

**SPECIALIZED HEALTH CARE AND
MEDICAL EDUCATION
DEPARTMENT**

GOVERNMENT OF THE PUNJAB



Health Department

**PRODUCT VOCABULARY
MEDICAL STORE (PVMS) OF
RADIOLOGY EQUIPMENT**

Volume - I , 2016

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PVMS OF MEDICAL EQUIPMENT

Clinical Specialty	Radiological Equipment
Generic Name	MRI 3 T
Clinical Purpose	Where specialized studies of rapid moving structure specially in cardiac imaging is required. It is used in conditions where nerves, soft tissues, joints, musculoskeletal system and posterior fossa of brain need to be examined and also when ionizing radiations are contra indicated as well as staging of tumors.

TECHNICAL SPECIFICATIONS

Latest Generation, latest Technology High Resolution 3.0 Tesla Wide Bore, Superconducting Magnetic Resonance Imaging (MRI) system with ZERO Boil off Cryogen Technology. High Homogeneity, latest generation gradients and digital radio frequency (RF) system to be capable of all 2D & 3D routine including Neuro imaging , Body, Spine, Orthopedics, pediatrics, cardiac and peripheral vascular imaging.

MRI system should comprise of the following specifications.

PERFORMANCE

- Simultaneous scanning, image acquisition, image reconstruction, processing and filming etc.
- Capability to execute multi sequence automated scanning & post processing through simplified, Preferably single mouse-click operations.
- The system should offer Imaging packages for Neurosciences, Orthopedics, Cardiology, Angiography, Body, Breast, Oncology & Pediatric etc with following minimal capabilities at console.
- Feet-first positioning for almost all examinations possible reduces anxiety and claustrophobia.
- Window width/level controls, zoom, pan, rotate, mirror.
- Image annotation, Image arithmetic, Image measurement
- Regions of Interest (ROI) statistics (area, volume, mean and standard deviation) from user defined square, rectangular, circular, elliptical or irregular shapes.

Time Intensity analysis of dynamics/phases.

Volume calculation from contours drawn in adjacent slices.

Simultaneous visualization of up to four independent series for comparison.

Cine movie display of 20 slices / 128GB or more dynamics/phases.

Reduction of noise over images with edge enhancement.

Real-time MIP, MPR and 3D surface rendering.

Film generation of image series with capability to export to DICOM/Windows PC formats.

MAGNET

- Magnet Type: Super-Conductor
- Field strength: 3 Tesla
- Helium Boil off: Zero boil off with 10 years helium warranty
- Shielding method: Active
- Shimming Method: Active / passive

- Bore Diameter: 70cm or More
- Magnet Length: 170 cm or less
- Magnet Field Stability: 0.1 Ppm/Hr
- FOV: 5-50 cm

Other features: Operating panel on both sides of gantry with patient positioning display, laser light

- localization, In-Bore lighting & ventilation
- Magnet Homogeneity: 1.44ppm or less in 40cm DSV
- RF SYSTEM
- Transmitter Type: Digital/Optic Fiber based RF system
- Transmitter Power: 25 KW or more
- RF receiver Channels: 32 standard simultaneous independent receiving channels /direct digitization
- For 32 channels coil connectivity using optical fiber transmission.
- Gradient: 44 mT/m or more
- Slew Rate: 200 mT/m/s or more

EXAMINATION COILS

- **Whole Body** Gantry Integrated Whole Body imaging Coil
- **Head/neck** 20 Elements or more, Head Coil For Head Imaging (parallel imaging compatible)
- **Spine** 32 Element or more spine coil (parallel imaging compatible).
- **Neuro-Vascular / Coil (Head & Neck)** 28 Element Array Neuro Vascular Coil For Aortic Arch And Carotid Imaging/coil.
Combination of head / neck / spine Combination. (Parallel imaging compatible)
- **Torso Coil** 30 Element or More /with coil combination Torso coil (parallel imaging compatible)
- **General purpose OR Flex Coil** 8 elements or more
- **Dedicated OR Flexible coils**
- **Ankle** 16 elements or more (parallel imaging compatible)
- **Shoulder** 16 elements or more (parallel imaging compatible)
- **Wrist** 16 elements or more (parallel imaging compatible)
- **Knee coil** 15 elements or more. (parallel imaging compatible)
- **Breast Coil** 8 elements or more
- **Multiple Coil Connection** Able to perform whole body imaging using surface coils simultaneously

ACQUISITION PARAMETER

- Slice thickness 2D / 3D 0.1 mm to 0.5mm or better
- Parallel Imaging The system should offer parallel imaging capability (Sense/ASSET/iPAT/Speder/RAPID or equivalent)
- Acquisition matrix 1024 x 1024

PATINET COUCH AND COMFORT

- Type Detachable/fixed motorized patient table with height lowering capability (feet first)
- Weight Bearing Capacity 225 Kg or more

- Table Length 2.0 meter
- Min. Height 0.7 meter or less
- Gating VCG/ ECG Cardiac gating system, Peripheral pulse gating system, Respiratory gating system (or compatible)

- Motion Correction Motion correction for all anatomy
- Intercom Integrated Two Way Communication Between Patient & Operator
- Safety/Emergency Run Down, Safety Switches For Emergency Ramp Down Overhead couch built in camera along with LCD display.

CONSOLE / HOST/ RECON

- Standard Console, Standard Key board And Mouse, Automated Scanning capability and user friendly interface base.
- Hard Disk Capacity 1TB or more / per manufacturers highest provision Minimum storage capacity of maximum uncompressed image at 256 x 256 matrix.
- Clock speed 2.4 GHz quad core processor or better; 32 GB Ram or more
- DVD/CD R/W DVD /CD Writer must be included
- Connectivity/Networking DICOM 3.0 Query/Retrieve, Modality Work-list, Storage & Print to be Included (with licenses)
- Display Monitor 19 inches or more LCD/TFT/LED monitor (Flicker free & High Resolution)
- Word size 64 bit parallel array / 32 bit multi core processing
- Reconstruction Speed Minimum 12000 Images or FFT/Sec (256x256 Matrix) at full field of view
- All Imaging sequences and MR applications as listed below

MRI DEDICATED / Multimodality WORKSTATION

Original Workstation supplied by the Manufacturer as MRI system to be offered.(Qty to be defined by the procuring agency), with licensed software having three concurrent user licenses with necessary hardware and should be independent of MRI console)

- Standard Console Standard Key board And Mouse, user friendly interface base
- Hard Disk Capacity (1 TB or as per manufacturers highest provision /Minimum storage capacity of 250,000 uncompressed images at 256 x 256 matrix
- DVD/CD R/W DVD /CD Writer must be included
- Connectivity/Networking DICOM 3.0 Query/Retrieve, Modality Work list, Storage & Print to be included
- Display Monitor 19 inches or more LCD/TFT monitor (Flicker free & High Resolution)
- CPU & RAM Intel Quad Core processor 2.4 GHz/AMD Opteron & 12 GB RAM or as per
- Recommendation (windows XP 64 bits OS)/Linux
- Post Processing Post Processing for Basic & advanced MR applications to

be included with auto shifting of data from the console to the workstation.

STANDARD IMAGING SEQUENCES, BASIC& ADVANCED APPLICATIONS FOR CONSOLE/WORKSTATION

APPLICATION SOFTWARE:

- a. Spin Echo (single and multi-echo)
- b. Fast Spin Echo
- c. Gradient Echo
- d. Inversion Recovery, IR-STIR, FLAIR, dual IR for fat fluid and tissue suppression.
- e. Fast Inversion Recovery, Fast FLAIR
- f. Echo Planner Imaging (Single & Multi Shot)
- g. 2D & 3D FFE and 2D & 3D balanced FFE
- h. 2D & 3D TFE and 2D & 3D balanced TFE
- i. 2D & 3D TOF (including TURBO, gating)
- j. 3D Motion correction
- k. Phase Contrast 2D & 3D
- l. Fat Suppression (at least 4/5 different techniques)
- m. Contrast Enhanced MRA with automatic table movement
- n. 3D isotropic imaging
- o. Diffusion Imaging with ADC maps for application in brain and body in real time.
- p. MRCP 2D and 3D
- q. Perfusion imaging with online calculation of hemodynamic maps like mean transit time, time to peak, time of arrival etc.
- r. Brain Perfusion Arterial Spin Labeling (2D and 3D)
- s. Bolus tracking for real time synchronization of contrast bolus arrival.
- t. Single and multi shot EPI-free selection capability of single or multi shot EPI
- u. Dynamic Imaging (brain, liver, breast)
- v. Brain Volume Imaging
- w. Diffusion Tensor Imaging + Tractography
- x. Spectroscopy – Single
- y. Spectroscopy – Multi-Voxel (Brain, Breast and Prostate)
- z. Functional MRI/ (BOLD Imaging) with online processing.
- aa. Flow Analysis software with display of peak velocities
- bb. Motion Correction for all anatomy and in functional imaging.
- cc. Fluoro Triggered MRA
- dd. MPR-Multi Planner Reconstruction
- ee. Magnetization transfer imaging
- ff. Advanced volumetric imaging with T2, T2 Flair and Proton density weighted contrasts / Similar Solution.
- gg. Cartilage Mapping / Similar for non-invasive imaging method for early detection of osteoarthritis
- hh. Time Resolved Imaging in high resolution of multi-phase 3D volumes of any anatomy for fast accurate visualization of the vasculature
- ii. 3D non-contrast enhanced MRA application for brain, carotid and peripheral arterial

imaging.

- jj. 3D Arterial Spin Labeling – Non Contrast whole brain perfusion
- kk. High resolution T2 weighting for clear depiction of inner ear structures and facial nerve.
- ll. MR Elastography/relaxography or similar sequence for brain, liver, breast and prostate.
- mm. Susceptibility weighted imaging or similar software.
- nn. Fusion software

ACCESSORIES: (Procuring agency to select as per its actual requirement)

- a. MRI Compatible wheel Chairs
- b. MRI Compatible patient care monitor / display on MRI Screen
- c. MRI Compatible Trolley
- d. MRI Compatible IV Pole
- e. Metal detectors door and hand held detector
- f. Standard set of phantoms for calibration of MRI.
- g. Online pure sine Wave Double Conversion UPS (Capacity to be define by Procuring agency) for whole MRI suite, with a minimum backup time of 20 minutes on full load, (MGE, Emerson, Liebert, Chloride, Riello, APC, GE or Equivalent).
- h. Programmable, MRI Compatible Dual Head power injector with flow / volume and temperature control. Mounted on mobile base with 500 disposable syringes of 150ml capacity and connecting tubes (Medrad-Bayer, Angiomat / Madtron /Tyco or equivalent).
- i. DICOM 3 Ready Dry Laser Camera / Imager, multi-size up to 14" x 17" for different size films (Carestream, Agfa, Fuji, Konica or equivalent) for black & white printing on film, including 1,000 films.
- j. Film Viewer (x 04) for images up to 14" x 17" with variable light control and shutter, with 4 1 format ; LED type.
- k. Imported Water Chillers as per requirement of the system with standby arrangement.
- l. RF cage as per manufacturer's recommendation and according to site requirement.
- m. Audio system for patient during MRI.
- n. Renovation and up gradation of waiting area and reporting room.
- o. Two film storage cabinets (14 x 17 film holding).
- p. MR compatible stretcher.
- q. Provision of storage aluminum racks, aluminum doors with elbow action controls, paneling, lead lining, flooring, paints etc. Oxygen and suction system connection with the existing hospital pipeline. Provision of furniture (benches, LCD TV, water dispenser etc) of MRI waiting area. Complete electricity works from power station to MRI room including earthing, power racks, breakers, DB etc.
- r. POWER GENERATOR (Capacity is to be defined by Procuring Agency). Including ATS panel, Sound Proof Canopy, Foundation Pads, Earthling and cabling.
- s. MRI compatible adult / paediatrics anesthesia machine with compatible ventilator, mobile type. Two Gas Model machine (oxygen and nitrous). Oxygen Monitor, Isoflurance vaporizer. Compatible with AMBU bag. Close circuit system, Circle absorber, flow meter with sets compatible cylinders.

OPTIONALS: (Procuring agency to select as per its actual requirement)

- a. Cardiac imaging package.
- b. 4D/advanced Cardiac imaging package.
- c. MRI angiogram (cardiac), flow measurements, offline analysis, coronary imaging.
- d. Advanced Orthopedic software.
- e. Advance vascular package including 3D peripheral arterial imaging.
- f. Advance Liver imaging.
- g. The firms should quote all other optional and advanced available applications / packages for neuro, vascular / angiography, oncology, brain, abdomen, orthopedics etc.
- h. Functional imaging software and hardware.
- i. Fetal anomaly survey / Equivalent software.
- j. 48 Channel (Procuring agency to justify the requirement, in case of such specialized requirement and get approval from the competent authority before initiating the purchase)
- k. Provision of storage aluminum racks, aluminum doors with elbow action controls, paneling, lead lining, flooring, paints etc. Oxygen and suction system connection with the existing hospital pipeline. Provision of furniture (benches, LCD TV, water dispenser etc) of MRI waiting area. Complete electricity works from power station to MRI room including earthing, power racks, breakers, DB etc.
- l. POWER GENERATOR (Capacity is to be defined by Procuring Agency). Including ATS panel, Sound Proof Canopy, Foundation Pads, Earthing and cabling.
- m. MRI compatible adult / pediatrics anesthesia machine with compatible ventilator, mobile type. Two Gas Model machine (oxygen and nitrous). Oxygen Monitor, Isoflurance vaporizer. Compatible with AMBU bag. Close circuit system, Circle absorber, flow meter with sets compatible cylinders.

Note: (Procuring agency to specify, if required)

The firms may additionally quote advanced available applications / packages / Software's for neuro, vascular / angiography, oncology, brain etc separately as optional (which will not form the basis of acceptance / rejection)

PVMS OF MEDICAL EQUIPMENT

Clinical Specialty	Radiological Equipment
Generic Name	MRI 1.5 T
Clinical Purpose	It is used in conditions where nerves, soft tissues, joints, musculoskeletal system and posterior fossa of brain need to be examined and also when ionizing radiations are contra indicated as well as staging of tumors.

TECHNICAL SPECIFICATIONS

Latest Generation, latest Technology High Resolution 1.5 Tesla MRI system.

Wide Bore 60 CM or more.

MAGNET

- Magnet Type: Super-Conductor
 - Field strength: 1.5 Tesla
 - Helium Boil off: Zero boil off with 10 years helium warranty
 - Shielding method: Active /passive
 - Shimming Method; Active / passive
 - Bore Diameter: 60 cm or more.
 - Magnet Length: 170 cm or less
 - Magnet Field Stability: 0.1 Ppm/Hr
 - FOV: 5-50 cm
- Other features: Operating panel on both sides of gantry with patient positioning display, laser light localization, In-Bore lighting & ventilation
- Magnet Homogeneity: 1.2 ppm or less in 40cm DSV or 2 ppm or less in 50cm DSV

RF SYSTEM

- Transmitter Type: Digital/Optic Fiber based RF system
- Transmitter Power: 10 KW or more
- RF receive Channels: 16 Standard simultaneous independent receiving channels /direct digitization for 16 channels coil connectivity using optic fiber transmission or more.
- Gradient: 33 mT/m or more
- Slew Rate: 120 mT/m/s or more

EXAMINATION COILS

- Whole Body Gantry Integrated Whole Body imaging Coil
- Head/neck 11 Elements or more, Array Head Coil For Head Imaging (parallel imaging compatible)
- Spine 12 Element or more spine coil (parallel imaging compatible)
- Neuro-Vascular / Coil 16 Element Array Neuro Vascular Coil For Aortic Arch And Carotid Imaging / Coil Combination of head/neck/spine Combination

- Torso Coil 16 Element or More /with coil combination Torso coil (parallel imaging compatible).
- General purpose / Flex Coil 8 elements or more
- **Dedicated coils**
- Ankle 16 elements or more (parallel imaging compatible) / Flex Coil
- Shoulder 6 elements or more (parallel imaging compatible)
- Wrist 6 elements or more (parallel imaging compatible)
- Knee coil 8 elements or more. (parallel imaging compatible)
- Breast Coil 8 elements or more
- Multiple Coils Connection At least 3 coils (Head, body & Spine) must be connectable simultaneously.

ACQUISITION PARAMETER

- Slice thickness 2D /3D 0.1 mm to 0.5mm or better
- Parallel Imaging The system should offer parallel imaging capability (Sense/ASSET/iPAT/Speeder/RAPID)
- Acquisition matrix 1024 x 1024

PATIENT COUCH AND COMFORT

- Type Motorized patient table with height lowering capability
- Weight Bearing Capacity 150 Kg or more
- Table Length 2.0 meter
- Min. Height 0.7 meter or less
- Gating ECG Cardiac gating system, Peripheral pulse gating system, Respiratory gating System or VCG or compatible.
- Motion Correction Motion correction for all anatomy
- Intercom Integrated Two Way Communication Between Patient & Operator
- Safety /Emergency Run Down, Safety Switches For Emergency Ramp Down
- Feet first scanning Overhead/ couch built in camera along with LCD display (CONSOLE / HOST/ RECON)
- Standard Console Standard Key board And Mouse, Automated Scanning capability and user friendly interface base
- Hard Disk Capacity 1TB or more /or manufacturers maximum specified with minimum storage capacity of 250, 000 uncompressed image at 256 x 256 matrix.
- DVD/CD R/W DVD /CD Writer must be included
- Connectivity/Networking DICOM 3.0 Query/Retrieve, Modality Worklist, Storage & Print to be included.
- Display Monitor 19 inches or more LCD/TFT monitor (Flicker free & High Resolution)
- Reconstruction Speed Minimum 5000 Images or FFT/Sec (256x256 Matrix) at full field of view
- Image Reconstruction Intel Quad Core/AMD Opteron & 8GB RAM or more CPU & RAM
- All Imaging sequences and MR applications as listed below

MRI DEDICATED WORKSTATION

Original Workstation supplied by the Manufacturer as MRI system to be offered. (Qty to be defined by the procuring agency) or thin client solution offering same functionality with licensed software having three concurrent user licenses with necessary hardware)

- Standard Console Standard Key board And Mouse, user friendly interface base
- Hard Disk Capacity 400GB or more / Minimum storage capacity of 400,000 uncompressed image At 256 x 256 matrix.
- DVD/CD R/W DVD /CD Writer must be included
- Connectivity/Networking DICOM 3.0 Query/Retrieve, Modality Worklist, Storage & Print to be included
- Display Monitor 19 inches or more LCD/TFT monitor (Flicker free & High Resolution)
- CPU & RAM Intel Quad Core/AMD Opteron & 12 GB RAM or as per manufacturer
- Recommendation or Linux OS.
- Post Processing Post Processing for Basic & advanced MR applications to be included.

APPLICATION SOFTWARE:

- a. Spin Echo (single and multi-echo)
- b. Fast Spin Echo
- c. Gradient Echo
- d. Inversion Recovery, IR-STIR, FLAIR, dual IR for fat fluid and tissue suppression.
- e. Fast Inversion Recovery, Fast FLAIR
- f. Echo Planner Imaging (Single & Multi Shot)
- g. 2D & 3D FFE and 2D & 3D balanced FFE
- h. 2D & 3D TFE and 2D & 3D balanced TFE
- i. 2D & 3D TOF (including TURBO, gating)
- j. 3D Motion correction
- k. Phase Contrast 2D & 3D
- l. Fat Suppression (at least 4/5 different techniques)
- m. Contrast Enhanced MRA with automatic table movement
- n. 3D isotropic imaging
- o. Diffusion Imaging with ADC maps for application in brain and body in real time.
- p. MRCP 2D and 3D
- q. Perfusion imaging with online calculation of hemodynamic maps like mean transit time, time to peak, time of arrival etc.
- r. Brain Perfusion Arterial Spin Labeling (2D and 3D)
- s. Bolus tracking for real time synchronization of contrast bolus arrival.
- t. Single and multi shot EPI-free selection capability of single or multi shot EPI
- u. Dynamic Imaging (brain, liver, breast)
- v. Brain Volume Imaging
- w. Diffusion Tensor Imaging + Tractography
- x. Spectroscopy – Single
- y. Spectroscopy – Multi-Voxel (Brain, Breast and Prostate)

- z. Flow Analysis software with display of peak velocities
- aa. Motion Correction for all anatomy and in functional imaging.
- bb. Fluoro Triggered MRA
- cc. MPR-Multi Planner Reconstruction
- dd. Magnetization transfer imaging
- ee. Advanced volumetric imaging with T2, T2 Flair and Proton density weighted contrasts / Similar Solution.
- ff. Cartilage Mapping / Similar for non-invasive imaging method for early detection of osteoarthritis.
- gg. Time Resolved Imaging in high resolution of multi-phase 3D volumes of any anatomy for fast accurate visualization of the vasculature.
- hh. 3D non-contrast enhanced MRA application for brain, carotid and peripheral arterial imaging.
- ii. 3D Arterial Spin Labeling – Non Contrast whole brain perfusion.
- jj. High resolution T2 weighting for clear depiction of inner ear structures and facial nerve.
- kk. Susceptibility weighted imaging or similar software.

Accessories: (Procuring agency to select as per its actual requirement)

- a. MRI Compatible wheel Chairs
- b. MRI Compatible patient care monitor / display on MRI Screen
- c. MRI Compatible Trolley
- d. MRI Compatible IV Pole
- e. Metal detectors door and hand held detector
- f. Standard set of phantoms for calibration of MRI.
- g. Online pure sine Wave Double Conversion UPS (Capacity to be define by Procuring agency) for whole MRI suite, with a minimum backup time of 20 minutes on full load, (MGE, Emerson, Liebert, Chloride, Riello, APC, GE or Equivalent).
- h. Programmable, MRI Compatible Dual Head power injector with flow / volume and temperature control. Mounted on mobile base with 500 disposable syringes of 150ml capacity and connecting tubes (Medrad-Bayer, Angiomat / Madtron /Tyco or equivalent).
- i. DICOM 3 Ready Dry Laser Camera / Imager, multi-size up to 14" x 17" for different size films (Carestream, Agfa, Fuji, Konica or equivalent) for black & white printing on film, including 1,000 films.
- j. Film Viewer (x 04) for images up to 14" x 17" with variable light control and shutter, with 4 1 format ; LED type.(Qty-02)
- k. Imported Water Chillers as per requirement of the system with standby arrangement.
- l. RF cage as per manufacturer's recommendation and according to site requirement.
- m. Audio system for patient during MRI.
- n. Renovation and up gradation of waiting area and reporting room.
- o. Two film storage cabinets (14 x 17 film holding).
- p. MR compatible stretcher.

OPTIONAL:

- a. MR Elastography / Relaxometry or similar sequence for body.
- b. Cardiac imaging package.
- c. 4D / Advanced Cardiac imaging package.
- d. MRI angiogram, flow measurements, offline analysis, coronary imaging.
- e. Advanced orthopedic software.
- f. Advance vascular package including 3D peripheral arterial imaging.
- g. Advance Liver imaging.
- h. Functional MRI/ (BOLD Imaging) with online processing.
- i. Fetal anomaly survey/ equivalent software.
- j. Fusion software.
- k. Provision of storage aluminum racks, aluminum doors with elbow action controls, paneling, lead lining, flooring, paints etc. Oxygen and suction system connection with the existing hospital pipeline. Provision of furniture (benches, LCD TV, water dispenser etc) of MRI waiting area. Complete electricity works from power station to MRI room including earthing, power racks, breakers, DB etc.
- l. POWER GENERATOR (Capacity is to be defined by Procuring Agency). Including ATS panel, Sound Proof Canopy, Foundation Pads, Earthing and cabling.
- m. MRI compatible adult/Pediatrics anesthesia machine with compatible ventilator, mobile type. Two Gas Model machine (oxygen and nitrous). Oxygen Monitor, Isoflurance vaporizer. Compatible with AMBU bag. Close circuit system, Circle absorber, flow meter with sets compatible cylinders.
- n. 70cm bore system
- o. 32-Channel system

Note: (Procuring agency to specify, if required)

The firms may additionally quote advanced available applications / packages / Software's for neuro, vascular / angiography, oncology, brain etc separately as optional (which will not form the basis of acceptance / rejection)

PVMS OF MEDICAL EQUIPMENT

Clinical Specialty	Radiological Equipment
Generic Name	Whole body Multi Slice CT Scan 128 Slice
Clinical Purpose	It is used in cases of head trauma, bone diseases, abdominal and chest imaging as well as staging of tumors and gastrointestinal studies.

TECHNICAL SPECIFICATIONS

GANTRY

System should be capable of Acquiring /Generating 128 slices per gantry rotation in real time.
Gantry bore / aperture to be at least 70 cm or more.

Minimum gantry rotation time to be at least 0.35 seconds or better, for 128 slices per 360 degree rotation, for all applications.

All the firms should quote their latest model scanner with shortest rotation time Breath holding time 05 sec or less in cardiac scan.

System should be able to acquire helical OR sequential scan with the gantry tilted from the vertical.

Gantry tilt range must be + 30 degree.

Maximum scan field of view to be at least 50 cm. For Paeds & Children the system should be able to reduce the field of view to 250 mm.

Minimum slice thickness 0.625 mm or better in Helical mode.

Dual Control (including tilt,) of gantry and table from the gantry-housing and console.

TUBE

Heat storage capacity of at least 7 MHU or better. Generator output of up to 550mA or more.

Active collimation during scanning.

GENERATOR

High frequency power generator with minimum power of at least 70 KW or more should be capable of variable kV setting in steps from 80 to 135/140 KVP.

Should have ability to vary the power (mAs) automatically in steps Real-time dose reduction hardware / software and with ECG modulation Iterative dose reduction must be offered.

Low contrast detect ability (LCD) calculated on a CATPHAN 20 cm, of 5 mm resolution with a CT No. of 3 HU (0.3 %) or better, contrast difference

Scan Length of at least 1.7 meters or more of helical or axial scan in a single acquisition.

Maximum Scan Time 100sec. or better.

DETECTORS

Solid state crystal / ceramic detectors with conversion efficiency (x-ray to signal strength) of nearly 98% latest technology.

Isotropic voxel size of 0.35 mm or better, in all three axis.

Minimum 64 Detectors and detector electronics capable of providing 128 slices per gantry

rotation.

Detectors width 38 mm or more.

COUCH

Dual motorized control (from console and gantry) of table movements in horizontal and vertical axis.

Maximum weight allowed on the couch up to 200 kg or more Horizontal movement speed up to 100 mm per second.

Single acquisition scan range of at least 1.8 meter.

Scan with at least 0.25 mm accuracy / reproducibility on a 200 kg patient.

Lateral movement table.

CONSOLE COMPUTER

System architecture and operating system must be based on latest technology.

(64 bit RISC or Dual Xenon Processor PC) original.

Multitasking and parallel processing CPU system.

At least 8 GB RAM or more

Hard disc capacity for image storage of at least 500 GB or more.

Capable of storing at least 3000 raw data files / rotations or 700 GB raw data / 450000 images in 512 x 512 format.

Reconstruction of at least 25 images FRAMES per seconds or better at 512 x 512 matrix. Image area display matrix dimensions (1024 x 1024).

Console color monitor (X 02), LCD of at least 19 inches, medical grade with maximum viewing angle.

DVD and CD writer

SOFTWARE:

- a. All the latest whole body & cardio-vascular software should be supplied as standard which is available at the time of shipment original with their part No of company.
- b. USER INTERFACE SOFTWARE True isotropic volume acquisition
- c. Prospective and retrospective ECG gated acquisition
- d. Variable Delay algorithm like fixed percent delay (FPD) and fixed offset delay (FOD) or
- e. better, for selection of period of least motion in cardiac cycle (temporal resolution of 44 milli second or less will be preferred)
- f. Automated contrast media bolus tracking software.
- g. 3D Reconstruction Display Original Company Software.
- h. Maximum and minimum intensity projections
- i. Multi-planer and curved planer reconstruction
- j. 3D shaded surface display
- k. 3D volume rendering software
- l. 3D virtual endoscopy, colonoscopy with lumen / fillet view /electronic cleansing / auto segmentation of the colon and bronchoscopy.
- m. 3D cone beam correction.

CT Angiography:

- a. Basic Comprehensive Brain perfusion analysis.
- b. Image reconstruction Automatic real time dose adjustment according to the body

attenuation i.e. core 4D dose/longitudinal dose workstation/ 40 boost/ sure exposure 3D/ organ specific dose modulation or similar.

- c. Artifact reduction algorithm.
- d. Automatic control of tube current over high and low attenuation areas for patient dose reduction software for low dose to patient original / certified.
- e. Iterative Dose Reduction Software.
- f. Bone removal software.
- g. Mattel artifact reduction software.
- h. Dental CT
- i. optimal dual energy to be separately quoted.

WORK-STATION- (Qty to be defined by the procuring agency) thin client server (work station with 03 license users)

Independent, automatic multimodality, fully functional. All companies will supply the Work-stations by the manufacturer that they provide world-wide as a standard. Work-stations will be supplied from manufacturer of CT to ensure similar work flow.

High speed link to operator console on DICOM network

System architecture and operating system

- a. Dual processor Xeon
- b. 2.66 GHz or more speed
- c. 512 cache or more
- d. Graphic card and network card

Original Licensed software: Window XP/7/8 or Linux, MS Office 2013, Norton / equivalent antivirus (current and upgradeable for at least for the time of warranty)

Should have at least one high resolution LCD monitor (medical grade as recommended by the manufacturer) of 18 inch or more

DVD RW (super-drive will be preferred)

DICOM-3 viewer with universal PC display capability (licensed)

WORKSTATION SOFTWARE

(original with certificate) with thin client, server with three concurrent users).

Software up-gradation of all existing applications for at least next 05 years will be provided free of cost. Following software will be provided at the workstation of the same origin as are being used in USA/EUROPE & JAPAN. 3D Reconstruction display.

- a. UPS 3 KVA (x 03), Branded, dry battery capable of providing 20 minutes of back-up for workstations (MG, APC, MC, Chloride, Riello, Emerson). The dry batteries will be included in company warranty.
- b. Heavy duty Laser black and white printer (qty: 3) A4 /letter size 2400 dpi or higher, two paper trays for A4/ letter size media, (HP, Lexmark, Xerox, CANNON) network-ready DICOM
- c. DICOM 3 ready (multi-vendor and multimodality compatible for send, receive, archive, retrieve and print, on main console and workstations).

UPGRADE-ABILITY

All vendors will quote their latest and best system.

The system should have a software upgrade route to higher versions with undertaking of above two by the principal manufacture, that is their latest version been used in USA/EU & Japan.

POWER REQUIREMENT

Three phase with line voltage of 380-440V, 50Hz.

ACCESSORIES: (Procuring agency to select as per its actual requirement)

Programmable, dual head power injector with flow/volume and temperature control.

Mounted on mobile base, with 500 syringes of 150 ml capacity and connecting tubes (Medrad, Medtron / Mallen, Nemoto).

DICOM 3 ready dry laser camera / imager, Multi-size up to 14 x17 in. (Agfa, Fuji, Kodak/Carestream, Konica) for black and white printing on films including 5000 films.

FILM VIEWER (x 08) for images up to 14 x 17 inch with variable light control and shutters for control of viewing area, with 04 x 1 format MEDICANVAS, MAVIA

On-line sine wave UPS for whole CT suite, with a minimum back-up time of 30 minute on full load including air-conditioning system.

Air conditioners Two Ton each for UPS room office and waiting area lights/fans etc.

Protection devices:

Lead aprons with hangers.

Lead-gloves

Lead goggles

Thyroid Shields all 0.5 mm lead equivalent European & Japanese.

Lead glass for control room , 0.5 mm lead equivalent.

Standard set of Phantoms for calibration of CT

Pediatric scanning package - software and hardware original.

Cardiac defibrillator.

Dedicated Cardiac Monitor for synchronize with cardiac scan.

Pulse oximeter.

ECG machine, multichannel (three channel)

Cardiac Resuscitation trolley completely equipped with all necessary items.

TABLE ACCESSORIES – Table pads, arms rest, patient restraint kit, IV pole, infant cradle, flat head holder, ceiling mounted hand holder patient (original accessories from the vendor)

Digital Transcription system for reporting (hand held units – x 03, and Complete steno-type desktops unit (x 02)

OPTIONAL:

Fat software OR Equivalent.

SITE PREPARATION/INSTALLATION:

Complete Site renovation of CT, Console and UPS room, including lead shielding of the CT room and doors, Air-Conditioning, False ceiling, painting, Antistatic flooring,

Electrical DB, Earthing and Power cable from Main Transformer / Hospital

LT Panel Will be the responsibility of the supplier. The installation will be a turnkey project and any modification in the existing site will be the responsibility of the firm. The firm will be responsible for complete interface free installation keeping in view the requirement and recommendation of manufacturers and its surroundings to ensure artifacts examinations/procedures.

Note: (Procuring agency to specify, if required)

The firms may additionally quote advanced available applications / packages / Software's for neuro, vascular / angiography, oncology, brain etc separately as optional (which will not form the basis of acceptance / rejection)

APPROVED PVMS

PVMS OF MEDICAL EQUIPMENT

Clinical Specialty	Radiological Equipment
Generic Name	Whole body Multi Slice CT Scan 16 Slices
Clinical Purpose	It is used in cases of head trauma, bone diseases, abdominal and chest imaging as well as staging of tumors and gastrointestinal studies.

TECHNICAL SPECIFICATIONS

GENERAL:

Latest Generation Whole Body CT Scanning machine for general purpose, multi-slice technology of 16-Slice per rotation with helical/spiral scanning capabilities.

GANTRY:

Gantry Bore diameter 70 cm or more.
Tilt at least + 30o from the normal position.
Minimum scan length of the table should be 1500 mm.
Spiral scan duration up to 100 sec.
FOV: Maximum field of view to be 50cm.

X-RAY GENERATOR:

The X-Ray generator should be of 50 KW or more.
High frequency type generator.
KV range selectable between 80KvP and 135kVP or more. Current range of 20mA to 400 mA or more.

ROUTINE SCAN TIME:

0.5 Second or less for 360 degree scan.

DETECTORS:

Should be ultra fast solid state / ceramic detector, compatible with multi slice CT scanner.
Low contrast detectability of 5mm at contrast difference of 3HU(0.3%).

SLICE THICKNESS / COLLIMATION:

Multiple slice thickness options, selectable with minimum slice thickness of 0.625mm to or better.

X-RAY TUBE:

Anode heat storage capacity should be at least 5.0 MHU or equivalent.

COOLING SYSTEM:

Water to water / oil / air heat exchanger for the dissipation of heat generated in the gantry.

TABLE:

Motorized table with weight bearing capability of 180 kg or more.

HELICAL MODE:

Full range of all helical / spiral studies / capabilities should be included.

SYSTEM COMPUTER:

Quad Core Xeon Processor 2.33GHz/64 Bit RISC or better with compatible software. System architecture and operating system must be based on latest capacity.
Multitasking and parallel processing CPU system with 64-bit word.
Hard drive capacity should be 300 GB or more. Storage capacity should be 200,000 images or

more.

Access to raw data files and images should be available.

Image zoom, pan, evaluation, measurement and annotation facilities should be present. Image reconstruction speed of 15 images / sec for 512 x 512 matrix.

Real time MPR / Multi-planner reformatting.

DVD/CDR/MOD storage device (re-writeable) should be available.

Compatible keyboard.

OPERATOR CONSOLE:

High resolution flicker free LCD 19" or more color monitor of 1024 x 1024 or better display matrix with keyboard and mouse control.

Intercom for patient monitoring and instructions.

CT ANGIOGRAPHY:

Injector required for CT Angiography along with compatible software should be available.

3-D IMAGE RECONSTRUCTION:

Software should be available in main console.

FOLLOWING LATEST FEATURES/SOFTWARE ARE REQUIRED ON CONSOLE:

Pediatric scanning system to reduce radiation dose to the children.

Perfusion CT for stroke evaluation.

Contrast media synchronization software.

Full Color Volume Rendering 3D at Console and workstation.

ISOTROPIC volume Acquisition at Console. CT Angio both at Console and workstation.

Vessel Stenosis Analysis at Console and workstation. 3D Surface Rendering at Console and workstation.

Curved Planner Performance at Console.

Virtual Endoscopy/Colonoscopy/Bronchoscopy at workstation and console.

Cerebral Blood Flow/Head Perfusion at Console and workstation. Lung Volume Analysis Software.

Pediatric Scanning Package.

Fly Through Software at workstation and console.

CT Fluoroscopy with real time imaging and display at least 6 frames / sec with required hardware and software. One high resolution TFT monitor 15" or more in CT room on mobile base or ceiling mounted.

Iterative Dose Reduction Software

Mottle artifact reduction software

NETWORKING AND DICOM FEATURES:

DICOM Send / Receive.

DICOM Query / Retrieve.

DICOM print.

DICOM Get work list.

POWER REQUIREMENT:

Three phase with line voltage of 220, 50Hz.

Accessories: (Procuring agency to select as per its actual requirement)

Patient observation and monitoring camera (CCTV).

Infant cradle, axial head holders, security straps, arm rest, table cushion, IV Pole, phantoms and

phantom petitioners.

Separate DICOM-3 compatible, workstation (all the companies shall provide the s workstation which is supplied by them in USA, Europe and Japan) for Doctor's office providing facilities for image viewing, analysis and reporting with 18" or more LCD color monitor.

It should have software for the quantitative evaluation of brain perfusion, 3-D volume and surface rendering and vessels stenosis analysis software.

Lead glass 5 x 3 feet.

Programmable power injector with flow/volume and temp control. Mounted on mobile base with 200 syringes of 150ml capacity and connecting tubes (Medrad-Bayer, Angiomat or equivalent).

Broad band connectivity for remote diagnosis.

Protection devices:

Lead aprons (03) with hangers, lead gloves (03 pairs) (0.5mm Pb. equivalent, weight).

LASER IMAGING SYSTEM:

Up to 14 x 17" film. Dry processing type printer. DICOM-3 compliant.

UPS FOR CT SCAN SYSTEM:

Compatible full load online sine wave UPS with minimum 10 minutes back up time.

IGBT based with isolation Transformer.

Optional:

Bone mineral density.

Fat Software OR equivalent.

SITE PREPARATION:

Complete Site renovation of CT, Console and UPS room, including lead shielding of the CT room and doors, Air-Conditioning, False ceiling, painting, Antistatic flooring, Electrical DB, Earthing and Power cable from Main Transformer / Hospital LT Panel will be responsibility of the supplier. The installation will be a turnkey project and any modification in the existing site will be the responsibility of the firm. The firm will be responsible for complete interface free installation keeping in view the requirement and recommendation of manufacturers and its surroundings to ensure artifacts examinations/procedures.

System must be software upgradeable.

Note: (Procuring agency to specify, if required)

The firms may additionally quote advanced available applications / packages / Software's for neuro, vascular / angiography, oncology, brain etc separately as optional (which will not form the basis of acceptance / rejection)

PVMS OF MEDICAL EQUIPMENT

Clinical Specialty	Radiological Equipment
Generic Name	CT SIMULATOR
Clinical Purpose	To help in the advance specific and better applications of certain imaging protocols like Hepetobieiliry, lung module, cerebrum perfusion.

TECHNICAL SPECIFICATIONS

GANTRY

- Gantry bore to be at least 85 cm or more.
- Minimum gantry rotation speed to be at least 0.5 sec for 16 slices per 360 degree rotation or better.
- System should be able to acquire helical spiral scan.
- Maximum field of view to be 60cm or more.
- Minimum slice thickness for 16 slices: 0.60 mm or better.

TUBE

- Heat storage capacity of at least 7.0 MHU.
- Anode heat dissipation of at least 1000 kHU/minute.
- Generator output of at least 500mA or more.

GENERATOR & DETECTOR

- High frequency type. Maximum power of at least 60 kW or more.
- Dose reduction hardware/software.
- Calculate patient dose in milli-Gray preferably before axial acquisition.
- Low contrast delectability (LCD) calculated on a catphan CT phantom of 3mm resolution with a CT Number of 3 HU (0.3%) contrast difference.
- Scan length of at least 1.7 meters of helical or axial scans in a single acquisition.

TABLE

- The Flat Carbon Fiber Table Top.
- Single acquisition scans range of at least 1.7 m.
- Scans with at least 0.25 mm accuracy on a 180 Kg patients or more.

CONSOLE COMPUTER

- System architecture and operating system must be based on latest technology.
- Multi tasking and parallel processing CPU system. Dual Xeon processor.
- At least 200 GB of storage space or more.
- Capable of storing at least 3000 raw data files per rotation or 100 GB raw data.
- Spiral reconstruction at 20 images/frames per second or better at 512 x 512 matrix.
- Console monitor of color 19" LCD type. Dual monitors to be provided one for acquisition and the other for display.
- DVD and CD writer .

ADDITIONAL WORKSTATION (Same as recommended by manufacturer and supplied Worldwide by them) Qty-2

- High-speed links to the operator console on DICOM network.
- System architecture and operating system must be based on latest Dual Xeon processor of 2.6 GHz with 512 cache.
- Should have one Hi-resolution LCD/TFT screen of 19 inch or more.
- CD / DVD writer
- DICOM viewer with universal PC display capability (licensed).
- Color laser printer, A4 size, and high resolution.

SOFTWARES

- Full color volume rendering 3D both at console and workstation.
- True isotropic volume acquisition both at console and workstation.
- Vessel stenosis analysis at workstation.
- 3D surface rendering both at console and workstation
- Curved planer reformation at console.
- Contrast media based synchronizing software at console.
- Bone mineral density with phantom at console.
- Brain perfusion both at console and workstation.
- Pediatric scanning package.
- Lung nodule analysis
- ITETRAIVE DOES REDUCATION SOFTWARE:
- Mattel artifact reeducation software

NOTE: Console and workstation should be capable of independent working.

DICOM 3 Capability

- DICOM 3 Capability for Send, Receive, Archive, Retrieve and Print.

POWER REQUIREMENT

- Three phase with line voltage of 220 V, 50Hz.

Multi slice CT Fluoroscopy

- Multi slice CT Fluoroscopy with real time imaging with required hardware & software. One high resolution in room LCD monitor of at least 15 inches or more on mobile base / ceiling suspended.

Accessories: (Procuring agency to select as per its actual requirement)

DICOM compatible Dry Laser/Thermal camera, multi size up to 14" x 17".

- DICOM Film Printer/ Imager.
- Set of Moving Lasers (at least 3) with its software and its connectivity license with your TPS.
- On line compatible sine wave UPS for whole system with a minimum back up of 30

minutes on full load.(Emersion, Riello, APC,G.E.)

- Protection device (Lead aprons 04 with hangers, Lead Gloves 04 pairs, 0.5 mm Pb Equivalent light weight).
- Lead glass for control room 5x3 feet 0.5 mm Pb. Equivalent.
- Dual head programmable Power injector with flow/volume and temp control capable of simultaneous injection of both contrast and saline. Mounted on mobile base with 100 syringes of 150 ml capacity and connecting tubes.
- RT models of CT Scanners.
- Standard set of phantoms for calibration of CT.
- X-ray markers.

Optional:

CT Angio both at console and workstation including Coronary Angiography.

Virtual endoscopy / colonoscopy / bronchoscopy at workstation.

Dental CT at workstation / console.

Calcium scoring (coronary) with ECG / VCG gating and capability for prospective and retrospective reconstruction complete cardiac phase editing and function analysis.

Vessel Plaque analysis software for differentiating between hard and soft plaque automatically.

SITE PREPARATION:

Complete Site renovation of CT, Console and UPS room, including lead shielding of the CT room and doors, Air-Conditioning, False ceiling, painting, Antistatic flooring, Electrical DB, Earthing and Power cable from Main Transformer / Hospital LT Panel will be responsibility of the supplier. The installation will be a turnkey project and any modification in the existing site will be the responsibility of the firm. The firm will be responsible for complete interface free installation keeping in view the requirement and recommendation of manufacturers and its surroundings to ensure artifacts examinations/procedures.

PVMS OF MEDICAL EQUIPMENT

Clinical Specialty	Radiological Equipment
Generic Name	Digital Color Doppler (High End).
Clinical Purpose	It is immediately available imaging modality with its main use in obstetrical and antenatal care likewise in conditions when ionizing radiations are contra indicated.

TECHNICAL SPECIFICATIONS

Color Doppler with Fully Digital Beam former having 2D / M-Mode and Doppler Facilities, (PW, HPRF, & Color Flow Imaging) with High Resolution Imaging Doppler Signal Quality; having DICOM Compatibility and Upgradeable to CW and 4D Imaging in Convex, Linear and Endocavity Probe.

1) **B-MODE Specification:**

- a) Sector Scan Angle Variable in Four Steps.
- b) Viewing Depth: 30 cm Minimum (Both in B & W and Color).
- c) Frame Rate: 500 f/sec or more
- d) Built-in cine loop with ability to vary reverse and slow motion of display; Internal Memory 2000 / 200MB or more Color Images.
- e) Real time and Freeze Image Magnification at least 10X or more with panning for Real, Freeze and Memorized Images.

2) **M-MODE SPECIFICATION:**

- a) Magnification: X2 or more.
- b) Sweep Speed: Slow, Medium and Fast.
- c) Color Display of M-Mode.

3) **D-MODE SPECIFICATION:**

- a) Pulse-Wave Doppler Measureable Velocity Range.
- b) HPRF Doppler.
- c) **CONTINUOUS-WAVE DOPPLER:**
 - Measurable Velocity Range: Steerable.
 - Must have Doppler Beam Steering and Bi-Directional Stereo-Audio.
- d) Colorized Spectrum Display.
- e) Automatic Baseline and Velocity Range Control.
- f) Live Measurements for Doppler Spectrum.

4) **COLOR DOPPLER MODE SPECIFICATIONS :**

- Both CW and PW Doppler must be Continuous Steerable in the Color Blood Flow Image Mode in Real Time.
- 2D Image with Color, CW and PW Doppler.
- Windows based System for easy usage with Programmable Control Panel Keys.
- Tissue Harmonic Imaging with 4THI or more Frequency.

- Power Doppler.
- Triplex Mode for Simultaneous Display of Color B/M and D-Mode Displays.
- 200 db system dynamic range or more.

5) **MEASUREMENT PACKAGE:**

To provide Comprehensive Software Package for Measurement of Distance, Circumference, Area, Time Depth, ANGLE, Velocity, Frequency, Heart Rate, Volumes, Nuchal Thickness/ Measurement Software to be Provided as a Standard.

6) **SYSTEM COMPLETE WITH FOLLOWING FACILITIES AND ACCESSORIES:**

- 19-Inches Minimum LCD / LED Color Monitor, with Resolution 1280 x 1024 Pixels minimum.
- Foot-Switch.
- 3 to 4 Active Transducer Connector for Tran thoracic Probes DVD / CD Drive for Image Storage to be Built-in to the System.
- 100 GB or more Hard Disk Drive to be Built-in to the System.
- Built-in DICOM Compatibility. (3.0 with all components)
- Touch Command Screen Control at least 8-inches LCD / TFT or more.
- Full DICOM (Upgradable)

Probes must be supplied by same manufacturer.

7) **UPGRADEABILITY :**

- System Software must be Upgradable.

8) **STANDARD PROBES :**

- 2 – 6 MHz Multi-Frequency Convex Probe for B/M/CDI/PW and Shearwave Elastography.
- 5-9 MHz Multi-Frequency Linear Probe with shearwave elastography.
- TVS/ENDOCAVITORY Color PROBE

NOTE: All Probes must be supplied by same Manufacturer.

9) **STANDARD RECORDING DEVICES:**

- Thermal Paper Printer with fifty Rolls of Paper (Black & White). WITH HD
- CINEWAVE UPS Online with 30 minutes back up time for the System.(IMPORTED)

10) **Tissue Doppler Imaging Mode.**

11) **Pure Wave / Pulse Inversion / Differential Tissue Harmonic Imaging to Enhance Effective Wide Band Frequency Range to provide Simultaneously Spatial Resolution, Contrast Resolution and increased Penetration using Two Transmission Pulses at Different Frequencies Simultaneously and Reception at Harmonic as well as Differential Component.**

12) **Auto Image Optimization / Quick Scan Imaging for Automatic STC / GAIN and Doppler Spectrum Adjustment with Optimal Image Quality by using One Touch Operation.**

13) **B-Flow / Dynamic Flow Imaging / E-Flow / Clarify.**

14) **Trapezoid Imaging / Virtual Convex Imaging with Linear Probe.**

15) **Compound / Aplipure Imaging for THI/both Frequency Compounding and Spatial**

Compounding in B/W and Color Mode.

- 16) Panoramic / SIESCAPE / Logic view Imaging with Measurements.
- 17) TISSUE CONTRAST ENHANCEMENT SOFTWARE/SPECTRAL REDUCTION
- 18) N-Sight / Adaptive Suppression / Precision Imaging /Cross beam / XFlow or equivalent to Enhance B-Mode Imaging, Xress / Ccare / DTCE or equivalent Detailed in Layers and Boundaries and Sharpened Outlines of the Lesions and reduce Cluttering.
- 19) Micro CPA / Superb Micro Imaging/vascular enhancement/B flow with Color/spectral to Clearly Show Blood Flow in tiny Vessels,
- 20) Shear wave Elastography with Quantification for body Organs specially Liver with Convex & Linear Probes to visualize Tissue Stiffness by Generating Images through Shear Wave Propagation.
- 21) Live Strain Rate Elastography with Quantification for Body Organs Specially Breast to Visualize Lesions.
- 22) Voltage : 220V – 240V, 50 – 60 HZ

Accessories :

1. Thermal Printer 256-Gray scale (Sony, Mitsubishi or equivalent)
3. UPS: on line with sine waves 2 KVA with thirty minutes back up time. (IMPORTED)
3. 50 High Density / High Glossy thermal paper Rolls
4. Gel: 20 liters

Optional:

7-14 MHz Multi-Frequency Linear Probe for B/M/CDI/PW
Fusion Imaging of CT / MRI 3D Volume DATA to Synchronize with Ultrasound Imaging. Complete with Hardware /needle navigation with tracking system.
Contrast Harmonic Imaging Upgradable.

PVMS OF MEDICAL EQUIPMENT

Clinical Specialty	Radiological Equipment
Generic Name	DIGITAL COLOR DOPPLER (LOW END).
Clinical Purpose	It is immediately available imaging modality with its main use in obstetrical and antenatal care likewise in conditions when ionizing radiations are contra indicated.

TECHNICAL SPECIFICATIONS

Color Doppler with Fully Digital Beam former having 2D / M-Mode and Doppler Facilities, (PW, HPRF, & Color Flow Imaging) with High Resolution Imaging Doppler Signal Quality; having DICOM Compatibility and Upgradeable to CW and 4D Imaging in Convex, Linear and Endocavity Probe.

1) **B-MODE Specification:**

- a) Viewing Depth: 30 cm Minimum (Both in B & W and Color).
- c) Frame Rate: 500 f/sec or more
- d) Built-in cine loop with ability to vary reverse and slow motion of display; Internal Memory 2000 / 200MB or more Color Images.
- e) Real time and Freeze Image Magnification at least 10X or more with panning for Real, Freeze and Memorized Images.

2) **M-MODE SPECIFICATION:**

- a) Magnification: X2 or more.
- b) Sweep Speed: Slow, Medium and Fast.
- c) Color Display of M-Mode.

3) **D-MODE SPECIFICATION:**

- a) Pulse-Wave Doppler Measureable Velocity Range.
- b) HPRF Doppler.

c) **CONTINUOUS-WAVE DOPPLER:**

- Measurable Velocity Range: Steerable.
- Must have Doppler Beam Steering and Bi-Directional Stereo-Audio.

d) Colorized Spectrum Display.

e) Automatic Baseline and Velocity Range Control.

f) Live Measurements for Doppler Spectrum

4) **COLOR DOPPLER MODE SPECIFICATIONS :**

- Both CW and PW Doppler must be Continuous Steerable in the Color Blood Flow Image Mode in Real Time.
- 2D Image with Color, CW and PW Doppler.
- Windows based System for easy usage with Programmable Control Panel Keys.
- Tissue Harmonic Imaging with 4THI or more Frequency.
- Power Doppler.
- Triplex Mode for Simultaneous Display of Color B/M and D-Mode Displays.
- 200 db system dynamic range or more.

5) **MEASUREMENT PACKAGE:**

To provide Comprehensive Software Package for Measurement of Distance, Circumference, Area, Time Depth, ANGLE, Velocity, Frequency, Heart Rate, Volumes, Nuchal Thickness/ Measurement Software to be Provided as a Standard.

6) **SYSTEM COMPLETE WITH FOLLOWING FACILITIES AND ACCESSORIES:**

- 19-Inches Minimum LCD / LED Color Monitor, with Resolution 1280 x 1024 Pixels minimum.
- Foot-Switch.
- 3 Active Transducer Connector for Tran thoracic Probes DVD / CD Drive for Image Storage to be Built-in to the System.
- 500 GB or more Hard Disk Drive to be Built-in to the System.
- Built-in DICOM Compatibility. (3.0 with all components)
- Touch Command Screen Control at least 8-inches LCD / TFT.
- Full DICOM (Upgradable)

7) **UPGRADEABILITY :**

- System Software must be Upgradable.

8) **STANDARD PROBES :**

- 2 – 6 MHz Multi-Frequency Convex Probe for B/M/CDI/PW.
- 5-9 MHz Multi-Frequency Linear Probe for vascular studies.
- TVS/ENDOCAVITORY Color PROBE

NOTE: All Probes must be supplied by same Manufacturer.

9) **STANDARD RECORDING DEVICES:**

- Thermal Paper Printer with fifty Rolls of Paper (Black & White). WITH HD
- CINEWAVE UPS Online with 30 minutes back up time for the System.(IMPORTED (EUROPE/USA/JAPAN)

10) Tissue Harmonic imaging without contrast with 4 harmonic frequencies.

11) Pure Wave / Pulse Inversion / Differential Tissue Harmonic Imaging or similar.

12) Auto Image Optimization / Quick Scan Imaging for Automatic STC / GAIN and Doppler Spectrum Adjustment with Optimal Image Quality by using One Touch Operation.

13) B-Flow / Dynamic Flow Imaging / E-Flow clarify for low flow vessels imaging.

14) Trapezoid Imaging / Virtual Convex Imaging with Linear Probe.

15) Compound / Aplipure Imaging for THI/both Frequency Compounding and Spatial Compounding in B/W and Color Mode.

16) Panoramic / SIESCAPE / Logic view Imaging with Measurements.

17) Voltage : 220V – 240V, 50 – 60 HZ

Accessories :

1. Thermal Printer 256-Gray scale (Sony, Mitsubishi or equivalent)
3. UPS: on line with sine waves 2 KVA with thirty minutes back up time. (IMPORTED)
3. 50 High Density / High Glossy thermal paper Rolls
4. Gel: 20 liters

Optional:

7-14 MHz Multi-Frequency Linear Probe for B/M/CDI/PW

Complete with Hardware / needle navigation with tracking system & Software Upgradable.

PVMS OF MEDICAL EQUIPMENT

Clinical Specialty	Radiological Equipment
Generic Name	PORTABLE /MOBILE ULTRASOUND
Clinical Purpose	It is immediately available imaging modality with its main use in obstetrical and antenatal care likewise in conditions when ionizing radiations are contra indicated.

TECHNICAL SPECIFICATIONS

Digital Ultrasound scanner with digital beam former System should be capable to handle multi frequency probes from 3.0 MHz to 9.0 MHz or above. Built-in Trolley System.
 Multi frequency Convex Probe with center frequency between 3 to 5 MHz
 Multi frequency Linear Probe with center frequency between 5 to 7.5 MHz
 Biopsy adopter for any probe
 Modes: B.M and combination thereof.
 M. Mode sweep: 4 speed or more.
 Gray scale: 256
 Sensitivity time gain: 8-12 steps
 Depth: 24 cm or more
 Focusing system: 3 steps and dynamic
 Adjustable acoustic power
 Frame rate: 80 frame / sec or more
 Keyboard: Alpha numeric with track ball / Touch pad
 Tissue Harmonics: Tissue Harmonic imaging
 Cine memory of 64 frames minimum
 Post processing: Image inversion, edge/echo enhancement correlation / persistence/Dynamic range/Gamma Curve.
 Image magnification 4x or more in real time.
 Monitor: 12" LCD / TFT
 Two probe connectors or more.
 System must be DICOM compatible

Accessories :

1. Thermal Printer 256-Gray scale (Sony, Mitsubishi or equivalent)
3. UPS: on line with sine waves 2 KVA with thirty minutes back up time. (IMPORTED)
3. 50 High Density / High Glossy thermal paper Rolls
4. Gel: 20 liter

OPTIONALS:

Foot Switch
 Multi-frequency Linear Probe with center Multi-frequency between 5 - 7.5 MHz
 Biopsy Adaptor for Any Probe
 Multi-frequency Endocavity Probe with center Multi-frequency between 5 - 8 MHz (90-150 degree)

PVMS OF MEDICAL EQUIPMENT

Clinical Specialty	Radiological Equipment
Generic Name	DIGITAL MAMMOGRAPHY
Clinical Purpose	It is used for imaging soft tissues, calcification and where magnification is required. Also used for screening of breast cancer.

TECHNICAL SPECIFICATIONS

1. HIGH FREQUENCY X—RAY GENERATOR:

- 5 KW
- 23 — 35 KV (1 KV STEPS} Approx
- mAs range 5 - 500 mAs.
- Exposure Time 4- 6sec
- Exposure Mode: Manual & Automatic (AEC).
- Automatic Exposure mode should have automatic selection of Track, filter, kv and mAs. .

2. C ARM

- With source to detector distance 65 cm or more.
- Motorized Isocentric rotation
- User defined Motorized compression device with safety release.
- Rotation -100 to + 180°.

3. X-RAY TUBE WITH ROTATING ANODE

- Tube type should be rotating with dual material anode preferred material would be Molybdenum, Rhodium , Vanadium, Tungsten . Tube should comprise of any two mentioned materials.
- Four focal spot 0.1 & 0.3 and dual focus in each track.
- Anode heat storage capacity 162 kHU or better will be preferred
- System must have tube overload protection.

4. COLLIMATION

- Manual & Automatic.
- Automatically switching light centering device.
- Collimators should have at least two filters Molybdenum 0.03mm / silver 0.05mm, Rhodium 0.025mm / 0.05mm and Aluminum 0.07mm.

5. DIRECT / INDIRECT CONVERSION FULL FIELD FLAT PANEL DETECTOR 24 X 30 CM FORMAT.

- DEPTH 14-BIT or more
- PIXEL PITCH: 100 X 100 uM and RESOLUTION: 3062 X 2394 PIXELS or better
- DQE: 50 % or more

6. REMOVABLE GRID {RATIO 5:1, 30 LP/MM or better}

- Should have motorized Grid
- Should have Breast support for Geometric Magnification.

7. ACQUISITION WORKSTATION:

- Intel /AMD Dual Core HP or Equivalent brand from original Manufacturer workstation.
- Memory should be 2 GB RAM or better
- Should be able to store up to 25,000 images or more.
- 3 MP LCD Monitor Medical Grade.
- Compression force display
- Rotation Angle Display.
- Breast Thickness display with Thickness Compensation Algorithm.
- Processing Features should include:
- Dose Calculation information /AGD [Average Glandular Dose)
- Zoom & Pan
- Magnifying glass
- Flip, rotation of image.
- Inversion
- Measurement and Annotation Tools.
- Should have online/ built-in UPS for avoiding loss of information (Recommended built in UPS from original Manufacturer for system safety and reliability)
- Emergency Stop button

8. REPORTING WORKSTATION

- Latest work station must be supplied by same manufacturer.
- 2 Intel/AMD Xeon or Equivalent processor for High Density image processing.
- Storage HDD 2 TB or more.
- 32 GB RAM.
- DVD,/RW optical Device.
- Workstation should have 19" 1 MP Medical for Patient and Report Management.
- Dual 5 MP 21" Medical Grade Monitor for image Review.
- The work station should be multimodality and should be able to review and analyze from other breast imaging modalities from ultrasound and MRI for Comprehensive Diagnosis.
- Dedicated Measurement tool for distance, area and angle measurement.
- Should have free continuous zoom and quadrant zoom functions with panning and navigation zoom function.
- Integrated reporting tool.
- Zoom and Pan images.
- Magnifying glass
- Invert and graphical annotation through shapes.
- Rotate or flip
- Should have ability to display Computer Aided Detection (CAD) markers for micro-calcification and markers.
- Should have the ability to support CAD supported reports.
- Should have DICOM functions (Print, Storage. Query & Retrieve, modality worklist)

9. STEREO BIOPSY DEVICE

- Stereotaxy device should be easy to install and should be able to perform fine needle aspiration, core biopsy, vacuum assisted biopsy or hook wire placement.
- Needle approach should be Automatic and Manual motor driven both.
- Should have Vertical and lateral Approach for easy access to breast lesions.

- Should have three axis in both Vertical and lateral Approach
- Should provide phantom for Quality checks.
- Should also include Stereotaxic positioner and paddle.
- Should include lateral and vertical approach kit and metal guides.

NOTE:

Standard: Mammography system must comply with any two of FDA- 510-K / CE(MDD) / MHLW or any other relevant standard for mammography system.

ACCESSORIES: (Procuring agency to select as per its actual requirement)

- 24 X 30 cm Compression Paddles.
- 19 X 23 cm Compression Paddle.
- 24 X 30 cm Compression Paddle
- 19 X 23 cm Compression Paddle
- Wall Mount Stand For Paddles & Stereo Device.
- Gridless Device For Geometric Variable Magnification 1.5x And 2x.
- Two Pairs Of Compression Foot Paddle.
- X-Ray Control Push-Button With Extensible Cable.
- X-Ray Shield From Original Manufacturer Integrated With Acquisition Console For Protection.
- Laser Printer Capable Of Printing Of 10 X 12 And 14 x 17 FILMS with two packets of films for testing purpose.
- Two set of special illuminators for viewing the mammograms.
- UPS to run the whole system with minimum 20 min backup
- Standard manuals, calibration equipment and quality control devices should be part of the system.
- Lead Apron , female and Male should be provided.
- 2 magnifying glassy hand mirrors for viewing

11. SYSTEM UPGRADABILITY:

- The system should be upgradable to Advance applications 3D TOMOSYNTHESIS.

Optional (If Any):

PVMS OF MEDICAL EQUIPMENT

Clinical Specialty	Radiological Equipment
Generic Name	ANGIOGRAPHY SYSTEMS
Clinical Purpose	For neuro and Peripheral angiography system

TECHNICAL SPECIFICATIONS

Positioning ARMs:

One Ceiling mounted and one Floor mounted C--arm with motorized. Real time display of rotation angulations.

The C-arms should have the possibility of head to toe coverage of the patient without repositioning the patient.

Both-planes should have Flat Detector.

Right anterior oblique I Left anterior Oblique +/- 100° or more for Floor It -27 to +100 Degree for ceiling.

Cranial / Caudal: Minimum + 45 / 45 Degree or more for both planes.

Rotation speed:

10° / sec. or more in LAO I RAO for floor mounted and 8° / sec for ceiling mounted C-arm.

Motorized parking for floor and ceiling mounted C-Arms.

Integrated, computer-aided collision monitoring I Protection I Touch sensor

Programmable auto positioning of selected angulations. (50 or more programmable positions)

Variable source-to-detector distance

Motorized gantry rotation for free positioning of system and table», for optimum patient access.

The C-arm should maintain FD position, isocenter and projection while swiveling gantry around the patient.

PATIENT SUPPORT / TABLE:

Floor mounted examination table for angiography and interventions

Motorized height adjustment with variable speed. Floating tabletop with longitudinal and transverse movements

Left /right pivotal table rotation +/- 90 deg. or more

Patient weight bearing capacity 200 kg or more. Capability to handle additional load (100 kg) in any table position

Accessories:

Arm cradles (pair), Unilateral armrest, infusion bottle holder, Instrument tray.

X-Ray Generator

Microprocessor based high frequency X-ray generator

Output Power 100 KW. Radiographic rating minimum 1000 mA at 100 KV

The system should have capability of digital radiography and fluoroscopy

Continuous/Pulsed fluoro output power of 2 KW or more to ensure good image quality during fluoro at oblique angles

Shortest Exposure time of 1msec with automatic exposure control

X-RAY Tubes:

Dual/Triple focus X-ray tubes for both planes with anode heat storage capacity of at least 2.0

MHU or better.

Liquid bearing technology for longer durability and quiet operation

Focus 0.3mm, 0.6mm and 1.0 mm or better for triple focus & 0.4 & 0.8 mm or better for dual focus tube.

Continuous heat dissipation of 2500 W or more.

FLAT DETECTORS:

The high resolution dynamic flat panel detector with integrated detachable grid especially designed to fulfill the requirements for diagnostic and interventional radiology.

Large Flat Panel Detector on both planes: size 30 x 30cms or more for both planes.

Pixel size: 200 um or less.

Spatial resolution: 2.5 LP/mm or more.

image acquisition to be done in 14 bit digitization depth.

Digital imaging system (Acquisition / Fluoroscopy)

High resolution digital imaging system.

Acquisition, storage and display in 1024 x 1024 x 12 bits.

Real time filtering, online edge enhancement, noise reduction (spatial filtration) re-masking, and road map function,

Dynamic real time Pan/Zoom

Manual and automatic pixel shift for DSA studies

Hard Disk/Magnetic Disk Capacity for storage of 50,000 images with 1024 x 1024 x 12-bits matrix

DICOM 3.0 with standard exchange media

The system must have Dicom send, Dicom print and Dicom Query / Retrieve facility.

Digital pulsed fluoroscopy / radiography with 7.5/10 and 15 frames per second in 1024 x 1024 x 12-bits or more for

single plane

Display of scene directory for easy selection of any image or scene from the examination room of control room

Variable copper filtration during fluoroscopy and acquisition for radiation protection

The selection of the Cu filters must be automatic by the system based on patient weight / absorption without any

user interaction.

Vessel analysis with determination of degree of stenosis, distance measurement and calibration. The system should

have catheter-and sphere calibration

Automatic positioning of the-c-arm corresponding to reference image and preferably vice versa

Simultaneous display of subtracted and un-subtracted fluoroscopy images. single plane and biplane on flat display

monitor for both plane

Overlay fade feature i.e. online. Superposition of active fluoroscopy and reference image.

The system must have online image density (gray scale) correction i.e. Automatic online image density correction of

dynamic scenes and single images for clear view in the bright and dark areas of the image.

Facility to review previous studies in the examination room from the patients old CD. The

system has the capability for retrieval of angio images back in to the digital imaging system from the CDs and/or the network.

Online Digital subtraction angiography (DSA) with frame rates from 0.5 to 6.0 fls selectable.

Flexible pixel shift automatic manual.

Digital rotation angiography in SD effect with 'un-subtracted and dynamic subtracted image display in acquisition

with rotating. for acquisition in 1024

2 x matrix 25 f/s or better in single plane.

The system should display subtracted images during acquisition preferably while rotating.

All controls of digital imaging system must be available in the examination as well as control room.

CD RECORDER

CD drive for automatic digital image storing on CD-ROM for off-line data exchange in DICOM 3 format. The system

must archive the images/scenes on to the CD in background

MONITORS FOR THE SYSTEM:

Active Matrix TFT monitors with 1024 x 1280 matrix resolution.

Monitors should be ceiling-mounted in the operating /examination room. The ceiling suspension for monitors in the

examination room should have room for six monitors.

Two 19 inches or more active matrix digital TFT monochrome monitors for live images of each plane in the

operating/examination room. Brightness of the imaging monitors: 600 cd/m² or more

Two 19 inches or more active matrix digital TFT monochrome monitors for road mapping in the operating/examination room. Brightness of the imaging monitors: 600 cd/m

19 inches color display I monitor for display of images of the workstation in the examination room (Quantity 01).

19 inches active matrix TFT monochrome monitors for live images and road mapping in the control room (Quantity 04).

Brightness of the imaging monitors; 600 cd/m

Additional Workstation: As recommended by the Manufacturer and being supplied worldwide.

High Performance Windows/LINUX based Multimodality /dedicated workplace with 2 X Dual Core 3GHz Pentium

Processors with minimum 3GB or more. The workstation to be equipped with graphic board to support 3D

applications. High performance windows XP based multimodality workplace with 2 x Dual core 3 GHz Pentium

processors with minimum 3 GB RAM or more and a minimum disk capacity of 140 GB or more 3D reconstruction SW for universal angiography & neuro applications for the reconstruction of 2D tomograms from the projection images.

Interactive 3D reconstruction and visualization in real time of a volume in volume rendering technique, MPR and MIP

Features:

Display of multiple volumes, to switch between un-subtracted and subtracted mode. Transfer,

3D reconstruction and visualization in one defined protocol within minimum time duration.
Different sets of acquisition and reconstruction protocols to meet the requirements for visualization of vessels, bones, clips and coils.
Reconstruction result can be native and subtracted.
Modification of reconstruction area to allow zoom via reconstruction
Display of the 3D reconstructed image data in the examination room on a monitor in the main ceiling suspension of angio monitors.
Control of 3D-reconstruction SW from the table side control / workstation
The workstation should have multi-modality capability on it or on a separate addition workstation in order to display CT/MRI images on it.
The Workstation must have the ability to post process DSA images on the SD workstation. If DSA post-processing is not possible on 3D Workstation, then additional workstation for DSA post processing is to be offered.
Special package to provide soft-tissue cross-sectional imaging in the interventional suite. it should suite and support Neuro-radiologist during interventional procedures in the angiography suite with both endovascular and non endovascular.
This package should provide excellent soft tissue image quality (in 512 matrix) for neuro and body imaging . Neuro images in 512 x 512 matrix are to be reconstruction minimum time. It should be possible to visualize a density difference of 10HU (Hounsfield Units, less preferred) of an object 10mm in size in a Thick-MPR display. (Measured with a CATPHAN CT phantom).

Accessories: (Procuring agency to select as per its actual requirement)

Surgical shadow-less light ceiling suspended.
Ceiling suspended Lead Glass for Upper Body Radiation Protection
Lower body radiation protection flaps.
1 x Fully programmable latest model contrast medium injector.
One Postscript level Network Laser Printer for taking image printouts on paper.
This printer is to be connected with the Main Digital imaging System. Paper for 500 prints should be delivered with the printer.
1000 write-able CDs should be delivered with the system
Lead Glass Window size 2 x 1_ meter or more. Pb equivalence 2.1mm or better.
6 x Pb aprons, double sided. Pb equivalence front 0.5mm; back 0.35mm.
6 x Thyroid shields and 6 x Pb Glasses.
Intercom for communication between control and exam room.
DICOM Laser Camera with 14-x17 inches cassette formats.
UPS compatible for the whole system with back-up time of 10 minutes for fluoro and cine acquisition.
2x firm viewer for images up to 14 x 17 with variable light control and shutters.

Optional:

workstation should create visualization and fading between the live / acquired 2D fluoro image and the matching 3D

reconstructed image by the workstation for vessels / coil/bone. it should allow to overlay the colored 3D volume

with regular/acquired fluoro as well as with subtracted fluoro and acquisition series on the display of the workstation. Thus this information is available in parallel to the regular or subtracted fluoro or acquisition.

Simultaneous display of subtracted and un-subtracted fluoroscopy images for single plane and biplane.

Additional display i.e., monitor per plane is to be included and these monitors are to be installed with the remaining monitors in the examination room.

Any other latest software available with the company should be offered as option which will not be considered as reason of rejection.

Note:

Cardiac Angiography system addressed in the PVMS of cardiology.

APPROVED PVMS

PVMS OF MEDICAL EQUIPMENT

Clinical Specialty	Radiological Equipment
Generic Name	DIGITAL RADIOGRAPHY/FLUOROSCOPY (RF ROOM)
Clinical Purpose	It is used for real time imaging of bowel, kidneys, ureters, urethra and helps in interventional procedures (where passage of contrast can be seen and recorded).

TECHNICAL SPECIFICATIONS

Digital Radiography/ Fluoroscopy unit of high quality digital imaging chain, optimal dose conservation, high patient throughput with over table tube and Flat Panel Detector.

- The output of the X-ray high-voltage generator should be 80 kW. The X-ray control should use a high-frequency inverter.
- The tabletop move approx. 20cm or more in the lateral direction. The detector movement covers form edge to edge of the x-ray table. The table tilts should be from the upright vertical position (approx. +90°) to the horizontal position (0°) to the head-down-tilt position (approx. -15°).
- The tabletop should be Flat/convex type to allow patient centering.
- The startup time should be short.

X-Ray Diagnostic Table:

Table tilting

Tilt range: Upright vertical position (approx.90°) Horizontal position (approx. 0°) Head-down tilt position (approx. -15°)

Compression force of the compression cone: 80 N or more

Allowable patient mass: Max. 150kg minimum.

X-Ray High Frequency Generator:

Ratings

High-voltage generation method: Inverter method

Short-time ratings: 800mA at 100kV.

Nominal maximum electric power: 80 kW Radiography

Radiographic tube voltage setting range: 40 kV to 150 kV, in 1-kV increments

Radiographic tube current setting range: 25 mA to 1000 mA

Radiography time setting range: 1.0 ms or less

Automatic Exposure Control (AEC):

Anatomical Settings should be available

Radiographic condition automatic setting:

The radiographic conditions should be automatically set

X-ray tube anode heat monitoring:

Fluoroscopic tube current setting range: 0.5 mA to 4.0 mA in 0.1-mA increments

Automatic Brightness Control (ABC) function

Pulsed rate setting range variable up to 15 frame/s

X-Ray Tube:

Focal Spot (mm): 0.6 & 1.0/1.2.

Anode Heat Storage Capacity of 600KHU or more.

X-Ray beam limiting device:

X-ray exposure field size 43x43 cm

Built-in light field lamp.

FLAT PANEL DETECTOR: -- CSI or better with size 17"x14" inches or more.

Effective number of pixels: 2600 pixels × 2200 pixels or more (vertical × horizontal).

Pixel size: 160um or better.

DQE: 60% or better.

Spatial resolution: 3.4 lp/mm or more

DIGITAL IMAGING SYSTEM:

Basic image processor performance Images from the detector should be input in digital format.

Image storage

Capacity of hard disk: 50,000 images for 1024 × 1024 or 1TB HDD.

2-Image display Monitors one for last imaging mode and one for live imaging mode.

a) System monitor display for Playback images, processed images, multi- images, etc.

b) Monochrome Medical grade Live monitor 1280 × 1024 pixels (SXGA) for Digital fluoroscopic images, fluorography images, playback images one in room with Original Trolley & One on Main Console Monitor for LIH.

Fluoroscopic function

Image processing

- Recursive filter
- Last image hold
- Image flipping
- Spatial filter (edge enhancement, smoothing)
- Digital Compensation Filters.

Recording

Fluoroscopic image and last-image-hold image can be stored to hard disk.

Fluoroscopic image acquisition

- Frame rate variable up to 15 fps

Fluorography function

Images should be recorded to hard disk processed, and displayed on the monitor.

Real-time image processing: Digital Compensation Filter and Noise Reduction Filter.

Post processing

Gray scale: Adjustment of contrast and brightness

Filming

Two Tray Laser imager with multi-sizes Printing of 14 x 17 and 8 x 10.

Provision of DICOM 3.0 facility

Power Requirements

Line voltage: Three-phase, 200-440VAC

Line frequency: 50 Hz

Permissible line voltage fluctuation rate (no load): ±10%

Accessories: (Procuring agency to select as per its actual requirement)

Online sine wave Double Conversion 160KVA UPS for digital radiography system, with a minimum backup time of 10 minutes on full load.

Optional:

PVMS OF MEDICAL EQUIPMENT	
Clinical Specialty	Radiological Equipment
Generic Name	DIGITAL RADIOGRAPHY SYSTEM
Clinical Purpose	Better resolution than CR and a film less technique with availability of images at multiple sites.
TECHNICAL SPECIFICATIONS	
<p>Digital radiographic X-ray system radiography Recumbent, standing or seated patient position Ceiling - mounted x-ray tube assembly and digital imaging system. Motorized multi leaf collimator Fix Dual flat panel detector for table and chest stand separately Automatic image positioning through vertical motorization of wall stand</p> <p>X-Ray Generator: 80 KW or better high-frequency X-ray generator 800 mA at 100 KV. 1 ms shortest exposure time. Integrated automatic exposure control (three chamber). Organ programs to be available.</p> <p>Motorized Multileaf Collimator: Ceiling-mounted tube assembly support, with tube assembly Multileaf collimator for vertical, oblique, horizontal, and lateral acquisitions Rotation upto +/-40° or more. Filters to avoid soft radiation Automatic collimation and cassette and detector sensing. Manual collimation should also be available.</p> <p>Patient Table: Height adjustable patient positioning table with six way floating tabletop, Access the patient from all sides. Head to toe cassette and detector cover range. Autotracking during table height adjustment. Foot paddle for height adjustment of the patient positioning table of the floating tabletop.</p> <p>Flat Panel Detector (cable less): Flat panel detector with active image size of 16"x16" or better Cesium (CsI) scintillator or better Pixel size 200 µm or better. Spatial Resolution 2.5 lp/mm or better or DQE 60% or more Matrix size approximately 2800 x 2800 or better. 14 bits or better detector depth. Time for data acquisition, transmission and viewing for full image to be 10 sec. or less.</p> <p>X-Ray Tube:</p>	

Exposure voltage 140 kV or more.
Focal spot 0.6 mm and 1/1.2 mm or better.
Anode heat storage 300 KHU or more
Motorized tube movement for precise imaging.

Chest Stand:

Motorized Chest stands with height-adjustable and tiltable Bucky cabinet to house FD and X-Ray cassettes /Detector holder for image acquisition.

Chest stand should have moving exchangeable grid for scattered radiation reduction for Pediatric acquisitions.

The grid should be removable

The chest stand should have servo / auto tracking i.e., the ceiling stand should move automatically with the height adjustment of the chest stand.

Complete with overhead handle for optimum positioning of patient for lateral exposures and lateral patient handles for optimum patient positioning, e.g. during PA thorax exposures.

Imaging System

High resolution digital imaging reconstruction.

Image display with DICOM network connection, complete with 19 inch color TFT display.

Digital Radiography System

Dual core or better microprocessor with at least 2 GB Ram.

Storage of 5,000 or more images.

Imaging System should be capable of patient and study Administration

Exposure and post processing

Image documentation, archiving, display of image markers.

Organ program selection and configuration.

Image processing functions such as rotate, mirror, zoom, window, filter, insert comment line and stitch etc.

The system to have SW/HW to attain higher detail contrast (soft tissue and bone)

Reduced noise with the multi-scale procedures for images post- processing.

DICOM Functions include: Send, print and CD Write.

UPS for the digital system 5 KVA for 20 minutes backup.

Accessories: (Procuring agency to select as per its actual requirement)

Lead glass size 1.5 mm or better: size 80 cm x 100 cm.

Compression belt.

Lead Aprons 0.5 mm

Thyroid shield: 0.5 mm pb

Lead goggle and gonadal shields

DICOM 3.0 compliant Grayscale Dry LASER Printer with 3 online sizes.

Should have minimum productivity of 150 films/ hour in mixed sizes.

Printer should be capable of printing 08x10, 10x12, 11x14, 14x14 & 14x17 size films.

Minimum resolution should be 10 pixels/mm with 12-bit gradation.

1000 x14x17" Dry LASER films

Optional:

UPS 100KVA for 10 minutes backup of the whole system.

PVMS OF MEDICAL EQUIPMENT

Clinical Specialty	Radiological Equipment
Generic Name	COMPUTERIZED RADIOGRAPHY SYSTEM
Clinical Purpose	It has better resolution and is less time consuming because of digital processing laminating the use of dark room and incidence of X-ray retakes.

TECHNICAL SPECIFICATIONS

One Digitizer / Reader unit, multiple plates type System for General Radiography & Mammography.

Should be capable to read X-Ray exposed Rigid Imaging Plates (IPs) of all standard sizes in inches/cm.

The productivity of reading / digitizing should be minimum 100 IPs/hour in mixed sizes.

Reading function should be 100 µm and 50 µm

Should support resolution of 10 pixels / mm.

One CR console for Radiographer with medical application software licenses.

An additional workstation for Radiologist with 1TB HDD.

Should be capable to enter & edit Patient ID.

Should support Image Preview & Quality Assurance.

Should have Mammography Software License. (Procuring agency to specify)

Should have temporary storage capacity of up to 2,000 or more images.

Should comply with DICOM Conformance 3.0 and have standard functions for future connectivity with PACS or other DICOM modalities inclusive of Print, Storage, etc.

DICOM 3.0 compliant Grayscale Dry LASER Printer with 3 online sizes.

Should have minimum productivity of 150 films/ hour in mixed sizes.

Printer should be capable of printing 08x10, 10x12, 11x14, 14x14 & 14x17 size films.

Minimum resolution should be 10 pixels/mm with 12-bit gradation.

Imaging Plates (IP) and Cassettes

DICOM 3.0 for Send, Receive, Archive, Retrieve and Print.

POWER REQUIREMENT:

Single phase with line voltage of 220V, 50 Hz

Accessories: (Procuring agency to select as per its actual requirement of size and quantity)

Imaging Plates (IP) and Cassettes

14x17inch (Set of IPs & Cassettes)

10x12inch (Set of IPs & Cassettes)

08x10inch (Set of IPs & Cassettes)

18x24cm (Set of IPs & Cassettes) for Mammography

24x30cm (Set of IPs & Cassettes) for Mammography

15x 30 cm (Set of IPs & Cassettes) for OPG

Optional:

PVMS OF MEDICAL EQUIPMENT

Clinical Specialty	Radiological Equipment
Generic Name	PRINTING SYSTEM FOR DIGITAL X RAY
Clinical Purpose	Print the X-Ray film.
TECHNICAL SPECIFICATIONS	
DICOM 3.0 compliant Grayscale Dry LASER Printer with 3 online sizes. Should have minimum productivity of 150 films/ hour in mixed sizes. Printer should be capable of printing 08x10, 10x12, 11x14, 14x14 & 14x17 size films. Minimum resolution should be 10 pixels/mm with 12-bit gradation.	
Accessories: (Procuring agency to select as per its actual requirement) Online UPS 10 KVA with ten minutes back up time.	
Optional:	

PVMS OF MEDICAL EQUIPMENT

Clinical Specialty	Radiological Equipment
Generic Name	Static X ray Machine Ceiling Mounted.
Clinical Purpose	Highly useful for routine radiography.
TECHNICAL SPECIFICATIONS	
<p>Microprocessor based. High frequency, 50KW X-Ray generator. 500 mA at 100 kv Anatomical programmed radiography. Digital display of all set parameters. Rotating anode x-ray tube, with dual focus 0.6 & 1.2/1.5 mm. Anode heat storage capacity of at least 300 KHU or more Electronic timer with exposure time of 1msec. System with AEC facility. Ceiling mounted with three directional movement Capable of lateral radiography. 4-way floating table Chest stands with Bucky. Complete with grid 8:1 ratio. Automatic over-load protection device and automatic line compensation. 3-phase, 380 V, 50 Hz.</p>	
Accessories: (Procuring agency to select as per its actual requirement)	
Optional: Auto Tracking & Auto Collimation supplied with 6 way floating table.	

PVMS OF MEDICAL EQUIPMENT

Clinical Specialty	Radiological Equipment
Generic Name	MOBILE X-RAY UNIT
Clinical Purpose	They are used in wards, in ICUs and at accident sites.
TECHNICAL SPECIFICATIONS	
<p>Mobile Microprocessor based X-Ray Unit. High frequency, 30KW X-Ray Generator. 300 mA at 100 kv. Digital display of all set parameters. Rotating anode x-ray tube, with dual focus / Single Focus Anode heat storage capacity of at least 107 KHU or more Electronic timer with exposure time of 1-3 msec. Automatic over-load protection device and automatic line compensation. The unit should be battery supported for exposure and movement (Motorized). 220 V, 50 Hz.</p>	
Accessories: (Procuring agency to select as per its actual requirement)	
Optional:	

PVMS OF MEDICAL EQUIPMENT

Clinical Specialty	Radiological Equipment
Generic Name	MOBILE C-ARM IMAGE INTENSIFIER
Clinical Purpose	Can be used in theatres for interventional procedures and on spot guidance for implants/prosthesis placement.
TECHNICAL SPECIFICATIONS	
<p>C-arm x-ray unit mobile for radiography and fluoroscopy High frequency, power output of 2KW or more. 40 to 110kv with one shot fluoroscopy facility of 6ma or more. X-ray tube with stationary anode or better Dual focal spots of 0.6 and 1.5 mm Automatic Fluoro dose control Collimator : remote control of collimator, iris and blades diaphragms motorized with x-ray grid TV camera : high sensitivity, CCD camera, 1024 x 1024 pixels with last image hold Display : two 48cm (19") LCD/TFT monitors, medical quality on separate Mobile Trolley Digital video memory 100000 images or more Noise reduction filter, last image hold, pulsed fluoroscopy Edge enhancement, image inversion to be provided Real time digital image rotation Fluoroscopy footswitch: one cassette holder 24x30cm Laser localizer lights cross beam type</p>	
Accessories: (Procuring agency to select as per its actual requirement)	
Optional:	

PVMS OF MEDICAL EQUIPMENT

Clinical Specialty	Radiological Equipment
Generic Name	DOSIMETER
Clinical Purpose	To check the intensity (dose) of the X-Ray.
TECHNICAL SPECIFICATIONS	
<ul style="list-style-type: none">• Loud Alarm, 85 Db (A) Typical, (> 90 Db (C) Peak)• Vibrating Alarm• Highly Visible Backlit Display• Simple 2-Button Navigation• Extended Dose Rate Alarms• Dual Ultra Bright Led Alarm• Superior X-Ray And Gamma Energy Response• Meets Or Exceeds Applicable IEC And ANSI Standards• Designed For Ruggedness And Durability• Display Dose: 1 μ Sv To 10 Sv• Display Rate: 10 μ Sv/H To 10 Sv/H	
Accessories: (Procuring agency to select as per its actual requirement)	
Optional:	

PVMS OF MEDICAL EQUIPMENT

Clinical Specialty	Radiological Equipment
Generic Name	CASSETTES
Clinical Purpose	Used in to tack X-Ray image.
TECHNICAL SPECIFICATIONS	
(8x10 / 10x12 / 12x15 / 14x17)	

APPROVED PVMS

PVMS OF MEDICAL EQUIPMENT

Clinical Specialty	Radiological Equipment
Generic Name	HANGERS
Clinical Purpose	
TECHNICAL SPECIFICATIONS	
(8x10 / 10x12 / 12x15 / 14x17)	

APPROVED PVMS

PVMS OF MEDICAL EQUIPMENT

Clinical Specialty	Radiological Equipment
Generic Name	INTENSIFYING SCREEN
Clinical Purpose	
TECHNICAL SPECIFICATIONS	
Intensifying screen of Luminescence technology Easy to clean protective layer Set of all standard sizes.	

APPROVED PVMS

PVMS OF MEDICAL EQUIPMENT	
Clinical Specialty	Radiological Equipment
Generic Name	HANGERS AND INTENSIFYING SCREEN
Clinical Purpose	
TECHNICAL SPECIFICATIONS	
(8x10 / 10x12 / 12x15 / 14x17)	

APPROVED PVMS

PVMS OF MEDICAL EQUIPMENT	
Clinical Specialty	Radiological Equipment
Generic Name	LEAD APRONS/GONADAL SHIELDS/THYROID SHIELDS/LEAD GOGGLES
Clinical Purpose	
TECHNICAL SPECIFICATIONS	
Lead aprons with hangers all 0.5 mm Pb equivalent(Front)	

APPROVED PVMS

PVMS OF MEDICAL EQUIPMENT

Clinical Specialty	Radiological Equipment
Generic Name	X-RAY VIEWER AND LED
Clinical Purpose	
TECHNICAL SPECIFICATIONS	
<p>Ultra Thin X-Ray Film illuminator using LED Lamps, wall mounted. For two/Three/Four Films (<i>Procuring agency will specify the requirement</i>) Thickness: 30 mm or less. Viewing area: 370x420mm. +/- 05 % variation is acceptable LED Lamps life: More than 30000-40,000 hours. Easy insertion & removal of the film X-Ray film Holder: Rust-free steel clapper (rolling pin) Homogeneous illumination, flicker free. Illuminance:3500-4500 cd/m². On-Off button & separate Brightness control. Film sensor to turn-off at some interval after film removal. 220V, 50Hz</p>	

PVMS OF MEDICAL EQUIPMENT

Clinical Specialty	Radiological Equipment
Generic Name	X-RAY FILM PROCESSOR
Clinical Purpose	It helps in automatic processing of x-ray films providing better quality images and consuming less time.

TECHNICAL SPECIFICATIONS

High throughput free Standing type
Continuous roller transport
Sheet film, 10x10cm-35x43cm sizes (14"x17")
High through put more than 110 sheets (35 x 43cm)
Forced hot air circulation method
Piping installed in the DEV and FIX racks.
Processing solution temperature; Controlled by the temperature control tank, with the thermistor monitoring, with the heater heating and with the wash water cooling. Drying temperature; Controlled automatically according to a fixed temperature setting.

PVMS OF MEDICAL EQUIPMENT

Clinical Specialty	Radiological Equipment
Generic Name	X - RAY MACHINE FLOOR MOUNTED
Clinical Purpose	Highly useful for routine radiography.

TECHNICAL SPECIFICATIONS

Floor mounted X-Ray Machine 500mA
Microprocessor based.
High frequency, 50KW X-Ray generator.
500 mA at 100 kV
Anatomical programmed radiography.
Digital display of all set parameters.
Rotating anode X-ray tube, with dual focus 0.6 & 1/1.5 mm.
Anode heat storage capacity of at least 250 KHU or more
Electronic timer with exposure time of 1msec.
System with AEC facility.
Capable of lateral radiography.
4-way floating table with foot control movements.
Chest stands with Bucky.
Complete with grid 8:1 ratio.
Automatic over-load protection device and automatic line compensation.
3-phase, 380 V, 50 Hz.

PVMS OF MEDICAL EQUIPMENT

Clinical Specialty	Radiological Equipment
Generic Name	PACS & RIS SYSTEM
Clinical Purpose	Integrated Picture Archiving and Communication System (PACS) and Radiology Information System (RIS) will be used for managing radiological records and the associated data linked at numerous locations.

TECHNICAL SPECIFICATIONS

Integrated Picture Archiving and Communication System (PACS) and Radiology Information System (RIS) will be used for managing radiological records and the associated data linked at numerous locations. It should include several functions, such as patient registration and patient scheduling, patient list management, radiology department workflow management, request and document scanning, result entry, reporting and printout, result delivery including SMS and e-mailing of clinical reports, patient tracking, teaching files creation, modality, and material management. These features will be used to automate various operations and services of the radiology department.

PACS Features

- Archiving of Unlimited DICOM Studies Volume of CT / MRI / CR / DR / US / Flouro and Mammography etc. (Procuring agency to specify the required modalities)
- Save and provide view of CT limited / defined Slices DICOM studies for physicians.
- Save CT Raw Data (thin slice images))at separate location and auto deletion system set by user of this CT Raw Data.
- Previously performed studies are available with the patient health record
- Previously Archived / Saved studies are integrated with the system
- Images from other diagnostic machines in avi / mpeg format are integrated with the system
- State of the art DICOM compression technology providing minimum cost of storage and network load. Lossless Compression ratio at least 1:3 of original images.
- Tightly integrated with RIS and HIS, Orders data will be send to Modalities and Images will link to patient data in RIS
- DICOM Modality Worklist to populate in-queue orders data on modality machine to avoid typographical mistakes in patient and order information.
- Unlimited physicians viewing access to PACS images anywhere in the hospital
- Integration with any storage media (DAS/SAN/NAS/CENTERA etc.) for unlimited PACS data storage
- Support PACS Data Replication on PACS Storage Servers.
- Auto PACS Data Backup and Disaster Recovery System
- Unlimited Modalities Connectivity and Images Archiving and Viewing
- Auto-route image rounting to a secondary location such as a centralized remote long-term

storage archive.

- Create Auto Run DICOM CD that includes the images along with a DICOM viewer.
- Image Viewing Tools (MPR / 3D Volume Rendering / Image Fusion / 2D Imaging / Comparison Imaging / Pan / Markers / Measurements – ROI / Zoom / Flip / Negative etc.)
- HL 7 Level Integration with other Systems

RIS Features:

- Patient Scheduling and Appointment
- Transcription Management
- Patient Registration and Order Management
- Availability of Reports and Images to Physicians at Wards and OPDs.
- Reporting Physicians Queue Management
- Technologist Performance Record
- Recording of Contrast and Films Printing
- Consultant Based Reporting Queue
- Location Based Reporting Queue
- Modality Based Reporting Counter
- Studies Transfer Queue
- Patient Previous Records Auto Access to reporting physicians
- Support use of bar code technology to track patients and events for workflow reporting (e.g. patient ID, procedure ID, exam room location, etc.)
- Automatically retrieve patient demographic, location, medical, and physician data into patient exam report.
- Integrated word processing capabilities for transcription result reporting.
- Automatically email preliminary and final reports to referring physician.
- On-line storage and access for five years of exam report history and images.
- Films / CDs receiving and delivery management
- Auto Printing Labels for Films or Reports Envelops
- Films Record
- Contrast Record
- Administrative details (exam category, etc)
- Persons involved in the procedure and their role
- Radiographic examination details (dose, technique etc.)
- Contrast and other pharmaceuticals administered
- Equipment used in the procedure
- Free text examination notes
- Integrated Voice Recognition System for Radiology Reporting
- Auto Spell Checker
- Specified Reporting Templates for each radiologist
- Radiology Digital Imaging Library
- Creation of Teaching Files

Note: Procuring agency to select the requirement of both PACS & RIS system OR any one, as per their requirement.

Local /Imported

PVMS OF MEDICAL EQUIPMENT	
Clinical Specialty	Radiological Equipment
Generic Name	DIKTA PHONE
Clinical Purpose	To communicate with the patient site and operators end.
TECHNICAL SPECIFICATIONS	
Digital Transcription System for reporting; Hand Held Units and Complete Stenotype desktop units with voice recognition reporting system (Medical Grade).	

APPROVED PVMS