in security should comply with the latest international standards of data security and encryption, as well as with existing regulations to protect personal and protected health information (e.g., GDPR, HIPAA, any local regulation), during the

	complete life of the system
E	To keep up to date it is essential that radiologists and technologists must be trained in these advanced application developments at regular intervals. One Radiologist for 4 weeks once in 3 years, for 10 yrs should be sent for training on the latest developments in the advanced application of MRI at centers of repute. One member each of Radiology technologists for 2 weeks (for technical / maintenance training) once in 3 years for 10 yrs should be sent for training on the latest developments in the advanced application of MRI at centers of repute.
15	**ACCESSORIES**
A	Storagecabinetforallcoils
B	MRI Compatible Dual Syringe Pressure Injector: Independent dual Syringe PressureInjectorwiththe followingFeatures;Non-ferrous,automaticsyringesize detection, performs single and dual phase-contrast Injections, provides Saline flushdeliveryMustbecompatiblewith5,7&10mlpre-filledcontrastsyringe and 50 mlsyringes for both saline &contrast(100 Nos of50 mlSyringes with 100 nos. of tube connectors should be provided) Must be able to observe the progress of Injection and view injection result at the working console.
C	OneMRIcompatibleMultiparameterVitalSignsPatientMonitorof500Gauss/ Compliance and One Slave monitor in console room with following modules provision to monitor the following (all MR compatible);Heart rate, Wireless ECG, NIBP Size ofCuffs(adult&pediatric,neonatal)–2setseach, Respiration, Oxygensaturation-MRcompatibleWirelessPulseoximeterwith an adult,pediatric probe, and neonatal probes- 2 sets each, Should have plethysmograph perfusion factor. ETCO2andETAA(end-tidalanesthetic agents), IBPModule2 sets
D	One non-magneticpatienttransfertrolleyshouldbeprovided
E	Hand-held metaldetector-02 nos.
F	WalkthroughMetaldetector-01no (Zone III)

Prof. Avinash Agrawal
MD, IDCC, IFCCM, FCCP (USA)
Head, Department of Critical care,
King George's Medical University, UP, Lko.

G	Suitable Online UPS with 30 Min Backup for entire system MRI System.
I	LED–3filmsviewboxfor14"X17"filmsize–3Nos.
J	Test phantoms to calibrate and measure system performance
K	MRcompatibleWheelchair– 1No.
L	Mobile MRI compatible Anaesthesia workstation with in-built ventilator: Specifications: Electronically driven Piston ventilator; Ventilation modes - Volume Controlled Ventilation, Pressure Controlled Ventilation, Pressure Support, SIMV/PS, Manual Ventilation, Spontaneous Breathing; LCD colour screen; 2 vaporizers (Isoflurane & Sevoflurane); Carbon-dioxide absorber canister; Continuous monitoring of inspiratory O_2 concentration, breathing frequency, tidal volume (expiratory), minute volume (expiratory), peak airway pressure, PEEP, and mean or plateau pressure; Audible and visual alarms; breathing systems (modules for Mapleson D circuit, Bain circuit and closed circuit); breathing circuits suitable for use in MRI environment (adult and neonatal); pressure gauges for gas cylinders; MRI compatible oxygen cylinders for Anesthesia machines (Size E: 4 numbers); endotracheal suction unit; central brake; integrated safety functions, length of tubings connecting the wall station outlets to the anesthesia machine should be adequate enough to move the machine freely in desired location inside MRI suite.
M	MRI compatible Syringe infusion pumps: 3 numbers capable of being stacked in a single cabinet The pumps should have battery backup and a mechanism for providing infusion dose as well as a bolus.
N	MRI compatible Transport monitor: Specifications: Should be operated on battery and wall AC as well; Should have ECG, SpO2, respiratory rate & NIBP modules; MRI compatible SpO2 probes - adult, pediatric, neonatal (1 of each); MRI compatible NIBP cuffs - Adult, pediatric/ neonatal cuff (1 of each); Screen should be minimum 6-7 inches; Should have an audible beep and alarms; monitor should have a holder or fixation mechanism to attach on the MRI compatible patient

Prof. Avinash Agrawal
MD, DNB, FCCM, FCCP (USA)
Head, Department of Critical care,
King George's Medical University, UP, Lko.

	transportation trolley to secure it firmly during patient transportation
O	Others: a. MRI compatible stethoscopes: 1 adult & 1 pediatric, b. Wall outlets (2 for compressed oxygen, 1 for air, 1 for N_2O, and 1 for vacuum suction) c. MRI compatible wall suction apparatus: 1 d. MRI compatible Pressure transducer stand: 2 e. MRI compatible Magill's forceps: 3 sizes: Adult, pediatric, infant f. MRI compatible anaesthesia face masks - Sizes: 0, 1, 2, 3, 4, 5 g. MRI compatible temperature probes: adult & pediatric h. Endotracheal tube exchanger: 1 number; it should have the facility toadminister oxygen i. Gum elastic bougie: 2 (adult and pediatric) j. Guedel airways: One set of all sizes k. Stylets for endotracheal tubes (adult & pediatric)
P	ChillerforMRISystem
	Emergencylightsfor examination and console room.
16	**STANDARDANDSAFETY**
A	Shouldbea BIS(BureauofIndiaStandards),USFDA&EuropeanCE-approvedproduct.
B	FireFightingSystem,SmokeDetectorsinallrooms(exceptRFcabin),and 3 Fire Extinguishers all MRI Compatible
17	**SITEMODIFICATIONWORK-1.5TMRI**
A	The system should be installed and handed over in working condition with all necessaryelectrical,airconditioning,andcivilworkundertakenbythevendorin consultation with the user dept.
B	The magnet should be shielded from external interferences. The MRI should be sited in such a manner; In order to minimize the effect of fringemagneticfieldonsurroundingareas.Theareaslyingwithinthe 5Gaussline should be clearly demarcated and cordoned off with an adequate warning.

Conditions for tender:

1. All accessories should be from the same Original Equipment Manufacturer for the main unit.
2. Any equipment supplied along with the main unit; is the responsibility of the company to install the MRI scanner. The third-party maintenance should be properly taken care of and should not hamper with smooth functioning or maintenance of the equipment. However, the overall responsibility for the functioning of these third-party accessories will be the responsibility of the company, which is awarded the tender.
3. Cost of each hardware and software (Machine, coils, pulse sequences, computer, accessories, etc.) should be separately mentioned in the bid.
4. Instruments must be ISO certified and a copy should be enclosed. (The ISO Certificate must be issued by any organization accredited by the Bureau of Indian Standard or accredited by the international accrediting forum "IAF" (Certificate to be attached).
5. Should be USA FDA and European CE be approved by 4 digits notified body.
6. Other necessary certifications will be provided by the bidder for the smooth functioning of the machine.
7. Installation process should be performed by O.E.M trained service engineers/ service representatives on OEM letterhead or Service Report within 15 days of supply, with the mandatory provision of providing preventive services visit of OEM trained Service Engineer/ Service Representative quarterly per year till the completion of warranty period (i.e., 20 visits for the first 05 years) & further quarterly visits (04 visits/year) year till the completion of CMC period.
8. The equipment should have a Brand name / Model Number embossed/etched on the equipment.
9. All the technical specifications in the compliance statement must be supported by Original Literature from the firm / O.E.M with highlighting Numbering & flagging of all technical certificates.
10. Offered Equipment should have a strong Government Installation base.
11. Offered Equipment should have a Regional Sales Service Centre of the Original Equipment Manufacturer in the region for a 95 % uptime guarantee.
12. For the offered main unit, the essential, optional required consumables'/accessories' shelf life should be declared on the Original Equipment Manufacturer's letterhead.

Prof. Avinash Agrawal
MD, IDCC, IFCCM, FICCM, FACCM, FCCP (USA)
Head, Department of Critical care,
King George's Medical University, UP, Lko.

13. In case of technical snag/failure/breakdown the response time for the inspection should be within 24 hours and repair within 05 days otherwise provide a service machine/ alternate arrangement to be made till the period of recovery of the breakdown of the unit, failing which attracts penal action as per the decision of institute/ hospital.
14. For offered equipment the Training of technical staff and users should be performed by Original Equipment Manufacturer trained Service Engineers at the proper designated place- at bidders' cost.
15. Company should quote their latest model and need to provide an affidavit for the same.
16. As a tendering process the Demonstration of the offered Equipment is Mandatory at hospital/institute premises or other designated places at the bidder's cost.
17. The bidder must comply with the General Financial Rules and their modifications if any issued by the Government of India- 2017.
18. Any bidder from a country that shares a land border with India will be eligible to bid in the tender only if the bidder is registered with the Competent Authority (i.e., Registration certificate issued by the Ministry of Commerce and Industry (Department for Promotion of Industry and Internal Trade- DPIIT after October 2020). If any such bidder is not registered with DPIIT they will be liable for technical disqualification.
19. Principal (OEM) must authorize only one agent to be quoted in the bid otherwise multiple quotes through different agents in the same bid will be canceled.
20. The Bidder and its OEM both have to submit a notarized affidavit on the Indian Non-Judicial Stamp Paper of Rs.100/- that the bidder has not quoted the price higher than the current financial year and last financial year supplied to any government Institute/ Organization/ reputed Private Organization. OEM also has to submit that the price quoted by the bidder in the bid is on its behalf and the lowest in the current and last financial year in the country. Therefore, if at any stage it has been found that the supplier and its OEM have quoted lower rates than those quoted in this bid; the Institute (the purchaser) would be given the benefit of lower rates by the Supplier and any excess payment if any, will become immediately payable to the Institute (the purchaser). If such an affidavit is not submitted, the bid will be outrightly rejected. (Part of technical bid).
21. Guarantee / Warranty Period: Separate offers of Comprehensive Maintenance Contract (CMC on main equipment) and Annual Maintenance Contract (AMC on main equipment) for further 5 years after expiry of 5 years of warranty (i.e., 6^{th}, 7^{th}, 8^{th}, 9^{th} and 10^{th} years) in rupees only (and on basis of percentage of price) should be included in a financial bid in the absence of which the offer is liable to be rejected. Payment for CMC/AMC shall be made only after the

Prof. Avinash Agrawal
MD, IDCC, FCCM, FICA, FACCM, FCCP (USA)
Head, Department of Critical care,
King George's Medical University, UP, Lko.

expiry of the warranty of 5 years, in case the Institute (the purchaser) decides for availing of CMC/AMC services. Contract for CMC/AMC shall be decided on expiry of warranty but rates (not more than 5% inclusive of all taxes for 6th to 10th year) will be frozen at the price of an issued purchase order before the release of payment by the Institute (the purchaser). However, the Institute (the purchaser) may decide not to enter into any CMC/AMC contract without assigning any reason for the same, which shall be binding upon the bid.

Prof. Avinash Agrawal
MD, MCC, IPCCM, FICCM, FIACCM, FCCP (USA)
Head, Department of Critical care,
King George's Medical University, UP, Lko.