HSCC/SES/Radio diagnostic/SJH/2018 Dated: 11.01.2019

All Bidders

Amendment -X

Subject: Outsourcing of Radio Diagnostic Imaging Facilities through NABH (MIS) Accredited Diagnostic Setups in New Super Speciality Block of Safdarjung Hospital, New Delhi.

IFB No. : Safdarjung/Tender/Radio Diagnostic Imaging Facility/2018/2 dated 28.08.2018

This has reference to above IFB.

The following Amendment may be noted which shall be treated as part of the tender document and to be submitted duly signed & stamp along with tender.

Sr. No.	Bidder's Query	Reply
1.	2.0 Pre- Qualification Criteria, Page No. 8 2.2 (iv) Valid NABH (MIS) accreditation Certificate We request the authorities to consider the service providers who are the operating the radiology diagnostics within the NABH accredited hospitals and non-accredited diagnostic centers as well.	Tender Terms And Conditions remain unchanged.
2.	2.0 Pre- Qualification Criteria, Page No. 8 2.2 (v) Valid DSIR Registration for Research We would request the authorities to kindly exclude the clause.	Tender Terms And Conditions remain unchanged.
3.	General Conditions to the Tendered, Page No. 36 35. The Hospital reserves the right to change the place of duty for conducting imaging procedures and also has the right to ask for replacement if a particular Staff is not found to be carrying out the functions satisfactorily. The agency will be bound to replace the same within the time period assigned by the Hospital authorities. We request the authorities to reconsider this clause as the cost involved in relocating the radiology imaging equipment is huge.	It is not about relocating equipment but pertains to staff working replacement.

4.	General Conditions to the Tendered, Page No. 32 11. Bidder/Firm/should have NABH(MIS) accreditation with experience for 3 (three) years in Radio DIAGNOSTIC Imaging Set-up investigations of CT Scan, MRI, Digital Radiography, Digital Radio fluoroscopy, Digital Mobile X-Ray, Ultrasound & Colour Doppler etc. Should also have DSIR registration for research. Kindly request the authorities to remove Digital Fluoroscopy and instead of DR it should be amended to DR/ CR as it is also an equivalent experience.	Tender Terms And Conditions remain unchanged.
5.	Page No. 47, Digital Flat Panel Radiography (Dual Detector) Qty. 2 no. Biplane DSA Qty. 1no. Mobile DR System Qty. 4 no. Request you to delete Biplane DSA and Digital Flat Panel Radiography from the list, The procedure list is not available with CGHS and there are interventional equipment where a PPP partner may not add too much value. Request you to change the requirement of 4 Mobile DR from the start to the service provider can start with 2 Mobile DR systems and should add 2 more as the volume of cases grow.	Deleted, as there is existing in-house facility.
6.	Page 8 Pre-qualification Criteria Point iii Experience of having successfully completed similar* works of costing not less than the Rs 10.00 Cr for minimum 3years ending last day of month previous to the one in which tenders are invited. ***Similar nature of works means serving/served of at least NABH (MIS)accredited Radio Diagnostic Imaging Facilities satisfactorily in the 300 bedded hospital for minimum 3 years.** **We request to amend to:** **1.** Experience of having successfully completed similar* works of costing not less than the Rs 20.00 Cr minimum **2 years** ending last day of month previous to the one in which tenders are invited.	Tender Terms And Conditions remain unchanged.

	2. *Similar nature of works means serving/served of at least NABH (MIS) accredited Radio Diagnostic Imaging Facilities satisfactorily in the 300 bedded hospital for minimum 2 years. 3. Higher weightage should be given to the companies with higher number of Radiology PPP projects.	
7.	Page 8 Pre-qualification Criteria Point iii (iii) The Company should have positive Net Worth and should not have incurred loss in more than Two years in last Five years ending 31st March 2017 duly certified by the Chartered Account. Kindly remove these conditions from qualification criteria as this will stop some of the progressive diagnostic companies set up 3-4 years back to bid for this project. In addition to this, balance sheet of only last three financial years ending **31stMarch 2018** should be asked.	3 years profit making in last 5 years.
8.	Page 8Pre-qualificationCriteria Point iv Valid NABH(MIS) accreditation certificate NABH (MIS) certificate of any one location or multiple locations? Kindly specify. Higher weightage should be given to the bidders having higher number of NABH Centres.	Tender Terms And Conditions remain unchanged. It is clearly spelled in similar nature of works.
9.	Page 8 Pre-qualification Criteria Point v Valid DSIR Registration for research Kindly delete this. Hardly any Diagnostics Centre/chain or hospital would be DSIR registered.	Tender Terms And Conditions remain unchanged.
10.	Page-8FinancialCapabilities: The Audited Balance Sheets for the last five financial years. Balance sheet of only 3 years should be asked when experience of 3 years is the eligibility. This shall allow new progressive diagnostic companies set up 3-4 years back to bid for this project.	Eligibility is minimum 3 years. 5 years accounts asked to rule out loss making units.
11.	Page 35Point 28	Deleted.

	Main facility of Service provider should not be more than 15 km from Safdarjung hospital. This is a restrictive and biased clause. Kindly delete this. This stops all progressive companies to bid for the project despite having pan India presence.	
12.	Page 8 Pre-qualification Criteria Point ii Experience of having successfully completed similar* works of costing not less than the Rs. 10.00 Cr for minimum 3 years ending last day of month previous to the one in which tenders are invited. **Similar nature of works means serving/served of at least NABH (MIS) accredited Radio Diagnostic Imaging Facilities satisfactorily in the 300 bedded hospital for minimum 3 years.* *A Certificate from client for running/run of Radio Diagnostic Imaging facility satisfactorily must be submitted along with application. Own works/ Certification of agencies shall not be considered for prequalification.* This eligibility criterion is restrictive and does not qualifies big hospitals and diagnostic chains running their own centers. Similar nature of work should be the experience of owning and running any CT & MRI centre whether in one's own hospital or stand alone. How would a big hospital or a big diagnostic chain running its own Radiology Centre furnish a 'Certificate'? Please allow a self-Performance **affidavit** for the bidders which are running their own centres. Affidavit can include the equipment available and no. of cases performed in last year. This can be signed by head of the bidder institution.	Obtaining of NABH/QCI is essential. Tender Terms And Conditions remain unchanged (with accreditations from the competent authorities).
13.	Page 8Pre-qualificationCriteria Point iv Valid NABH(MIS) accreditation certificate NABH (MIS) certificate of any one location or multiple locations? Kindly specify.	At least in a 300 bedded hospital at one location.
14.		Tender Terms And Conditions

	Page 8Pre-qualificationCriteria Point v Valid DSIR Registration for research Kindly delete this. Hardly any Diagnostics Centre/chain or hospital would be DSIR registered.	remain unchanged.
15.	Page-8 Financial Capabilities: The Audited Balance Sheets for the last five financial years. Balance sheet of only 3 years should be asked when experience of 3 years is the eligibility.	Answered earlier
16.	General Conditions of the Contract, Page 33Point 2 Report should be dispatched within 24 hours. Every day and in case of any emergency investigations must be done as and when informed telephonically round the clock. If reporting is to be done by Safdarjung hospital doctors, then why is turnaround time defined for private player.	The word is dispatched.
17.	General Conditions of the Contract, Page 33 Point 3 Overall single discount offered in % (Over and above minimum 15% discount to be offered on prevalent CGHS rate). Highest discount offered by the service provider will be selected for award. This shall be technically not possible as the centre has to be empanelled with CGHS too. CGHS does not allow to have lower rates at the centres empaneled with them. The Centre needs to give an undertaking at the time of empanelment that they shall not charge rates lower than CGHS rates. Kindly amend the bid variable to 'percentage revenue share' or 'annual concession fee' and fix CGHS rates for all the patients.	Tender Terms And Conditions remain unchanged.
18.	General Conditions of the Contract, Page 33 Point 4 The service provider of Imaging Diagnostic Set-up is responsible for performing imaging of all OPD, IPD and Paid ward patients. **Services to CGHS and BPL patients will be**	Tender Terms And Conditions remain unchanged.

	provided only if the required test is/ are not available in the institutional Diagnostic Imaging Set-up. Cases referred to the center should not be restricted by not sending CGHS& BPL cases. How would financial viability of PPP Radiology center be assured as there are other hospital equipment are already running and few are in process of installation by the hospital itself? Minimum assurance of cases should be given to assure the viability.	
19.	General Conditions of the Contract, Page 33Point 5 The service to BPL patients will be provided **free of cost** on the recommendation of Safdarjung Hospital. As these cases are to be reimbursed by the hospital, please amend 'free of cost' to 'cashless' to avoid any confusion in future.	It is implied.
20.	General Conditions of the Contract, Page 33Point 6 For CGHS patients, the firm will claim reimbursement from CGHS. What would be the reimbursement mechanism for IPD patients under CGHS, other state run insurance cases and future NHPS? All such cases should be reimbursed by Safdarjung hospital only as the hospital shall be paid the package rate for IPD patients. Also, the rates reimbursed should be CGHS rates only irrespective of what rates are paid to the hospital by various insurance schemes.	IPD and OPD has same payment mechanism.
21.	General Conditions of the Contract, Page 33Point 9 9. The service provider of Radio Diagnostic Imaging Set-up should be made fully operational maximum by 4 months. 4 months' timeline should start from handover of site with electricity and water connection.	Tender Terms And Conditions remain unchanged.
22.	General Conditions of the Contract, Page 33 Point	Tender Terms And Conditions

	11 The service provider should carry out Radio Diagnostic Imaging services for the patients of Safdarjung hospital only. They should not allow patients outside Safdarjung hospital at their Radio Diagnostic Imaging set up in SSB Safdarjung hospital for services. Like all other Radiology PPP projects running in India, outside patients should be allowed. Rates for outside patients can be fixed at CGHS rates only.	remain unchanged.
23.	General Conditions of the Contract, Page 34Point 19 The service provider of Imaging Diagnostic Set-up must continue to remain accredited during the term/tenure of the contract. If accreditation is cancelled during the contact period, his contract will also be cancelled without any notice. NABH accreditation may get suspended in between because of some non-conformity that takes time to be complied with. In such a case a provision of grace period of at least 4months should be given to take corrective action and regain the accreditation.	Condition agreed.
24.	General Conditions of the Contract, Page 34 Point 20 The Imaging Diagnostic Set-up in the Hospital must be NABH (MIS) accredited within one year of setting-up and continued to do so throughout the term of the contract. NABH Application can be submitted only after one year of operations hence minimum 2 years should be given for NABH accreditation.	Tender Terms And Conditions remain unchanged.
25.	General Conditions of the Contract, Page 34 Point 21 The service provider of Imaging Diagnostic Set-up shall submit an undertaking that the charges quoted are not higher than they have quoted in any Government Hospital. Kindly delete this. Charges quoted at a hospital are based on the viability in that particular hospital.	Tender Terms And Conditions remain unchanged.

26.	General Conditions of the Contract, Page 34 Point 24 For Diagnostic Imaging Set-up the contract will be awarded initially for a period of Seven years extendable for further three Years Tenure should be at least 10 years to make the project financially viable as capex for this project is very high.	Tender Terms And Conditions remain unchanged.
27.	General Conditions of the Contract, Page 34 Point 25 Medical Superintendent, Safdarjung Hospital, New Delhi (MS) or person authorised by MS, reserves the right to terminate the contract without assigning any reason by giving to the bidder one calendar months' notice, Please define the causes for termination. Such open end clauses make the project un-bankable as financial institutions see such clauses as biggest risk while evaluating for project loans.	Tender Terms And Conditions remain unchanged.
28.	General Conditions of the Contract, Page 35 Point 28 Main facility of Service provider should not be more than 15 km from Safdarjung hospital. Why is a main facility required near by when all equipment are to be installed at Safdarjung hospital. This is a restrictive and biased clause. Kindly delete this.	Deleted.
29.	General Conditions of the Contract, Page 36 Point 37 The Medical Superintendent, Safdarjung Hospital, New Delhi reserves the right to cancel the contract agreement or to withhold the payment in the event of non-commencement or **unsatisfactory performance** of the work contract. Kindly define 'un-satisfactory performance' to avoid unnecessary conflicts.	Tender Terms And Conditions remain unchanged.
30.	General Conditions of the Contract, Page 39 Point 22 The service provider should deploy sufficiently trained staff with minimum Diploma in Radiography from reputed Govt Recognized	Agreed with proper documentation.

	Institution with minimum 05years' experience of all modalities. It will be difficult to get all the staff with 5+ years of experience. Manpower in an organization is always a mix of age and experience. Adequately trained staff as per NABH guidelines should be asked.	
31.	Page 41Annexure 11 List of investigations List of investigations will not suffice the need of having technical specifications of all equipment. Investigation list shall not ensure' **quality of imaging'** and best technology from all the vendors. Detailed technical specifications will bring all the vendors on same platform ensuring best technology for the hospital.	Specification enclosed.
32.	**Annexure –XII- List of Equipment** **List of Equipment** Kindly give detailed specifications of all the equipment to keep all Equipment suppliers and the bidders on same platform. We shall be submitting detailed specifications separately.	Specification enclosed.
33.	i) 256 Slice CT Scan All the CT scan procedure given in annexure XI can be performed on a128 slice CT scan. Cost of a 256 slice CT will be double that of a 128 slice with no added utility. It would be a wastage of resources and shall make the overall project non viable.	Specification as approved prevail.
34.	Viii) Biplane DSA Kindly remove this from the list. Biplane DSA shall not fit in this PPP model. How payment for procedures would be done. Many procedures are not defined under CGHS. Since procedures are to be conducted by hospital doctors, how would a private service provider ascertain utilization of the equipment?	Deleted.
35.	Page 47 List of minimum manpower required for Super Speciality Block at Safdarjung Hospital, New Delhi.	Tender Terms And Conditions remain unchanged.

	Please leave manpower planning to service provider as per their work flow optimization. Since NABH accreditation is mandatory, manpower planning shall be as per NABH only.	
36.	Clause 2.2 Sub Point v), Page 8 Valid DSIR Registration for research We would request you to remove this as a eligibility criteria, the prime objective for Radiology PPP cannot be research activities but rendering services to the patients.	Tender Terms And Conditions remain unchanged.
37.	Point No. 11, Pg,32 Bidder/Firm/should have NABH(MIS) accreditation with experience for 3(three) years in Radio DIAGNOSTIC Imaging Set-up investigations of CT Scan, MRI, Digital Radiography, Digital Radiofluoroscopy, Digital Mobile X-Ray, Ultrasound & Colour Doppler etc. Should also have DSIR registration for research. We request you Please remove Digital Fluoroscopy; instead of DR it should be amended to DR/CR as it is also an equivalent experience.	Tender Terms And Conditions remain unchanged.
38.	Point No 5, Pg.33 The service to BPL patients will be provided free of cost on the recommendation of Safdarjung Hospital. We request, This is in contradiction to clause no 4. Further, while the service provider may provide cashless service to BPL, same need to be reimbursed at contracted rates to the service provider.	Payment in case of BPL patients shall be paid by SJH. In this respect it is cashless to BPL patients.
39.	Point No 11, Pg.33 Service provider shall apply for the installation of separate electric meter in its name and the installation charges for such a connection shall be borne by the service provider. We request specify What is the payment mechanism and rates for the DG backup available at Safdarjung. We would request you to include this in the rental quote only.	Tender Terms And Conditions remain unchanged..
40.	Clause No. 9,Pg. 33 The service provider of Radio Diagnostic Imaging Set-up should be made fully operational maximum by 4 months including furnishing, installation of brand new equipments as per Annexure-XII since the hospital is going to function soon.	Tender Terms And Conditions remain unchanged.

	We request The site should be made operational within 4 months from the handover of the site to the service provider.	
41.	Point No 16, Pg.34 Quality Control Data validation and Reporting for Diagnostic Imaging Set-up will be done by the Radiology Department Doctors of Safdarjung Hospital on daily basis. We request If the reporting is being done by the Radiology department doctor there should be no penalty imposed on the service provider on the Quality of the reports.	Point of start to the presentation to experts for reporting and after report to dispatch.
42.	Page No. 39, point 4 False report or deviation of report beyond acceptable limit as per standard practices- Rs.25,000/- on first instance and termination of contract subsequently and performance security will be forfeited. We request This cannot be levied on the service provider if the reporting is being done by the radiology department of the Hospital. Request you to delete the same.	Read as above in 6.
43.	Page No. 39, point 1 For misbehaving with patients, officers, staff of institute – Rs.5000/- per default. We request Please remove this clause as this is also a harsh Penalty, there will be no one to prove the case.	A committee shall fix the responsibility.
44.	Point. No. 36, Pg. 36 In case any new test added later by the institute, their rates will be decided by Safdarjung Hospital administration. We request you to change this to mutual consent or as per CGHS Guidelines.	If no CGHS rates then a duly constituted committee shall decide the rates.
45.	Point 38 b. Pg. No. 36 Service provider will take reimbursement from CGHS for CGHS beneficiaries. We request The CGHS rates would be charged in case of CGHS Beneficiaries as the service provider cannot claim the differential rates.	Tender Terms And Conditions remain unchanged. To be read with earlier
46.	Pg. No. 47 The list of Equipment required in brand new for the Radiology Department in Super Specialty Block, Safdarjung Hospital are as under We would request you to provide the Technical	As earlier.

	Specifications of the Machines to avoid challenges in future.	
47.	Pg. No. 47 Digital Flat Panel Radiography (Dual Detector) Qty. 2 no. Biplane DSA Qty. 1no. Mobile DR System Qty. 4 no. We would request you to delete Biplane DSA and Digital Flat Panel Radiography from the list, The procedure list is not available with CGHS and there are interventional equipment where a PPP partner may not add too much value. Also, request you to change the requirement of 4 Mobile DR. The Service Provider can start with 2 Mobile DR Systems and should add 2 more as the volume of cases grow.	As earlier.
48.	Annexure XIII, Pg. No. 49 The occupant shall vacate the project site in the event of the termination of the agreement or at the end of 5 years whichever is earlier. We request Please make it 10 years or completion of the tenure.	Annexure XIII, Pg. No. 49 The occupant shall vacate the project site in the event of the termination of the agreement or at the end of 7 years/10 years in case of extension of 3 years on the basis of satisfactory performance.
49.	Point 1,Page 4 Outsourcing of Radio Diagnostics Imaging Facilities through NABH (MIS) Accredited Diagnostic Setups in New Super Speciality Block of Safdarjung Hospital, New Delhi. (Completion Period – 4 Months) We request It is not clear whether the set up has to be NABMIS or the applicants are supposed to be NABMIS. Kindly Clarify	Set ups in minimum 300 bedded facility.
50.	Clause2.2 Sub Point ii),Page 8 *Similar nature of works means serving/served of at least NABH (MIS) accredited Radio Diagnostic Imaging Facilities satisfactorily in the 300 bedded hospital for minimum 3 years. We request Need to amend this. NABMIS cannot be made a pre-requisite but bidder can be asked to Comply further, it should not be made compulsory to serve a hospital. Almost 60-70% of the radiology imaging facilities are stand alone diagnostic centre. criteria looks suited to a few service provider.	Read as per earlier.

51.	Clause2.2 SubPoint v),Page 8 Valid DSIR Registration for research We request This cannot be an eligibility criteria, the prime objective for Radiology PPP cannot be research activities but rendering services to the patients. Request you to delete this eligibility Requirement	Tender Terms And Conditions remain unchanged.
52.	ClauseNo. 8,Page No.31 All the documents of the firm and details of Imaging Diagnostic Centre uploaded by the tenderer should bear the same name and address. We request Same entity name to be ensured through the tender. in case of consortium all documents of the participants to be attached?	Tender Terms And Conditions remain unchanged.
53.	ClauseNo. 9,Page No.31 The bidder shall deposit Bid Security (Earnest Money Deposit) in the form of Bank Guarantee/FDR/DD issued in favour of Medical Superintendent, Safdarjung Hospital New Delhi drawn on any scheduled /nationalized bank payable at Delhi/Noida. Original Earnest Money Deposit (EMD should be put in the tender box placed at HSCC India Ltd., E -6A Sector 1 Noida, U.P.-201301 up to 3.00 P.M. on.1.10.2018. We request EMD should be put in an envelope as a part of the bid submission process - why is it being asked separately?	Tender Terms And Conditions remain unchanged.
54.	Point No.11, Pg,32 Bidder/Firm/should have NABH(MIS) accreditation with experience for 3(three)years in Radio DIAGNOSTIC Imaging Set-up investigations of CT Scan, MRI, Digital Radiography, Digital Radio fluoroscopy, Digital Mobile X-Ray, Ultrasound & Colour Doppler etc. Should also have DSIR registration for research. We request Digital Fluoroscopy should be removed instead of DR it should be amended to DR/CR as it is also an equivalent experience.	Tender Terms And Conditions remain unchanged.
55.	Point No.3, Pg. 32 Overall single discount offered in % (Over and above minimum 15% discount to be offered on prevalent CGHS rate). Highest discount offered by the service provider will be selected for award. We request Generally it is difficult for the firms empanelled by CGHS to provide a discount rate for other institutes?	Answered earlier.

	Request the bid variable to be the rental per month or annum for the space provided by Safdarjung and the tariff / user charges to remain at the CGHS rates	
56.	Point No4, Pg.33 The service provider of Imaging Diagnostic Set-up is responsible for performing imaging of all OPD, IPD and Paid ward patients. Services to CGHS and BPL patients will be provided only if the required test is/ are not available in the institutional Diagnostic Imaging Set-up. We request Given that Safdarjung has multiple similar modalities present with them - how the case distribution will happen ? Does this clause mean that all paying patients in OPD, IPD and wards will be treated by the service provider? Any other insurance scheme patients should also be reimbursed at the contracted rates.	Answered earlier.
57.	Point No5, Pg.33 The service to BPL patients will be provided free of cost on the recommendation of Safdarjung Hospital. We request this is in contradiction to clause no 4. further, while the service provider may provide cashless service to BPL, same need to be reimbursed at contracted rates to the service provider. Further, what is the quantum of such cases of BPL which may be referred to the service provider - important to know to calculate the bidding parameters	Answered earlier.
58.	Point No.34 Vii) The service provider should allow maximum 30 (thirty) numbers of cases Free of cost per month for laboratory on recommendation of MS Safdarjung. The Medical Superintendent, Safdarjung hospital or any committee nominated by him or Ministry of Health & Family Welfare, Govt. of India will reserve absolute right in this regard. We request What are these free cases. Request these cases to be reimbursed by the Government at the contracted rates. Do these hold true for radiology as well?	Tender Terms And Conditions remain unchanged.
59.	Point No11, Pg.33 Service provider shall apply for the installation of separate electric meter in its name and the installation charges for such a connection shall be borne by the service provider.	Payment deducted through the reimbursement made to SP. Rates applicable as per NDMC prevailing rates and applicable to other vendors.

	We request What is the payment mechanism and rates for the DG backup available at Safdarjung. request that this be included in the rental quote only.	
60.	Point No11, Pg.33 The service provider should carry out Radio Diagnostic Imaging services for the patients of Safdarjung hospital only. They should not allow patients outside Safdarjung hospital at their Radio Diagnostic Imaging set up in SSB Safdarjung hospital for services. We request to allow to scan/ provide service to private cases at the contracted rates. this is just to enhance viability. Safdarjung may insert a clause for priority to be given to their in house cases.	Tender Terms And Conditions remain unchanged.
61.	Clause No. 9,Pg.33 The service provider of Radio Diagnostic Imaging Set-up should be made fully operational maximum by 4 months including furnishing, installation of brand new equipment as per Annexure-XII since the hospital is going to function soon. We request The site should be made operational with in 4 months from the handover of the site to the service provider.	Tender terms & conditions prevail.
62.	Point No16, Pg.34 Quality Control Data validation and Reporting for Diagnostic Imaging Set-up will be done by the Radiology Department Doctors of Safdarjung Hospital on daily basis. We request If the reporting is being done by the Radiology department doctor there should be no penalty imposed on the service provider on the Quality of the reports.	Answered earlier.
63.	Page No.39, point 4 False report or deviation of report beyond acceptable limit as per standard practices- Rs.25,000/- on first instance and termination of contract subsequently and performance security will be forfeited. – We request This cannot be levied on the service provider if the reporting is being done by the radiology department of the Hospital. Request you to delete the same.	Answered earlier.
64.	Page No.39, point1 For misbehaving with patients, officers, staff of institute – Rs.5000/- per default. We request For misbehaving with patients, officers, staff of institute – Rs.5000/- per default.	Tender Terms And Conditions remain unchanged.

65.	Point No19, Pg.34 The service provider of Imaging Diagnostic Set-up must continue to remain accredited during the term/tenure of the contract. If accreditation is cancelled during the contact period, his contract will also be cancelled without any notice. We request This is a onerous clause. there is no such statutory requirement to be empaneled by NABH(MIS) all the times. since the accreditation is subject to review, it is possible of some suspension for some time during renewal.	Answered earlier.
66.	Point No21, Pg.34 The service provider of Imaging Diagnostic Set-up shall submit an undertaking that the charges quoted are not higher than they have quoted in any Government Hospital. We request Since the price discovery is done through on a open bidding process, such declarations are not necessary further, we request the bid to be on rental basis to avoid any such conflicts.	Answered earlier.
67.	Point.No. 28,Pg. 35 Main facility of Service provider should not be more than 15 km from Safdarjung hospital. We request How is this relevant to the PPP project at hand- does this mean that only South Delhi Diagnostics centres can apply? isn't this a Pan India PPP tender.	Answered earlier.
68.	Point.No. 36,Pg. 36 In case any new test added later by the institute, their rates will be decided by Safdarjung Hospital administration. We Request to change this to mutual consent	Answered earlier.
69.	Point 38b. Pg. No.36 Service provider will take reimbursement from CGHS for CGHS beneficiaries. We request there should be no discount on CGHS rates -a revenue share or rental should be used for bid award and contractual rates.	Answered earlier.
70.	Escalation of Rates We request There is no provision of escalation of rates,request that if the rates are not changed by CGHS in 4 years the Authority should consider revising the rates by at least 10% every 4 years.	Tender Terms And Conditions remain unchanged.
71.	Point 38g., Pg.No. 36 The bidder should offer minimum 15% discount on prevalent rate of CGHS. Higher discount offered by the Service provider will	Answered earlier.

	be selected. We request There should be no discount on CGHS rates -a revenue share or rental should be used for bid award and contractual rates.	
72.	Pg. No.47 The list of Equipment required in brand new for the Radiology Department in Super Specialty Block, Safdarjung Hospital are as under We request Only the list of Equipment is provided, request you to give technical specification for the same as well. This is to avoid challenges in future.	Answered earlier.
73.	Pg. No.47 Digital Flat Panel Radiography (Dual Detector) Qty. 2 no. Biplane DSA Qty. 1no. Mobile DR System Qty. 4 no. We Request you to delete Biplane DSA and Digital Flat Panel Radiography from the list, The procedure list is not available with CGHS and there are interventional equipment where a PPP partner may not add too much value. Request you to change the requirement of 4Mobile DR from the start to the service provider can start with 2 Mobile DR systems and should add 2 more as the volume of cases grow.	Answered earlier.
74.	Pg. No.47 List of minimum manpower required for Super Speciality Block at Safdarjung Hospital, New Delhi. Request you to change the Minimum requirement of Manpower to an adequate no. of manpower to run the center without any interruptions. In case you are retaining the same request you to make the second and the third shift requirement as adequate nos.	Minimum is adequate.
75.	Annexure XIII, Pg.No. 49 The occupant shall vacate the project site in the event of the termination of the agreement or at the end of 5 years whichever is earlier. We request Please make it 10 years or completion of the tenure.	The occupant shall vacate the project site in the event of the termination of the agreement or at the end of 7 years/10 years in case of extension of 3 years on the basis of satisfactory performance.
76.	Technical Specifications of Equipment	Enclosed as in Annexure-A

All other terms & conditions remain unchanged.

Sr. Chief General Manager -I, HSCC (I) Ltd.
For & on behalf of Medical Superintendent, Safdarjung Hospital, New Delhi

Technical Specification	
(CT 256 Slice)	
Sr. No.	**Specification as per tender**
	The system quoted should be latest state of art top of the line with the features of latest RSNA (2014 or later) release. The system to be of 128 or more physical rows of detectors with dual energy application. The scanner should be capable of comprehensive whole body imaging including cardiac, abdomen, neuro and vascular imaging applications, true isotropic volume acquisition. It should also be capable of 3-D reconstructions at fast speeds, quantitative calcium scoring in the vessels using all documented quantification algorithms, 3-D image display during acquisition on-line as well as real time, 3-D vessel imaging with feasibility for volume rendering.
	Please note that if new technological developments occur and an upgraded system becomes available between the notification of this tender and the time of finalization of the bid, then the newer upgraded version shall be supplied at the rates quoted. The AERB compliance for the equipment and its installation would be the responsibility of the supplier.
A.	**Gantry:**
	a. The CT Scanner should have low Voltage Slip Rings incorporated in the Gantry
	b. The Minimum scan time for a 360 Degree rotation should be less than or equal to 0.35 seconds.
	d. The gantry should be provided with User control panels on either side for easy positioning.
	d. The sub millimetre Slice @ 0.63 mm or less in 128 rows or more of detector with 256 or more acquisitions should be available. The system should be in position to perform256 acquisition Slices/ Rotation for general, cardiac/vascular applications. (Specify the submillimetre slice thickness in millimetres)
	f. The Gantry should have 3D Positioning Laser lights.
	g. The Scan field of view (FOV) in acquisition mode should be at least from 200 mm to 500 mm with intermediate Steps for scanning different anatomies.
	h. Aperture should be at least 70 cm diameter.
2.	**X ray Section:**
	a. The X ray Generator should be compact and inbuilt in the Gantry.
	b. The System X ray power should be 100 kW (actual power) and above
	c. The mA range available should be between 20 to 800 mA or more with increments in steps of not more than 10mA.
	d. The X ray Tube should be essentially Dual Focus. The heat storage capacity should be 7 MHU or equivalent. Specify the method and technique of cooling. Any special feature of the X ray tube to be highlighted with literature.
	e. Specify the focal Spots of the X ray tube.
	f. The X ray tube should have a cooling rate of not less than 1000 KHU per MIN
	g. The X ray tube Cooler Unit should be in built in the Gantry.

3.	**Detectors:**
	a. The Detector Offered should be Solid State.
	b. The 256 acquisition slice or more per Rotation should be possible. The Systems should have at least 128 Physical Rows of the detector or more.
	c. Specify the Fan Angle of the X rays and the geometry. The detectors should not require frequent calibration.
4.	**Patient Couch:**
	a. The patient table offered should have a minimum load bearing capacity of at least 200 KG.
	b. The Minimum table top height should not be more than 65cms from the floor level for easy transport of trauma patients.
	c. The Floating table top width should be at least 40 cms for better comfort.
	d. The range of metal free scan should be at least 165 cms.
	e. The vertical range should be at least 55 cms (max height — min height)
	f. Specify the reproducing accuracy of the table.
	g. Remote UP/DOWN, FWD/BWD of the Patient Couch should be standard
5.	**Topogram:**
	a) Length and width: specify range.
	b) Scan times: specify range, specify whether real-time image option available.
	c) Views: should be feasible in frontal and lateral views
	d) Should be possible to interrupt acquisition manually if necessary.
6.	**Spiral/Helical Section:**
	a. The system offered should have Spiral Capability of at least 80 seconds & above. Real Time Spiral @ 10 f/s should be standard.
	b. The range of Spiral facility in Axial Direction should be more than 100 cms.
	c. The Reconstruction Time in Spiral scan should not be more than 100 Milli seconds.
	d. The system should have the Smart Prep or equivalent facility & ability to track Contrast medium to trigger scan should be included in the scope of Supply.
	f. High Resolution scan package should be offered as standard and Specify the minimum slice thickness for which High Resolution scan package is possible.
	g. Multi Slice CT Fluoroscopy to be quoted as standard. Price should be quoted separately.
7.	**Computer Section:**
	a. The Computer offered should be the Latest Multi-tasking Processors and a menu driven platform with a RAM size of at least 4GB.
	b. The medical grade monitor should be the latest Color of at least 18 inches and flat screen. Two Monitors Independent Console preferred. The Twin Monitor system should work on either shared or Common data base.
	c. The display matrix should be at least 1024 x 1024.
	d. The reconstruction time for an Axial scan should not be more than 100 milli seconds.

	e. The Hard disk Capacity for both Image and Raw data should be more than500GB.
	f. It should have facility to store at least 250,000 Images.
	g. The system should be supported with archiving facility of DVD & CD Main Console.
	h. DICOM facility to send , store , print , receive, Query / Retrieve , MWM , MPPS etc should be standard.
	i. PC Based connectivity should be standard for easy transfer of Images & Report. The image transfer from main console to workstation should be automatic and immediate.
	j. CT should be with dual monitor console with two concurrent workstations (thin client server architecture based solution) comprising of medical grade monitors (2 mega pixel resolution) with at least 8GB RAM. The server should have image storage capacity of 3 Tera bytes, minimum 20000 concurrent slice processing power and at least 32 GB RAM. It can be single/dual server configuration. The two concurrent workstations should have processing capabilities for basic 2D /3D and following advanced applications.
	a. MPR
	b. Minimum and maximum intensity projection.
	c. 3D volume rendering.
	d. 3D SSD (Shaded Surface Display).
	e. Advanced vessel analysis.
	f. Auto bone removal.
	g. Lung nodule assessment.
	h. Liver lesion analysis.
	i. Virtual endoscopy.
	j. Dedicated Colonography and colonoscopy.
	k. Time point comparison.
	l. Whole organ (Brain & Body) perfusion CT.
	m. Coronary tree analysis: automated 3D processing of coronary arteries, calcium scoring, stent analysis, LV analysis.
	n. Neuro DSA with Automated Bone Removal.
	o. Fusion CT: Fusion of morphological data of CT & MRI.
8.	**Image Processing section:**
	Cardiology and Oncology post processing tools to be quoted as standard. The post processing tools of the perfusion and others as quoted below to be available in the workstation.
	a. The system should have standard software like 3D Volume rendering , MIP,CT angio, color angio Display, CT Perfusion , Dental scan , Bone Mineral Study should be available as standard on the Workstation . Computer Aided Detection (CAD) to be provided
	b. The following software should be offered as standard (MPR , ROI, VOLUME CALCULATION , CT NUMBER DISPLAY , WINDOW WIDTH , WINDOW LEVEL , TOPOGRAM DISPLAY , CINE DISPLAY , HRCT LUNG, DYNAMIC SCAN)

	c. Cardiac Scan Attachment with ECG Gated Segmented Recon , Calcium score , Vessel Flythrough of the Coronaries should be available with software package at workstation and thin client server stations
	d. Automatic display of MPR Images after scan will be preferred.
	e. Bolus triggered Brain Perfusion CT study (at least 3-level) with automatic CBF, CBV, MTT, TTP maps, ROI placing, comparing ROI, saving maps.
	f. Neuro DSA with automatic bone removal software.
	g. Dental CT: high-resolution evaluation of teeth and jaws with automatic panoramic and paraxial reconstruction, evaluation of mandibular canal and life size filming.
	h. Fusion CT: fusion of morphological data obtained on CT, MR or DSA.
	i. Lung CT: low dose lung CT protocols for advanced lung nodule detection, assessment and follow-up. Lung segmentation software for nodule detection. Provide LUNG CAD for virtual bronchoscopy .
	j. provide Bone / Osteo / Dental CT software.
	k. Post processing should also have liver segmentation analysis, whole body perfusion, tumor tracking, myocardial assessment.
9.	**Resolution:**
	a. The System Spatial Resolution should be mentioned with parameters.
	b. The high contrast resolution should be more then 14.5 lp/mm in all routine scan, including spiral and axial mode.
	c. The low contrast resolution should not be more than 3 mm at 0.5 %. Shoulder, Pelvis Streak Artefact suppression Software should be standard.
	d. Noise Suppression protocols to maintain LCR at low dose should be standard.
	e. Special softwares(like mA modulationin routine & cardiac mode) to ensure dose efficiency should be standard.
	f. Specify the CT Dose Index.
	g. Should have iterative reconstruction technique for X Ray dose reduction.
	h. Low dose Paediatric CT mode should be available
	i. Patient radiation dose should be displayed on the monitor & films.
10.	**Accessories:(Make and Model of all the quoted accessories should be specified)**
	a) Dry chemistry camera of DPI 500 or more of any reputed make.
	b) Lead Glass of 200 x 100 cm.
	c) UPS with half an hour back up to run the entire CT, Computers, Dry chemistry camera, Work Stations etc.
	d) Dual Head Pressure Injector of reputed make with 300 sets of Syringes & 1000 sets of tubings. Specify the make of Injector.
	e) Multi Para monitor with pulse oximeter of a reputed make for monitoring vitals
	f) Patient radiation dose should be displayed on the monitor as well as on the films
	g) ULTRA LIGHT WEIGHT lead free aprons - 4 Nos.
	h)Apron stand — 1 No.
	i) Apron Hanger suitable for the supplied aprons, shields.
	j) LEAD Free Thyroid Shields – 4 nos.
	k) Lead Free Gonadal Shields – 4 nos

	l): Tumour ablation system with treatment planning solution & RF generator . Specifications as below; .
	Computerized needle positioning guiding tool along with radio frequency ablation system for CT guidance in tumor ablation.
	System should support different ablation system
	Registration of the data, post processing segmentation before and after ablation should be possible
	Overlay of non-contrast images with contrast images to be possible.
	Should include radio frequency ablation generator with:
	1. Frequency at least 450KHz.
	2. To support multiprong electrode and capable of 7cm ablation in one sitting.
	3. Temperature range should be 15-125 deg C with steps of 1 deg C.
	4. RFA accessories- Intelliflow pump, RFA probes, multiprong electrodes and coaxial biopsy gun of 9cm and 15cm with 20cm throw.
11.	**Warranty:**
	a) Five Years for Comprehensive warranty CT Scanner System including X ray tube and all accessories and turnkey works for which order is placed to be provided.
	b) 98% uptime should be maintained during the entire Warranty period. In case of downtime exceeding more than 2%, warranty will be extended double the down time period.
12.	**SERVICE**
	After warranty CMC for next Five years for complete CT Scanner System including X ray tube and all accessories and turnkey works for which order is placed to be provided. During CMC period vendor shall have to maintain 98% uptime of the equipments. CMC will be extended by double the down time in excess of 2%.A clear cut undertaking to be given regarding acceptance of uptime clause by the principal/vendor
13.	**Training**
	Qualified personnel nominated by the deptt, should be given application training by the vendor at their cost at site for three months and as and when required.
14.	**Certifications:**
	I. Offered model should be European CE and US FDA approved. Copy of certifications should be submitted with bid.
	II. The quoted model should be AERB approved. Copy of AERB type approval should be submitted with bid.
	i. DUAL ENERGY APPLICATIONS to be provided as standard: Renal Calculi Characterization & Gout.

	ii. All other Dual Energy applications available with vendor should be listed as optional with price of each quoted separately.
	iii. Proof of availability of dual energy application must be supported with original datasheet.
	iv. Dual energy application must be possible on all workstation and all fields of view with minimum FOV 33cm.
	v. Also Specify if DUAL ENERGY APPLICATIONS like Metal Artifact Correction / Beam Hardening artifact Correction, Brain Haemorrhage are available in the system. Any other application for dual energy if present in future upgrades should be part of the system.
	Accessories:
	X-RAY FILM ILLUMINATOR WITH COLLIMATION – SINGLE PANEL (3 NOS.)
	Specifications:
●	X-Ray Film Illuminators with collimation and luminous density control.
●	Suitable for viewing one 14"X17" film.
●	It should have high luminous density and uniform light as per DIN 6856
●	It should have daylight fluorescent lamps of latest design, colour temperatures of 6.200 and 6.500 Kelvin.
●	It should have fully electronic continuous brightness control, with adjustment range of approximately 90%.
●	High frequency flicker free light.
●	Maximum Luminous density of more than 4.500 cd/sq.m.
`	It should have four extremely easy to move shutters for glare-free reading of any film format. Four shutters should be fitted between an external scratch-proof clear-glass pane and an internal acrylic milk glass pane.
●	It should have movable nylon film retaining cords with plastic slides.
	X-RAY FILM ILLUMINATOR WITH COLLIMATION – DOUBLE PANEL (3 NOS.)
	Specifications:
●	X-Ray Film Illuminators with collimation and luminous density control.
●	Suitable for viewing two 14"X17" film.
●	It should have high luminous density and uniform light as per DIN 6856
●	It should have daylight fluorescent lamps of latest design, colour temperatures of 6.200 and 6.500 Kelvin.
●	It should have fully electronic continuous brightness control, with adjustment range of approximately 90%.
●	High frequency flicker free light.
●	Maximum Luminous density of more than 4.500 cd/sq.m.
●	It should have four extremely easy to move shutters for glare-free reading of any film format. Four shutters should be fitted between an external scratch-proof clear-glass pane and an internal acrylic milk glass pane.
●	It should have movable nylon film retaining cords with plastic slides.

	X-RAY FILM ILLUMINATOR WITH COLLIMATION – TRIPLE PANEL (3 NOS.)
	Specifications:
●	X-Ray Film Illuminators with collimation and luminous density control.
●	Suitable for viewing three 14"X17" film.
●	It should have high luminous density and uniform light as per DIN 6856
●	It should have daylight fluorescent lamps of latest design, colour temperatures of 6.200 and 6.500 Kelvin.
●	It should have fully electronic continuous brightness control, with adjustment range of approximately 90%.
●	High frequency flicker free light.
●	Maximum Luminous density of more than 4.500 cd/sq.m.
●	It should have four extremely easy to move shutters for glare-free reading of any film format. Four shutters should be fitted between an external scratch-proof clear-glass pane and an internal acrylic milk glass pane.
●	It should have movable nylon film retaining cords with plastic slides.
	X-RAY FILM ILLUMINATOR WITH COLLIMATION – FOUR PANEL (3 NOS.)
	Specifications:
●	X-Ray Film Illuminators with collimation and luminous density control.
●	Suitable for viewing four 14"X17" film.
●	It should have high luminous density and uniform light as per DIN 6856
●	It should have daylight fluorescent lamps of latest design, colour temperatures of 6.200 and 6.500 Kelvin.
●	It should have fully electronic continuous brightness control, with adjustment range of approximately 90%.
●	High frequency flicker free light.
●	Maximum Luminous density of more than 4.500 cd/sq.m.
●	It should have four extremely easy to move shutters for glare-free reading of any film format. Four shutters should be fitted between an external scratch-proof clear-glass pane and an internal acrylic milk glass pane.
●	It should have movable nylon film retaining cords with plastic slides.
	LED X-RAY FILM ILLUMINATOR WITH COLLIMATION – SINGLE PANEL (1 NOS.)
	Specifications:
●	LED X-Ray Film Illuminators with collimation and luminous density control.
●	Suitable for viewing one 14"X17" film.
●	It should have high luminous density and uniform light as per DIN 6856-1.
●	It should have LED lamps of latest design.
●	It should have fully electronic continuous brightness control, with adjustment range of approximately 90%.
●	It should have flicker free light.
●	Maximum Luminous density of more than 4.500 cd/sq.m^2.

●	It should have four extremely easy to move shutters for glare-free reading of any film format.
●	It should have thickness of not more than 70 mm.
	LED X-RAY FILM ILLUMINATOR WITH COLLIMATION – DOUBLE PANEL (2 NOS.)
	Specifications:
●	LED X-Ray Film Illuminators with collimation and luminous density control.
●	Suitable for viewing two 14"X17" films.
●	It should have high luminous density and uniform light as per DIN 6856-1.
●	It should have LED lamps of latest design.
●	It should have fully electronic continuous brightness control with adjustment range of approximately 90%.
●	It should have flicker free light.
●	Maximum Luminous density of more than 4.500 cd/sq.m^2.
●	It should have four extremely easy to move shutters for glare-free reading of any film format.
●	It should have thickness of not more than 70 mm.

Sr. No	Technical Specification of 3.0 Tesla MRI System
	Quoted Model :
	'State of the art' Whole Body 3.0 Tesla Magnetic Resonance Imaging System optimized for all body applications, includingmusculoskeletal, vascular, pediatric, hepatobiliary, abdominal,cardiac and neurological applications with super conducting magnet, high performance gradients and digital Radio Frequency System. The manufacturer/ bidder must quote the latest 'state of the art' 3 Tesla MR system as per the specifications below or better. Latest model to be quoted; If any new model in the same series with better specifications is launched in RSNA, then the same should be quoted. Model should be US-FDA approved
	Please mention the year of lunch of the quoted model offered should be latest RSNA November 2015 lunch –or later the manufacturer will guarantee the latest available model at the time of delivery. the detailed specification that follows shall be understood to be minimum requirement.
	The offered model should be USFDA approved. Authentic and legible certificate for the same should be annexed.
	The scanner supplied should not have any refurbished/recycled parts/accessories.
1	**Magnet**
A	3.0 T active shielded super conductive magnet should be short and non-claustrophobic.
B	It should have at least 70 cm patient bore with flared opening.
C	Magnet length should be less than 200cm.
D	Homogeneity of the magnet should be better than 1.5 ppm at 40 cms (guaranteed homogeneity)
E	The magnet should be well ventilated and with in-bore illumination with built in 2 way intercom for communication with patient.
F	It should have a built in cryo-cooler such that helium consumption is minimized and does not exceed 0.05 litre/hour.
G	Specify hardware and software for acoustic noise reduction.
H	Active shielding/ Fringe field - quote values for 5 Gauss and 1 Gauss line.
I	External shielding - external interference shield (sufficient to house the magnet, anaesthesia and physiologic monitors) should be provided.
2	
A	High performance, highly stable shim system with global and localized manual and automated shimming including 3D shimming for high homogeneity magnetic field for complete imaging, volume imaging & CSI and spectroscopy.

B	Auto shim should be available to shim the magnet with patient in position
3	**Gradient System**
A	Actively shielded Gradient system in X, Y, Z planes
B	Amended : The gradient should be actively shielded with each axis having independently a slew rate of at least 200 T/m/s and a peak amplitude of 44mT/m
C	The system should have efficient and adequate Eddy current compensation.
D	Effective cooling system for gradient coil and power supply
E	Silent MRI" sequence package. Please specify the decibel levels for silent MRI and list the sequences where silent MRI not available to be included in standard package.
4	**RF System**
1.A	Amended a (1) A fully digital RF system capable of Multi Transmission with 2 amplifiers of at least 15kW each or one amplifier of 30 kW, to reduce magnetic susceptibility artifacts. B1 in homogeneity correction should be possible. Vendor has to elaborate on technology used to improve organ specific the B1 homogeneity
2.A	If the vendor has additionally technology like Zoom it/FOCUS or equivalent for selective excitation within a user specified FoV, the same should be quoted. True shape and true form or equivalent technology such as multi drive/multi transit 4D to be quoted.
B	It should also have at least 32 independent RF receiver channels "acquisition" with each having bandwidth of 1 MHz or more along with necessary hardware to support quadrature array / Matrix coils.
C	It should support Parallel acquisition techniques with a factor of 12 or more. Highest available PAT factor to be quoted.
D	Should allow remote selection of coils and or coil elements.
E	The operating frequency should cover 1H and 31P nucleus (for multinuclear spectroscopy 1H and 31P)

5	**Patient Table**
A	Patient table should be fully motorized with computer controlled table movements in vertical and horizontal directions. (Specify the patient load capacity).
B	A CCTV system with LCD display to observe the patient should be provided
C	Emergency manual traction of the subject from the magnet.
D	Table technology - (1) Bolus chasing with automatic/ continuous moving table should be offered and should be available with fluoro triggered MR angiography for manual and fast switchover in less than 1 second for CE-MRA
2.	Latest table technology available with the vendor (globally) should be quoted (eg. TIM-CT, etc.) as optional. (Price for point 2 will not be considered for calculation of L1)
6	**Computer System /Image Processor Operator Console**
A	The main Host computer should have a 19 inches or more high resolution LCD TFT color monitor with 1024 x 1024 matrix display. The system should have image storage capacity of 100 GB for at least 2,00,000 images in 256 x 256 matrix.
B	The Image reconstruction speed should be at least 1300 images/second or more for full FOV 256 matrix.
C	The main console should have facility for music system for patient in the magnet room. The system should have DVD / CD/ Flash drive archiving facility. Supply 1000 DVD along with the system. The system should be provided with auto DVD writer.
D	Patient monitoring devices for ECG, respiratory rate, pulse rate, O2 saturation at console.
7	**Measurement System**
A	Largest Field of View should be at least 45 cm in all three axis. Specify the maximum and minimum FOV.
B	The measurement matrix should be from 128x128 to 1024x1024. Highest matrix available to be quoted.
C	Minimum 2D slice thickness mm should be equal to or less than 0.5
D	Minimum 3D slice thickness mm should be equal to or less than 0.1
8	**Coil System**

	The main body coil integrated to the magnet must be Quadrature/CP of the latest technology.In addition to the in-built body coil, following coils should be quoted. All coils (other than coils for exclusive spectroscopy, like surface coils) should be compatible for parallel acquisitions. The vendor should supply latest coil (with maximum channels and elements) with the best technology available with them at the time of tender submission.
I	Point Deleted
Ii	Multichannel Head coil with 32 channels or more for EPI/DTI application.
iii	Neuro-vascular Coil with 20 or more channels or Head / Neck Coil combined, capable of high resolution neuro-vascular imaging or combination of head & neck coil for similar coverage.
Iv	Spine Array/Matrix Coil for thoracic and lumbar spine imaging with at least 32 channels acquisition per exam
V	Body Array/Matrix coil with at least 40 cm z axis coverage for imaging of abdomen, with at least 32 channels Acquisition for body part angiograms and heart. In case one coil cannot provide this coverage then multiple coils should be offered. (The best available body coil with the vendor must be supplied)
Vi	Suitable surface coil for peripheral angiography application of at least 32 channelsSuitable surface / phased array coil for peripheral angiography application of at least 32 channels with coverage of minimum 80 cm, with single or combination of coils. For Angio application if the coils offered are in combination it will be counted as 1 coil for the purpose of peripheral angiography.
Vii	Bilateral Breast Coil with at least 16 channels with fully functional spectroscopy.
Viii	Dedicated Shoulder Coil- at least 16 Channel or more.
ix	Dedicated Knee Coil - at least 15 channels or more. If transmit receive coil is available the same should be quoted.
X	Dedicated Wrist Coil - 8 channels
Xi	xi Flex Coil
	Large (2 quantity) - 4 channel
	Small (2 quantity)- 4 channel
Xii	Small flex coil for pediatric and neonatal head and neck applications- 8 channels or more

Xiii	Dedicated Ankle Coil with 16 channels or more.
Xiv	Point Deleted
Xv	Point Deleted
	TOTAL COILS - 15 Nos.
Xvi	For Storage of all coils a caddy to be provided.
Xvii	The coil system should permit coverage of 200cm
	The system should continuously monitor the RF coils used during scanning to detect failure modes. (RF coils should not require either set up time or coil tuning; Multi coil connection for up to 2 or more coils simultaneous scanning without patient) repositioning. i.e. like 4GTIM/GEM/D stream coil combination should be quoted as standard.
9	**Application Package**
	Data acquisition:
I	The system should be capable of 2D and 3D acquisitions in conventional, fast and ultrafast spin echo and gradient echo modes so that real-time online images can be observed if needed. All the sequences that are available with the vendor at the time of quote/delivery should be provided as per their manual.
Ii	2D multi-slice imaging should be possible in all planes (axial, sagittal, coronal, oblique and double oblique)
iii	Up to 1024 x 1024 matrix acquisitions preferred for all applications
Iv	Half Fourier or other techniques to reduce scan acquisition time while maintaining adequate SNR
V	3D volume, multiple contiguous slabs, multiple interleaved and multiple overlapping slabs
Vi	Slice thickness in 2D and partition in 3D to be freely selectable
Vii	Dynamic acquisition (serial imaging) with capability to initiate scan sequences either from the magnet panel or from the console
Viii	Dynamic acquisition: number of repeat scans with delay time either identical time interval or selectable
ix	Auto slice positioning from the localizer images
X	Maximum-off center positioning both anterior-posterior and lateral direction and should be selectable
Xi	Gating: physiological signals like ECG, pulse, respiratory

Xii	External signal triggering (interface for triggering input pulse from external source). The provision should be available at the console also (for fMRI, EEG, etc.)
Xiii	Simultaneous acquisition, processing and display of image data in 2D multi-slice mode.
Xiv	Selection of voxels from oblique slices should be possible while doing spectroscopy.
Xv	Artifact reduction/ imaging enhancement/ image filtering/ image subtraction/addition/multiplication/ division techniques:
Xvi	Flow: 1st and 2nd order flow artifact compensation
Xvii	Presentation slabs: a number of relocatable saturation bands to be placed either inside or outside the region of interest
Xviii	Graphic prescription
Xix	Fat saturation techniques: frequency selective RF pulses to suppress fat signals in the measured image FOV. ROI selective (regional) fat suppression should also be given.
xx	Magnetization transfer saturation: Off resonance RF pulses to suppress signals from stationary tissue in FOV.
xxi	Phase contrast capability in 2D and 3D mode: Image intensity correction.
Xxii	Breath hold acquisition
xxiii	EPI mode
Xxiv	DTI with MDDW or equivalent with a minimum of 12 and selectable up to 64/256 direction encoding
xxv	Data acquisition in all three standard planes (axial, sagittal and coronal) and oblique and double oblique planes or more oblique planes
xxvi	Higher matrix acquisition capability in single shot EPI. Acquisition time, TR, TE and slice thickness should be clearly mentioned and supported by data sheet reference.
Xxvii	The vendor should offer multi coil acquisition in order to optimize throughput increase and increased effective FOV. Individual acquisition elements of every coil should be mentioned.
	Imaging pulse sequences:

I	All standard and special pulse sequences available at the time of quote/delivery should be offered and quoted in the bid. Fat suppression for high quality images both inversion recovery and Dixon method/ IDEAL/ 3D Dual Echo/ m-Dixon. The system should acquire motion artifact free images in T2 studies of the brain in restless patients (Propeller, Multivane, Blade, etc.). Dynamic study for pre and post contrast scans and time intensity studies.
ii	The system should be capable of selecting TR and TEs as per requirement in majority of the pulse sequences.
iii	Spin echo (SE): multi-slice single echo, multi-slice multi-echo (8 echo or more), SE with symmetrical and asymmetrical echo intervals and fast spin echo. MT-SE imaging sequence.
Iv	Inversion recovery (IR): including short T1 modified IRSE, FLAIR, DIR (Double inversion recovery).
V	Gradient echo (GE): with transverse gradient/ RF spoiling and transverse gradient rephrasing, e.g., GRASE or equivalent etc. 3D gradient echo with shortest TR and TE, free choice of angle selection, while maintaining SNR
vi	Fast sequences
Vii	Fast spin echo and GE sequences in 2D and 3D mode with T1,T2 and PD contrast capable of acquiring maximum number of slices with a given TR at minimum TE, echo train should be at least 256 or more in fast spin echo mode
Viii	Half Fourier acquisition capabilities should be available with/without diffusion gradients and in combination with fast spin echo
ix	Fast inversion recovery with spin echo
x	Fast gradient spin echo IR multi-slice multi-echo mode with maximum ETL. Sequences should incorporate RF focusing to acquire ultra-fast gradient spin echo
Xi	Fast gradient echo sequences should incorporate RF spoiling and other technique to acquire images in ultra-fast 2D and 3D modes, gradient echo with ETL of 255 or more.
Xii	Fat and water suppressed imaging sequences
Xiii	EPI optimized sequences (with and without fat suppression) with ETL of 255 or more.
Xiv	For T1, T2, PD imaging, perfusion, regular diffusion values (at least 5b, 3 directions) EPI-FLAIR, EPI-IR, EPI-FLAIR diffusion tensor, EPI-MT-FLAIR, tensor diffusion (at least 16 b values in minimum 32 directions) and diffusion studies. Suitable artifact/ fat suppression techniques to be incorporated in the sequence to have optimum image

	quality.
Xv	There should be capability of calculating ADC map(isotropic and anisotropy from the regular diffusion and tensor data)
Xvi	Optimized sequence package for special applications.
	Special application packages:
I	Point Deleted
	Please give details of licensees for acquisition post-processing and for special packages quoted for the following applications
A.	**Neuro Applications**
1	Functional MRI accessories and post-processing:
I	i Functional Imaging with package for BOLD Imaging and spectroscopic imaging and processing package capable of real-time processing and display of color overlay (in real time) using 32-channel head coil being supplied with the system.
Ii	ii Complete MRI solution including audio-visual projection system
iii	iii The audio-video projection system should have the capability to project movies to the subject, and should be compatible with the 32 channel head coil, and should include all attachments that may be required for complete integration
Iv	The system should be integrated with stimulus presentation/ paradigm generator along with licensed software (like super lab, eprime, presentation, etc.) which is capable of presenting audio-visual, audio, video (multiple formats), etc.
V	The paradigm presentation should be synchronized with the scanner (for starting and ending along with measurements)
Vi	Integration and provision near the console for external trigger (of the sequence) for synchronizing MRI acquisition with paradigm
Vii	Post-processing work station / server with post-processing software and hardware associated, with licences for processing the BOLD data (with required licensed operating platform required like MATLAB, IDL, etc.)
ix	Point Deleted
X	The entire MRI hardware package should be from a single vendor for complete integrated solution. Please specify the vendor.
2	2D/3D Arterial Spin labeling
3	Perfusion imaging of brain with software for rBV, CBV etc analysis.

4	Susceptibility weighted imaging with phase information (i.e. SW1/SWIp/eSWAN 2.0)/Venous BOLD Imaging
5	Multi Direction DTI with minimum of 32 directions. (Complete package including DTI quantification and tractography software). Prospective motion correction enabled software preferred. Spinal tractography should also be possible.
6	T2 Relaxometry and volumetric analysis for Hippocampus
7	3D-T2 weighted Turbo Spin for volumetric acquisition reconstructed in any plane e.g. for lumbar spine and for nerve root analysis
8	High resolution imaging for inner ear. Please specify sequences eg. CISS or equivalent
9	The system should have facility for flow quantification of CSF aqueduct, spinal canal, vessel flow. Both retrospective and prospective gating should be possible.
10	Whole spine imaging with fusion software.
11	Real time Brain Wave, Pre Acquisition / post processing or Inline BOLD or BOLD Specialist.
12	Sequences such as Double Inversion recovery for "Plaque Imaging' in Carotids to be provided.
13	MR ventriculography, cisternography, myelography
B.	**Cardiac applications:**
1	Advanced Cardiac Applications: ECG gating, Morphology/wall motion; Cine perfusion imaging; Myocardial viability imaging; Arrhythmia rejection techniques, Advanced Cardiac Ventricular Measurement Analysis; Cine Cardiac Tagging Techniques; Coronary artery techniques; real time interactive imaging, 2D/3D fast field echo/balanced/steady state techniques. Myocardial tagging, STIR for cardiac use, stress perfusion, 3D acquisition of whole heart in one breath hold. Complete cardiac evaluation package to be included on the workstation, besides the main console. 2 T1, T2, T2 quantification. Tools for evaluation in real time with automated guidance
C.	**Musculoskeletal:**
1	High resolution imaging for cartilage and musculoskeletal imaging. Parametric MAP be available. dGEMERIC or equivalent, radial imaging for menisci and labrum
2	The system should have software package for evaluation of bone marrow.
3	Whole body screening imaging studies for metastasis.
D.	**Hepatobiliary and abdominal system.**
1	High resolution Abdominal and Liver imaging in breath hold and free breathing modes with respiratory triggered volume acquisitions with navigation, liver iron quantification and liver fat quantification software, and spectroscopy

2	The system should have basic and advanced MRCP packages including free breathing and 3D techniques.
E.	**Vascular Imaging**
1	MR angio Imaging Should have 2D/3D TOF, 2D/3D Phase contrast (with and without gating and magnetization transfer saturation), black blood angiography for cerebral, pulmonary, abdominal and peripheral vessels and TONE, ceMRA, Facilities for high temporal and high resolution 4D angio imaging for time resolved vascular imaging with imaging frame of 40 frames/sec or more.
2	Bolus chasing with automatic and manual triggering from fluoroscopy mode to 3D acquisition mode with moving table facility for whole body application. Specify table movement. Inline subtraction should be available.
3	Non contrast enhanced peripheral angiography for arterial flow with Native/ Trance/inhance sequences.
4	Time resolved angiography with contrast kinetics like 4D TRACKS/ 4D BLISS/KTblast / TRICKS /TWIST or equivalent
5	Perfusion study in organ systems like kidney, brain, heart etc. with T1 perfusion with permeability maps, and quantification of rCBF/ rCBV, MTT, etc, with color maps.
F	Breast Imaging:Advance package including diffusion, spectroscopy and perfusion with time intensity curve.
G	**Diffusion Weighted Imaging** with at least b value of 7000 or more. Whole body diffusion weighted imaging with background suppression
H	**Spectroscopy:**
	The system should have the Hydrogen, Single Voxel spectroscopy, Multivoxel, Multislice & Multi-angle 2D, 3D Spectroscopy and Chemical Shift imaging in 2D / 3D.The complete processing / Post processing software including color metabolite maps should be available on main console and the workstation and each of the five clients. Complete prostate, breast, liver spectroscopy hardware and applications should be provided. Spectroscopy phantom for important short echo time neurometabolites, breast and prostate Water and lipid suppression in automated sequences.
I.	Prostrate Imaging with Parametric cards (Ktrans, Kep, Ve, Vp)- quote this as optional and price will not be included in calculation for L1.
	(1) Workflow improvement Techniques with availability of "Previous Scans" such as Smart Exam/ Auto Align /Ready for Brain applications to be provided.
	(2) Integrated exam planning should be possible. All filming, viewing and export options should be possible. Optional price for breast, joints including shoulder, hip, knee and for other applications to be provided.
J	(Price for point (2) will not be considered for L1 calculation).

10	**Additional software and hardware & Accessories (price to be mentioned separately not to be included in price for calculation of L1**).
I	Multi Nuclear Spectroscopy: Facility of P31 Imaging & Spectroscopy. Double tuned surface coil for P31 Imaging and spectroscopy for brain &breast.
Ii	Double tuned head coil for 31P and 1H spectroscopy. The operating frequency should cover 1H and 31P nucleus (for multinuclear spectroscopy 1H and 31P) to be quoted as Optional
iii	MR elastography.
Iv	MRI- HIFU complete system with application for fibroid, prostate, bone etc.
V	"Silent MRI" sequence package. Please specify the decibel levels for silent MRI and list all the sequences with their acquisition time where silent MRI is not available.
Vi	TIM whole body suite. Any other hardware, software application packages with the tender to be quoted.
Vii	Breast coil, biopsy attachment – 4 channels.
Viii	Carotid coil/ Suitable coil for carotid plaque imaging.
ix	Coil for Cardiac application
11	Additional workstation:
	Client server architecture-server with 5 concurrent clients (Dexus, Intelligence Portal, Syngo.via, etc. or higher) capable of rendering 40000 images at peak performance.Workstation hardware should be industry standards, and should be the latest with the vendors, as per their globally launched product catalogue.
A	A Server workstation with preferably the same user interface as of main console is required with the availability of all necessary software including.
I	Basic post-processing software including MIP, MPR, surface reconstruction and volume rendering technique, Image fusion , 3D evaluation on all five concurrent clients.
Ii	Advanced post-processing offered applications including FMRI, perfusion quantification, advanced diffusion and DTI, advanced cardiac evaluation(EF, Calculation, Wall motions, analysis) including perfusion analysis, processing of 2D/3D CSI data, with color metabolite mapping, quantification of CSF flow data, vascular analysis package on at least two clients concurrently.
iii	The system should support the DICOM print service class as a service class user (SCU)
Iv	Workstations support the DICOM query and Retrieve SCU
V	Workstation should retrieve MR spectroscopy images.
B	desktops with i7 , 6th generation , Intel Processor , 8 GB DDR3 RAM, 500 GB SSD (Solid state Drives) 1 TB HDD 24” LED Medical Grade Monitor - Total five Clients Each of the client should enable printing in laser film camera and color printers. Total

	5 client hardware and software to be provided.
C	The offered System is to be networked with the then existing "Department Network" including PACS. Appropriate anti-virus protection to be provided by the Vendor. The vendor should provide picture storage and archival system, to store and retrieve MR images
D	The system should have DICOM 3.0 compliant interface and enabled for networking connectivity to Linux/ Windows based servers/ clients with patient ID labelling and integration to generic hospital information system/ PACS
E	Point Deleted
F	Point Deleted
	Module for scheduling and imaging
	Modality, exam date and time will be fixed during scheduling of the exam Appointment letter with patient instructions will be printed from RIS and given to patient for OPD patients, ward patients, critical patients and VVIPsDWL licences to plan, perform and document examinations Statistics of exams, etc.
G	Point Deleted
12	**Safety Features**
	The System should have following safety features
A	The magnet system should include an Emergency Ramp Down unit (ERDU) for fast reduction of the magnetic field with Ramp Down time below 3 minutes.
B	The magnet should have quench bands that contain the fringe fields to a specified value in the event of a magnet quench
C	Real time SAR calculation should be performed by software to ensure that RF power levels comply with regulatory guidelines and are displayed on each image
D	The system shall have manual override of the motor drive for quick removal of the patients from the magnet bore
E	Temperature sensor (built in) for magnet refrigeration efficiency must be provided
13	**Accessories**
A	DICOM compatible Dry Chemistry laser camera (2 No.s) with integrated processor for filming from main console & workstation. The camera should be capable of printing on films of 14" x 17", 11" x 14" and 10" x 8" sizes in a resolution of 600 or more dpi. It should be possible to connect other imaging modalities to the printer. 2000 compatible films to be provided. Films to be provided after installation as and when required by the user. Main equipment (MRI) in the emergency block to be networked with cameras of CT and DRF camera in the emergency block

B	A color laser printer for printing high-resolution color-coded 3D images and protocols on plain paper in 1200 dpi resolution or more than 20 ppm or alternatively a dedicated color printer for medical images
C	The UPS system should be provided for complete MRI unit with Chiller and emergency lights with at least 30 minute back up, preferably 150 kVA or more (specify kVA). An emergency door or hatch should be provided in RF cabin.
D	RF Cabin: The system should be supplied with the imported RF cabin with RF room shielding, RF Door screen, and interiors for the same should be carried out suitably.
E	Dual Head MRI-Compatible Pressure Injector (minimum 2000 Gauss line) with 1000 sets of syringes (Two syringes & connecting tubing per set). It should be compatible with 50 ml syringes for both saline and contrast
F	Non-magnetic I/V stand
G	G Water Chiller for Cold Head and Gradients
H	Two Non-ferromagnetic MR compatible patient transfer trolleys should be globally repudiated make
I	Fire Fighting System, Detectors and 6 Fire Extinguishers (MR Compatible)
J	Hand held metal detectors - 2 Nos
K	Closed circuit CCD camera for patient observation.
I	Phantoms for image quality audits
M	Defibrillator Biphasic with ECG recording with Adult and Paediatric paddles
N	MR Compatible Infusion Pump (2000 Gauss Line)
O	Patient positioning accessories with hand held alarrn & look-out mirror.
P	MR Compatible Transport Ventilator. (1000 Gauss Line)
Q	Three desktops with i7 , 6th generation , Intel Processor , 8 GB DDR3 RAM, 500 GB SSD (Solid state Drives) 1 TB HDD 24” LED Medical Grade Monitor with three laser Printers of 600 dpi, UPS & dictaphone
R	SPECIFICATION FOR MRI COMPATIBLE ANAESTHESIA MACHINE (1000 Gauss Line) & MRI COMPATIBLE MONITOR or (1000 Gauss Line)
12	**MRI COMPATIBLE ANAESTHESIA MACHINE SPECIFICATIONS: (Minimum 1000 Gauss Line)**

A	Should be MRI compatible at 3T, antistatic,heavy frame & base with good quality castors with front brakes, with following features
I	Three gas model viz Oxygen, Nitrous oxide and Air.
Ii	Should be compact, ergonomic, easy to use and easy to maintain.
iii	. Should have separate fresh gas outlet for use in open circuit.
Iv	. Machine should have flow meters for Oxygen, Nitrous oxide and air. Emergency Oxygen flush should be available. There should be facility to select oxygen-air or oxygen-nitrous oxide with the help of a separate switch or knob.
V	Dual flow sensing capability at inhalation and exhalation ports.
Vi	Should have paramagnetic/ galvanic cell oxygen sensors. In case of galvanic cell sensors, the firm should supply free sensors for the entire warranty period of 5 years. In case of Paramagnetic sensors, the firm shall ensure that there is no down time during repair of these sensors (if necessary) and provide a standby alternative.
Vii	. Shall have back-up Oxygen Control which provides an independent fresh gas source and flow meter control in case of failure.
Viii	Pressure regulators shall be of modular design.
ix	Should have oxygen fail safe device & an auxiliary built in oxygen flow meter.
X	Electronic or Mechanical Hypoxic Guard to ensure minimum 25% Oxygen across all O2–N2O mixtures and Oxygen Failure Warning.
	Vaporizers:
Xi	Facility of mounting minimum two Vaporizers, latest technology , key filler, selectatec type, tool free installation ,meaning any vaporizer of our choice can be mounted at will with interlocking facility.It should be preferably of the same make as that of machine.
Xii	Temperature ,pressure and flow compensated with high accuracy of delivered concentration of volatile anesthetic agent. Should be maintenance free.
Xiii	Two Vaporizers should be supplied (Isoflurane ,Sevoflurane).
	Ventilators:
Xiv	The Machine should have an Integrated Anesthesia Ventilator System, facility to vary respiratory parameters and should be able to ventilate adult and Pediatric patients including infants.

Xv	Ventilator should have Controlled ,Manual, Spontaneous modes and provision for PEEP.
Xvi	Tidal volume (inspired and expired) respiratory rate ,1 :E ratio, minute volume Airway pressure & FiO2 should be continuously displayed.
Xvii	Should have Tidal volume and fresh gas compensation mechanism.
Xviii	Audio-visual alarms for high and low settings of Pressure, volume and disconnection should be present.
Xix	Tidal Volume (VT) 20-1500ml (Volume Control) ,Rate atleast 4-80 BPM.
Xx	Inspiratory / Expiratory ratio (I :E) 2:1 to 1:6 &Peak Flow -100 to 120
Xxi	Ventilator should have at least 30min rechargeable battery backup for ventilator.
Xxii	Machine should have an integrated breathing circuit with circle absorber of good quality, easy to clean, autoclavable , fewer parts to reduce leaks.
xxiii	Machine should have mounting capability of One O2 and one N2O pin-indexed cylinder
Xxiv	Adult autoclavable (2 sets) breathing circuits & one paediatric circuit to be provided.
Xxv	The Machine should be equipped with AGSS.
B)	**MRI COMPATIBLE MONITOR (Minimum 2000 Gauss Line)**
	Specifications for MRI compatibility:
I	Monitor should be quipped with MRI shielding and set to Remote Communication Mode.
Ii	Should be MRI compatible (Safe will not be acceptable) at 1000 Gauss, 3.0 Tesla and 4W/Kg SAR.
iii	System should include fiber–optic SPO2 finger sensor, MRI compatible ECG Patient Leads and Electrodes, NIBP cuffs, hoses and etCO2 sampling kit and temperature probe.
	General Specifications for Monitor:
I	The Monitor should have adult and neonatal application and should be user friendly.
Ii	It should be capable of monitoring ECG, non-invasive blood pressure ,oxygen saturation (SpO2) ,ETCO2 and temperature.

iii	. It should have an internal battery which should last for 30-40 min.
Iv	It should be operational at wide temperature (10 degree Celsius – 40 degree Celsius) and humidity (20% to 90%).
V	It should have a facility of 24hours data storage of trended parameters and trend graph of 1,2,3,6,12 or 24 hours display format.
Vi	Should have a facility to deactivate all the alarms if necessary.
	ECG Monitoring: Essential Specification:
I	Available leads : I,II,III,V,AVR,AVL,AVF with facility for recording 12 lead ECG.
Ii	Should display one or all the selected leads at a time.
Iii	Accuracy of +- 5% of the rate.
Iv	Monitor Mode : Digital Signal Processing (DSP).
V	T-Wave suppression for high field MRI.
Vi	Should have arrhythmia monitoring facility.
Vii	Should have user selectable alarms.
	Heart rate measuring ranges 15-300 beats/min.
Viii	**Pulse Oximeter (SPO2):**
I	Should provide a digital value of the arterial oxygen saturation as well as diagnostic plethysmographic pulse waveform.
Ii	Measurement range : 0% to100%.
Iii	User Selectable upper and lower alarm limits.
Iv	Probes with finger and ear sensors for adult, paediatric and neonatal use.
V	Should be sensitive and function accurately even at low perfusion states of low blood pressure or hypothermic conditions.
	ETCO2 Monitoring:
I	Should have side stream Carbon di-oxide module and display both graphically and numerically.
Ii	Single beam ,non-dispersive infrared (NDIR) absorption, radiometric measurement, no moving parts.
Iii	. Initialization time less than 10 seconds, full specifications within 1-2minutes.

Iv	Carbon di-oxide range should be 0 to152 mm Hg barometric pressure supplied by module itself.
V	Should be able to detect breath rate in the range of 2-150 BPM.
Vi	Respiratory rate accuracy should be + 1 breath.
Vii	Barometric Pressure auto compensated from 400mm Hg to 850mm Hg.Operator selectable O2, N2O,HE and Agent Compensation.
Viii	. No routine user calibration required. An offset calibration should run automatically when the ambient temperature is not stable.
ix	Sampling line should have both nasal sampling line and extension sampling line.
X	x Warm up time 10seconds.
	Temperature Monitoring:
I	Measuring range: 5 to 50 degree Celsius.
Ii	Accuracy + 0.1 degree Celsius.
Iii	User Selectable upper and lower limit of alarm.
Iv	Core and skin probes.
	Non-Invasive Blood Pressure (NIBP) monitoring:
I	Should automatically sense infant / adult cuffs and set appropriate inflation pressure and safety limits.
Ii	Operating Modes : Automatic ,Manual ,Stat.
Iii	Accessories ,NIBP cuff :
	1 Adult for thigh and arm.
	2 Paediatric
	3 Neonatal
14	**Guarantee**
I	Principals and Indian counterpart. The Principals should be responsible for any lacuna or deficit in service or supply.
I	All items in the supply order should be supplied during the time of installation, No exceptions will be allowed .Items under Research .Agreement should be finalized well in advance (after receipt of supply order). So that there is no delay in delivery of software or coil or any other accessories.

Ii	Software updates (where hardware upgrades are not required)like new pulse sequence, new application package etc. should be provided within one month after release worldwide (any country,viz. north America/ Europe/Germany etc).In case, the same is not provided in time, the parent company should undertake the responsibility to implement the same. This is to make sure that the machine stays updated with similar products for at least 5years.
	WARRANTY PERIOD
I	The equipment should have 60months warranty from the date of handing over the fully functional unit of all coils and the accessories supplied(such as UPS,AC,, etc)\ to the hospital against manufacturing defects of material and workmanship. The Helium Supply and cold head repairs (including replacement. If needed) should be included in the warranty period.
Ii	Even during the warranty period , the desired uptime of 98% of 365 days (24 hrs basis) will be ensured. In case the down time exceed the 2% limit, extension of the warranty period will be twice the excess downtime period
Iii	Note any Liquid Helium due to quenching or due to any other causes during the warranty period shall be borne by the firm.
Iv	If any particular coil is not working resulting in non functioning of a particular clinical application for more than 3 days it will be considered as downtime .
	POST GAURANTEE ANNUAL COMPREHENSIVE MAINTENANCE CONTRACT (CMC)
I	The post –warranty (after 5 years) CMC should be comprehensive and should include helium and cold head (repair and/ or replacement) + labour + spares for the complete system which includes all the accessories supplied such as UPS, AC, etc. (including all consumables like batteries for UPS,.) and maintenance for another 5 years. This CMC should be quoted in Indian Rupees.
	The price of post warranty 5 years CMC shall be taken for price comparison.
Ii	The desired up-time during post-warranty CMC is 98% of 365 days (24 hr basis) along with the penalty clause that in case exceeds the 2 % limit, extension of the post warranty CMC period by the twice the excess down-time period.
Iii	The rate of post-warranty comprehensive CMC should be offered for at least five years by the bidder and be offered in Indian Rupees only.
Iv	Note any liquid helium due to quenching or due to any other causes during the CMC period shall be borne by the firm.

V	If a particular coil is not working resulting in non working of a particular clinical application for more than 3 days will be considered as downtime
Vi	All local items should be quoted in Indian Rupees. Other items should be quoted in US Dollars only, to have uniformity. The technical and financial bids should be separate. The model with 'the best and latest technical features' available with the vendor should be quoted in tender response with original printed vendor data sheets. The system should incorporate all the features as per the November 2015 RSNA standards/declaration.
Vii	All product catalogues in original.
Viii	When the vendor data sheet disagrees with the bid response, clarification should accompany in the form of letter/certificates from the principals in original.
Ix	System should be DICOM - 3MPPS & should be ready to integrate with any existing PACS/HIS System
X	List of all installations of the system in the country
Xi	The compliance statement must be filled strictly under headings given in the tender.
Xii	Each specification corroborated in the compliance statement must give the page number where it is listed in the original technical data sheet along with soft copy. The technical bid should clearly mention model number and make, detailed technical specifications, quantity of each component offered. the technical bid should be duly supported by original brochure/catalogue of the manufacturer and relevant parts proposed to be supplied highlighted. In compliance statement units of measurement used should be same as in the required technical specifications.
Xiii	There should be no discrepancy between specifications given in technical bid, brochure and compliance statement. In case of any such discrepancy, the technical bid will be disqualified.
Xiv	The quotation should clearly mention the accessories (including quantity) which are part of the main equipment and the price of which is included in the main equipment.
Xv	The equipment should be fully functional with the standard accessories
15	**Training :**
1	On-site training of all faculty members & radiographers.
2	On-site training for radiographers and other staff by an application expert for a period of at least 3 months
3	One on site service engineer and one on site application specialist to be available for a uninterrupted continuously break period of two months with the team of both engineers will maintain log book of training provided to technical staff & doctors
	Amendment regarding the Turnkey Works:

	Turnkey Works For 3 Tesla MRI Unit
	The layout plans (with dimensions) allocated uploaded. Air-conditioning of appropriate strength/capacity (tonnage) in the area as required shall be done. Additional standby split air conditioner(s) of appropriate strength/capacity (tonnage) to be fixed in the main equipment rooms.
	Civil work: In the civil works Modifications/Renovations in the existing rooms by the supplier/vendor as shown in the layout plan after approval by Purchaser/HSCC shall be executed as per approved makes specified.
	The walls of MRI Complex should be finished acrylic/plastic emulsion (approved makes) and should be finished with vitrified tiles (approved makes) up to five feet height from the floor. Colour as approved by Purchaser/HSCC shall be provided.
	The flooring in the MRI complex should be as per regulations. Flooring in all rooms shall be of vitrified tiles of 80 x 80cm size or other close appropriate size of reputed makes (approved makes). Colour as approved by Purchaser/HSCC shall be provided.
	Whole area of MRI Complex as in the layout plan shall be finished with fire resistant false ceiling material (approved makes). MRI Room PVC roll flooring with mineral fiber panel false ceiling and Aluminium suspension.
	All the doors should be provided with necessary fittings with hydraulic type door closures (approved makes) and with Mortised locks (approved makes).
	Electrical work: The firm is required to specify load requirement i.e. required for the unit, the air conditioning, room lighting and accessories, if any. The electrical works should be as per approved makes mentioned. The electrical works should have minimum two separate Earthing with copper plate is to be provided for the each equipment and air-conditioning equipment as per equipment requirements. The use of earth leakage circuit breaker will be as required.
	A distribution panel of appropriate capacity is to be provided by hospital. The load shall also be provided by the hospital. From the substation of the hospital to the distribution panel, cable of appropriate size shall be provided & fixed by the hospital. Vendor shall do cabling from distribution panel up to the equipment.
	The switch gears (MCBs / ACBs/ MCCBs), L.T. distribution board for MCBs etc. (approved makes).
	Electrical wires should be of copper of different capacity as per the load (approved makes).
	For Telephone wiring cables (approved makes). Telephones to be provided in all rooms with EPABX system having control in office.
	Modular range Switches / Sockets of approved makes should be provided and fixed as per requirement.

	LED lights of suitable illumination should be provided of Phillips/GE/ Crompton/Syska make.
	Light dimmers (down lighters) should also be fixed in the equipment room.
	Air conditioning:
	Split Air conditioners of reputed make (approved makes) to be provided by the vendor in whole complex as per requirements (to maintain appropriate temperature in the main equipment room & other rooms) and as per regulations of AERB.
	Standby additional split air conditioners of appropriate strength/capacity (tonnage) to be fixed in the main equipment room
	Hygrometer Nos.1 to be provided.
	In-built or External De Humidifier in Equipment, Console and Examination rooms to be provided as per room layout.
	Fire Protection
	Non water based fire protection is to be integrated as per requirement. Fire extinguishers of appropriate types (approved makes) should be fixed in different rooms as per requirement. Heat detectors/hooters/photoelectric/smoke detectors (approved makes) shall be provided in all the rooms and corridors as per requirements. In case the expiry date of fire extinguishers is before the completion of 5 years comprehensive warranty period, extra set(s) of fire extinguishers will be supplied by the vendor till the completion of the 5 years comprehensive warranty period. Besides, any works required as per statutory/Delhi Fire Services norms shall be executed by the vendor.
	The vendor to also install the following:
	Audio visual Music systems for patient waiting areas.
	Adequate Pest, insect and rodent control system to be provided and installed to ensure that area remains insect, pest and rodent free.
	Music and Public Address system for calling/ informing the patients in the waiting areas.
	Furniture:-
	Following furniture (Godrej/Debono/Delite) will be provided:
	Chairs with castors and armrests 2 nos.
	Coil Rack for MRI 1 No.
	Medicine Trolley 1 No.
	Ultrasonic pest repellent equipment 1 no.
	Insect killer equipment 1no.
	Steel Storage Almirah 2 nos.
	Overhead Storage(1.2x0.4x.6m) for CD storage 1 no.

SPECIFICATIONS FOR DIGITAL FLAT PANEL RADIOGRAPHY SYSTEM

Latest state of the art Fully digital radiography system. Mention the year of introduction of the quoted model in the International market.

The quoted model (and not the individual components) should be US FDA and CE approved. In the system 2 out of 3 major components (Tube, detector, and generator) should be manufactured by the quoting vendor themselves. Mention the manufacturer of the third component and provide the MoU with the other party for the same. Vendor should have experience of supplying and maintaining similar DR equipment in the last 5 years in major government hospitals. (Certificates of supply and satisfactory performance to be enclosed Other certificates are not acceptable).

A) The quoted model should have AERB type approval certificate. In case the model is being imported for the first time NOC from AERB must be available & AERB type approval certificate must be obtained within 8 weeks of installation by the vendor who receives the order.(Vendor must give undertaking for obtaining AERB type approval certificates with tender quotation.

Fully digital radiography system with two Flat panel detectors with Cesium Iodide Scintillator and with Automatic Exposure control (AEC) capable of performing exposure in vertical, horizontal and oblique positions to perform all skeletal body (Upright and Lying down) radiographs. The unit should be completely integrated along with auto features in quality control & performance, AEC, APR, fully automated positioning system with autotracking for horizontal table and for vertical stand studies.

B) Detailed Specification of X-Ray Flat Panel Detectors (Quote the latest model of flat panel detectors)

Note: **The Technical Specifications should be supported by compliance statement with page number of original Technical Data Sheet and any additional information from the manufacturer.**

1 Use of matrix flat panel imager (Radiography).

2 Name of the Detector model and manufacturer to be provided.

3 Assembling should be Monolithic panel/tiles.

4 Active Matrix Flat Panel detectors should be based on Indirect Conversion process

5 Scintillate material used for flat panel detector should be Thallium doped Cesium iodide (Csi:TI).

6. Semi Conductor material (Photodiode) should be Amorphous Silicon.

7. Charge Read Out should be Thin Film Transistor Array (TFT Array).

8. Detector Size should be 40 cm x 40 cm or more (more will be preferred).
9. Array Size be 2000x2000 pixel or more.
10. Pixel Pitch should be 0.2 mm or less.
11 Image depth should be 14 Bits or more.
12. Detector Quantum Efficiency (DQE) should be at least 65%
13. Tube assembly movements to be automatically synchronized with both the horizontal and vertical detectors movement.
14. **Two Digital flat panel detector systems with detector fixed & integrated into the Bucky table as well as wall stand.**

Due to extensive workload a sturdy system is necessary, therefore wireless or tethered detector is not acceptable. Wireless detector is also not acceptable due to risk of theft and damage.
15. Mention the weight of the detector.
16. System warm up time should be mentioned.

C) Specification of Acquisition Work station:

17. Monochrome LCD monitor with protect panel from dust and scratches.
18. Manufacturers name and model to be provided.
19. Viewing angles **(Horizontal & Vertical)**: 170 Deg. or more.
20. Size of Monitor (diagonal) 19" or more.
21. **Mouse control & touch screen display.**

22. Mention all the standard accessories to be supplied with the monitor.
23. **Hard disc storage: 4000 or more images**.
24. Post Acquisition, Image processing and Display: Mention the time.
25. The system should have auto protocol select.

D) X-Ray Table Specification :

26. **Four way motor driven floating horizontal table top of carbon fibre or its equivalent, compact bucky table with digital flat panel detector should be provided.**

27. Mention the range of vertical, horizontal and longitudinal movements of the table.

28. Removable grid for SID of 100 cms for horizontal table applications.
29. Maximum patient weight - 200 kgs or more.
30. Table Top length: 200 cm or more.
31. **Foot switches for – adjusting height, longitudinal movement side to side movements and for locking.**
32. Automatic detector alignment should be possible on the table.

E) Vertical Stand

33. Vertical movement: Motorized with foot switch facility.

34. The vertical movement to be servo coupled to the movement of the X-Ray tube (simultaneous movements).

35. **Provide two removable grids with Grid Ratio of 12:1 or more.**

36. **Motorized Tilting vertical detector facility should be available from (-20) to (+90) degrees)**.

37. Maximum height from the floor to the centre of detector should be more than 175 cm.

F) Ceiling Mounted X-Ray Tube

38. X-Ray tube suspended on a telescopic column.

39. The movement of X-Ray tube should be motorized and should be possible in all directions: Specify the travel range and angulations in degrees.

40. It should have capability of manual override.

41. **Provision for control panel on patient side.**

It should have autopositioning and autotracking function.

G. X-Ray Generator

42 a)Invertors Type Constant Potential high Voltage Generator (High Frequency X-Ray Generator) ,Microprocessor controlled with constant output and low ripple frequency.

b) Power: 80 KW or more.

c) 1000mA at 80kv or more according to IEC standard.

d) Automatic exposure control with 3 or 4 chambers.

e) overloading protection should be available.

f)minimum exposure time should be 1 milli sec or less.

H) X-Ray Tube

43) **Mention the make of the X-Ray tube.**

44) **A dual focus Rotating anode with high speed of 8000 rpm or more, compatible with the provided generator.**

Focal spots of following sizes-

Large-1.2mm or less.

Small 0.6 mm or less.

45. Anode Heat storage capacity 300 KHU or more.

46. Inherent filtration to be provided. Tube protection against overload should be available. Please specify tube rotation at vertical and horizontal axes.

I) Filter and collimator

a) It should have Inherent filtration.

b) Mention details of added filtration.

c) Square collimation –automatic type
d) Display of collimation.
e) Rotation of +/_ 45 degrees or more.

J) Advanced Clinical Application Facility :

47. Auto Image stitching / image pasting soft ware and necessary hardware on vertical and horizontal bucky, for complete spinal column, extra long leg image **& other long body parts, should be a standard feature in the machine.**

K) Two additional Workstations for Image viewing, Post Processing, reporting and documentation : Qty (2 Nos.)

- High Speed processor based workstation 2.4 GHz or higher processing speed with post processing capability. The workstation should have 8 GB RAM or more. It should have its independent memory & hard disk of at least 1 TB. It should have a high resolution medical grade 2 MP monitor of size 21'' or more capable of simultaneously viewing or performing post processing functions. Both Workstations should be configurable with Digital X- Ray or Digital fluoroscopy System & all other Imaging equipments in New Emergency block of any make. Latest operating system should be available.

48. Addition of Anatomical markers.
49. Demographic Correction.
50. Image Annotation.
51. Window and Level adjustment.
52. Electronic Collimation.
53. Magnification, Image Rotation.
54. Application for comparison with standard (Look up) tables should be available. Should have CD and DVD writing facilities.

It should support storage of images on CD or DVD.

System should be DICOM 3 or higher version. It should have features to connectivity to any network in DICOM format.

Easy integration and networking should be possible with any other existing future networking including other modalities, HIS, RIS and PACS at no extra cost.

Accessories

55. Dry chemistry camera of 500 DPI or more should print at least 3 sizes of films at one time i.e. 10x8, 10x12, 10x14, 14x14, 14x17 inches. 500 films of 14x17 size should be supplied along with camera. **It should be capable of being networked with all modalities of all other Imaging equipments in New Emergency block of any make.**
56. Compression belt (Pediatric and adult) (2 each).

57. Patient hand grip.
58. Patient support bar for vertical stand to be provided.
59. Lead Glass 120 cm x 100 cm to be provided.

60. **Provide Voltage stabilizer for the entire system including both workstation.**
61. UPS of appropriate rating along with batteries (with half hour back up) for the acquisition workstation of reputed brand to be provided.
62. **Radiation protection equipment:**
a. light weight lead aprons -5,
b. gonad shields-4 (2 Adult, 2 Pediatric)
c. lead goggles-4
d. thyroid shield -4.
63. PA system for calling patient.
64. **lead aprons hanging unit – small size for 5 aprons.**

65.**Necessary furniture like table for operating console ,4 standard and two revolving office chairs, examination stool and foot step.**

L) Other Terms and Condition

66. Some specification which are not qualified, the buyer reserves the right to evaluate the specification based on the details given by the firm.

67. The equipment should be under comprehensive warranty for 5 years for all items for which order is placed including turnkey works from the date of successful installation and handing over with an uptime warranty of 98% and extension of warranty period by double the down time in excess of 2%.

68. Please quote Comprehensive maintenance Contract (Including X-Ray Tube and detector) and all other items for which order is placed including turnkey works for next 5 years after successful completion of warranty with 98%uptime and extension of CMC period by double the down time in excess of 2%.

69. All software up-gradation will be provided free of cost to the institute as and when available

70. Operating manual & service manual along with schematic diagram to be provided

71. There will be an agreement between the buyer and seller for comprehensive maintenance contract at the time of finalization of purchase of equipment.

72. Only principal or their authorized principal agents should participate in the tender. Principal manufacturer will have to give an undertaking of availability of spares as well maintenance of services for 10 years in case there is any change of local agent.

73. Company should provide adequate application training of at least one month or as long as required to the Radiologists & Technical staff.

74. All the civil, Electrical alternation / fixation pertaining to the installation of the machine will be the responsibility of the firm.

L) Accreditation and Quality Certification

75. The quoted model should be AERB type approved and CE & US FDA certified. (as detailed in A of the Technical specification)

76. The Bidder must have been in business of Flat Panel Detector equipment for at least last five years with .supply/installation in major government hospitals. (enclose copies of supply order and satisfactory performance reports)

M) For Digital Flat Panel Radiography System

77. The new latest, amended layout plans (with dimensions) allocated has already been uploaded earlier. Air-conditioning of appropriate strength/capacity (tonnage) in the area as required shall be done. Additional standby split air conditioner(s) of appropriate strength/capacity (tonnage) to be fixed in the main equipment rooms.

78. Civil work: In the civil works Modifications/Renovations in the existing rooms by the supplier/vendor as shown in the layout plan after approval by the **Atomic Energy Regulatory Board (AERB)** shall be executed as per approved makes specified in Amendment no. XX dated 04.2.2016.

The walls of whole Complex should be finished acrylic/plastic emulsion (for approved makes refer Amendment no. XX dated 04.2.2016) and should be finished with vitrified tiles (for approved makes refer Amendment no. XX dated 04.2.2016) up to five feet height from the floor. Colour as approved by Purchaser/HSCC shall be provided.

The flooring in the Fluoroscopy/DR complex should be as per **AERB regulations**. Flooring in all rooms shall be of vitrified tiles of 80 x 80cm size or other close appropriate size of reputed makes (for approved makes refer Amendment no. XX dated 04.2.2016). Colour as approved by Purchaser/HSCC shall be provided.

Whole area of Complex as in the layout plan approved by the **AERB** shall be finished with fire resistant false ceiling material (for approved makes refer Amendment no. XX dated 04.2.2016).

All the doors should be provided with necessary fittings with hydraulic type door closures (for approved makes refer Amendment no. XX dated 04.2.2016) and with Mortised locks (for approved makes refer Amendment no. XX dated 04.2.2016).

Main door of the complex in the corridor shall be in glazed aluminium powder coated with adequate thickness of glass with etching work wherever required. Colour of aluminium powder coating shall be got approved from Purchaser/HSCC before execution of works.

Lead Glass window of adequate size will be fixed as per **AERB guidelines** in the console room. Proper signage both external and internal to be done.

79. Electrical work: The firm is required to specify load requirement i.e. required for the unit, the air conditioning, room lighting and accessories, if any. The electrical works should be as per approved makes mentioned in Amendment no. XX dated 04.2.2016. The electrical works should have minimum two separate earthing with copper plate to be provided for the each equipment and air-conditioning equipment as per equipment requirements. The use of earth leakage circuit breaker will be as required.

S. No	TECHNICAL SPECIFICATIONS FOR DIGITAL RADIO-FLUOROSCOPY SYSTEM
	General
	High powered X-ray unit with Digital flat panel for various fluroscopy and radiography examinations for the department of radio diagnosis.
i	The Unit should be equipped with integrated high-frequency generator, digital detector and Digital Image processing system. It should be capable of performing all plain and contrast enhanced radiology and fluoroscopy along-with angiography facility for interventional procedures.
ii	Among three major components tube/generator /detector at least two component must be manufactured by quoting vendor themselves.
iii	It should be US FDA approved
iv	Type approval from AERB is mandatory. In case vendor is supplying a new model, NOC from AERB is mandatory and subsequently obtaining type approval from AERB within 8 weeks of installation shall be the responsibility of the vendor.
v	The vendor should have prior experience of supplying same/similar equipment in India in the reputed government or private institutions as per DGHS /MOHFW guidelines.
vi	The order copies and performance certificates from these reputed (Govt./Private institutions)should be available.
vii	The system should have the following essential features. The bidder should quote their latest model. Please mention year of launch.
viii	Supplier should have a trained service engineer in the state of supply for better uptime.
	SPECIFICATIONS :-
1	**Generator**
i	1000mA unit with microprocessor controlled high frequency (100 KHz) X-ray generator
ii	power output of 80 kW or more.
iii	Exposure kV range should be 40-125 or more.
iv	System should have facility for pulsed fluoroscopy
v	Generator should have minimum exposure time of at least 1ms.
vi	System should have multiple user defined programmes (vendor defined programmes)
vii	There should be provision for automatic exposure control (AEC). It should be possible to override AEC if required.
viii	Fluoro KV 40-110 KV.
ix	Fluoro mA 0.2-6 mA.
x	Density corrections: should be provided for optimum image quality.
2	**TABLE**
i	Floor mounted table with carbon fiber/composite material radiolucent table top with scratch resistant surface.
ii	Table should have minimum lowest height of 90 cm or lesser to facilitate easy patient transfer.
iii	System should have motor driven longitudinal and horizontal table top movements. Please specify the range of movements.
iv	Table should have angulations from vertical to head down positions. (Vertical +90 Degrees to Trendelenburg - 20 degrees).
v	Table should support patient weight upto 250 kgs

vi	System should have well designed foot switch for releasing fluroscopy and acquisition.
vii	System should have provision for collision protection
viii	Specify the dimensions of the table
ix	Table should have integrated bucky unit for direct flat panel general radiography and fluoroscopy.
x	Communication system to communicate with patients.
3	**X-Ray TUBE**
i	One X Ray tube should be over couch.
ii	The X Ray tube should have dual focal spots. Large focal spot of 1 mm or lower. Small focal spot of 0.7 mm or lower.
iii	X-Ray tube rating should be compatible with X-ray generator output.
iv	Small focal spot power rating should be in the range 30-50 kW
v	Large focal spot power rating should be in the range 70-90 kW.
vi	Size of focal spots should be specified.
vii	Rotating Anode with heat storage capacity of 600 KHU or more. Tubes with higher storage capacity will be preferred.
viii	Mention the heat dissipation of anode.
ix	Motorised copper filter for prefiltration with minimum 3 selections should be possible.
x	Should have provision of electromagnetic locks with collision protection sensors. The Copper filters should be positionable by organ programs.
xi	DAP meter output should be visible on software console.
xii	Collimator must be mounted on x-ray tube and must have integrated Dose area product.
4	**Digital Imaging system for Fluroscopy:**
i	Field of view of at least 40cms or more.
ii	Collimator may be rectangular or iris type.
iii	System should have real time optimization techniques to maintain constant brightness at the lowest allowances dose to the patient.
iv	Cine loop facility and last image hold facility.
v	Acquisition matrix should of at least 1024x1024 at 10 bit rate.
vi	Digital fluoro system in standard continuous fluroscopic operating mode from single image display to serial exposures with verifying frames rates up to 15 fps. In pulsed fluroscopy mode it should be at least 6 frames per second.
5	**Tube Column Assembly**
i	Tube Column – detector assembly movement should be motorized and not less than 160cm.
ii	Tube rotation should be preferably motorized -90/+180 degrees
iii	Tube should have an SID of 150cm on table for chest x-rays. Amended on dated 2.12.2016
6	**DETECTOR SYSTEM :-:**
i	Single digital flat panel detector with cesium Iodide Scintilator.
ii	Detector must be at least 40x40 cms or more
iii	Image matrix size 2kx2k pixels or more
iv	Pixels size should be 150 microns or lesser.
v	Image resolution should be at least 3.4 lp/mm
vi	Should allow centered /de-centered collimation
vii	Digitisation depth of minimum 14 bits should be available.

viii	Specify refresh cycle (time for second exposure).
ix	Frame rate should be at least 1 to 30 image/sec.
x	Dynamic range should be 16 bits or more.
xi	Detector should be from equipment manufacturer or parent company should have joint venture with the detector manufacturer.
xii	3 zoom levels
xiii	DQE more than 65%.
7	**IMAGE PROCESSING SYSTEM**
i	Latest imaging acquisition system.
ii	Operating console- for system operation from control room.
iii	Digital Fluoroscopy at minimum of 15 f/s at 1024 matrix or better.
iv	Alphanumeric patient data input.
v	Image processing functions: Black/inversion, windowing, edge enhancement, text input, roaming shuttering and reversal.
vi	Multiple image display of 16 images and 4 images.
vii	Image storage with last image hold.
viii	Storage of fluoroscopic images.
ix	Contrast should be 16 bits or more.
x	Spatial resolution should be not less than 3.4 lpm.
xi	The system should have capability of online digital subtraction angiography facility with image filters road mapping and peak opacification facilities.
xii	In DSA mode frame rate should be at least 8 per second.
8	**IMAGE DISPLAY SYSTEM :-**
i	Total of 4 monochrome monitors of 19 inches each to be provided - of these two should be ceiling suspended in examination room. Other two in console room.
ii	Monitors should have resolution of 1 Megapixel or more. Image resolution should be at least 3.4 LP/mm.
iii	Post acquisition image processing viewing reprocessing hardcopy documentation and onward transmission should be possible while doing fluroscopy or radiography. System should have the facility to integrate display of sources such as endoscopy / ultrasound on the right-hand monitor of the examination room display unit.
9	**CONTROL CONSOLE**
i	All systems movements of table shall be controlled by the operator at the table in the examination room and also at the console.
ii	The system should have faculty for edge enhancement,positive/negative image display windowing contrast brightness electronic shuttering image pixel shifting vertical and horizontal image reversal zoom functions.
iii	System should have software processing functions to improve detail and contrast in static images
iv	The system should have fast and direct access to all series, single images, in both examination (remote controlled) and console room.
v	System should have angle/distance measurement, image labelling and patient positioning facilities.
vi	System should have a dosimeter to display on line, actual radiation dose on the console.
10	**IMAGE STORAGE AND TRANSMISSION**
i	Image storage capacity of at least 30,000 images in 1024x1024 matrix at 10/12 bits on the main system disk.
ii	The systems should support storage of images on compact discs/DVD/USB device.
11	**WARRANTY:**

	5 Years Warranty on all supplied items including X Ray tube, vacuumated items, accessories, UPS batteries, third party items and all turnkey items. 98% uptime should be maintained during the entire Warranty period. In case of downtime exceeding more than 2%, warranty will be extended double the down time period.
12	**C.M.C**
	Comprehensive Maintenance charges of complete system for which order is placed including turnkey works must be quoted year-wise for next 5 years after completion of warranty. During CMC period vendor shall have to maintain 98% uptime of the equipments. CMC will be extended by double the down time in excess of 2%. A clear cut undertaking to be given regarding acceptance of uptime clause by the principal/vendor.
13	**SERVICE**
	Details of the service centers, in India along with names of Trained Service Engineers with address and their telephone Nos. to be provided in the technical bid.
14	**TRAINING**
	On site application training for 6 weeks and additionally if required to be provided by the company to doctors and technical staff members.
15	**Essential Accessories**
i	Lead free Apron 6 Nos. (AERB Approved)
ii	Lead Glass viewing window 100 cm x 120 cm or more with lead equivalence of more than 0.5 mm
iii	Dry Chemistry Digital Camera (2 Nos.), capable of printing all film sizes online with spatial resolution of 500 DPI or more. All film sizes should be freely configurable at user level. It should have contrast resolution of 12 bits/pixel or more. It should have all line film sizes. The imager should preferably come with standard films sorter at the output for sorting the films bases on modality connected. It should have a normal through put of 75 films per hour for the largest size. Access time for 1st film 90 seconds or less. The imager should be DICOM compatible for receive send and print facility. The system allow at least 3 sizes from the five sizes to be loaded at any time. Printer status should be displayed for any error status etc.
iv	Dual head pressure injector US FDA approved with 2000 syringes
v	Foot Switch for fluoroscopy and acquisition of images.
vi	Suitable UPS with at least 30 minute back up to be provided for the whole system.
vii	Patient monitoring system: Multi parameter monitor with facility of three lead ECG, SPO2 monitor, NIBP, reusable SpO2 probes for infants and two Invasive Blood Pressure (IBP) monitoring module, Defibrillator and Suction machine.
viii	One Mobile storage racks for aprons and two Wall Mounted Rack for Aprons with 5 hangers.
16	**TURNKEY**
i	Necessary Turnkey modification of the provided premises is to be done by the vendor.
17	**Other (Accessories, Components etc)**
	Handgrip rail
	Handgrips, angled
	Shoulder support, one pair
	Footswitch for fluoroscopy and exposure
	Full System Stabilizer
	UPS for workstation
18	**Optional Accessories:**
	Nearby Control trolley

	Trolley with a 2MP DICOM monitor mounted on it
	Grid Controlled Fluoroscopy

TECHNICAL SPECIFICATIONS FOR HIGH END COLOR DOPPLER

Technical Specifications – Premium End, Top of the Line, Color Doppler Ultrasound System with Shear Wave Elastography and Fusion Imaging

1. **System should be State of art, top of the Line Premium End Fully Digital with Broadband Digital Beam Former.**
2. The system design should be compliant with Green Emission Product specification.
3. The system should comply with standards of Environmentally Conscious Products (ECP). Certificate to be attached.
4. US FDA &CE compliant .Also mention year of launch.
5. The system should have high density Beam Former technology and should be able to handle independent processing channel for each receiving information from transducer.
6. The system should have minimum 192 hardware channels and 65000 or more digitally processing channels. Original manufacturing letter to be attached for confirming above channel numbers.
7. The system should perform up to 1000 frames/sec. or more. Also system should support transducers of frequency range from 1-17Mhz.
8. The system should have region specific presets like Adult Abdomen, Pediatric Abdomen, TV/TR, Gyn, Small Parts, Musculoskeletal and vascular presets. All presets should be customized according to the user.
9. The system should have Quick View mode for 2D & CDI Preset selection during exam and minimum 8 sub presets for 2D &CDI Modes.
10. The system panel height should be adjustable according to the user comfort.
11. The Panel should have Swivel and In/Out Control for Maximum User Comfort.
12. The system should have latest generation /pulse subtraction / Pulse Inversion Tissue Harmonic Imaging for better contrast and reduced side lobe artifact.
13. System Should have Receiving End Frequency and Spatial Compound Imaging Technology for reducing Clinical Artifacts and
    i. Compound Imaging Should work in all the Probes
    ii. Compound Imaging should be possible on Color and Doppler Modes .
    iii. Transducers operate in Trapezoid format with and without compound imaging.
14. Multiparametric Image Optimization: The system shall automatically and intelligently optimize key imaging parameters in real-time, maintaining image uniformity across tissue types with minimal adjustments as soon as the transducer is placed on the patient.
15. The system should have 256 gray scales.
16. The System should have 2D and spectral Doppler image optimization with a push of a button and auto-refresh function. Should be compatible with other advanced imaging options.
17. Up to 10X digital zoom should be available, on live, frozen, cine, dual screen images-Preserves full image resolution within the zoom ROI.HD zoom should be available.

18. The System should have THREE active transducer ports or more.
19. The system should display Thumbnails on a Clipboard while scanning to facilitate exams.
    i. The User can select either Bigger Screen only Ultrasound Image or With Thumbnail with Live Ultrasound Images.

20. The system should be Upgradable to User Configurable Protocol for Applications such as OBGYN/ Vascular etc. for system operation. The following automation should include the protocol:

    i. Automatic set up of Imaging Controls & Modes.
    ii. Manual/Automatic steering in B Mode/ CDI/PW Doppler.
    iii. Initiation and auto completion of required measurements etc.

21. The System Should High Dynamic range of 200db or more. Higher Dynamic range will be preferred please specify range.
22. The system should have Power Doppler Imaging mode with directions.
23. The system should have PW Doppler & HPRF mode for all transducers 0.3 to 34 KHz.
24. Specify Color Velocity Scale Selection.
25. Pw Sample Gate selection should be 1mm to 20mm or more.
26. The Minimum Imaging Depth should be 30 cm or more and should be selectable by user.
27. The system should have US FDA approved Real Time Elastography (strain and shear wave) for Liver, thyroid Breast, Prostate Applications. Also the Following feature's Available in the Elastography:

    i. During Elasto mode, Reference 2D Mode should display side by side. After Freeze best cycle selected from cine mode reference of Compression Wave.
    ii. Elastography should be Velocity based, The System should able to measure by ON LINE the Stiffness of Tissue and Compare with Normal Tissue, and Ratio should be calculated between Reference Tissue vs Target Tissue.
    iii. Convex and linear probe and Endocavity Probes Should Support strain elastography for all applications including Prostate Elastography. Necessary Software should be Built In
    iv. Convex and linear probes should offer shear wave elastography for abdominal ,breast,and thyroid etc applications.
    v. System should be able to generate a color coded elastogram with a reference adjustable elasticity scale for each application.
    vi. System should be able to display simultaneously both color coded elastogram and corresponding B-Mode image in real time for performing elastography guided biopsies/FNAC.
    vii. There should be user adjustable elasticity box size with a Display Depth: 0-8cm.

viii. Elastography quantification should be available with pixel accurate absolute or discreet Elasticity values on all transducers.

ix. Elastography quantification tool should be able to provide Mean, Max, Median & Min elasticity values of the tissues in both m/s or kPA on all transducers.

x. System should have integrated report worksheet for Liver elasticity assessment.

30. The system shall provide Color coded stiffness map with 4 color display modes
Color, size, strain ratio, shear velocity.

i. Maximum Shear wave velocity 10m/s; Minimum Depth shear-wave imaging should be 16cm; Minimum depth shear-wave quantification should be 8cm.

ii. System should offer custom tissue imaging to improve lateral and contrast resolution in breast imaging by modifying the speed of sound for fatty breast and adipose tissue.

31. The System should provide a **Volume Navigation Tool** which allows Fusing Real Time Ultrasound Images with Images acquired from other Modalities such as CT & MRI of any make. The Following features should be available for Real Time Fusion Imaging

i. The Transmitter should be fixed with System with movable arm for Easy Navigation.

ii. The Receiving Sensor should be attached with Convex Probe while performing Fusion Imaging mode.

iii. DICOM Datasets from other modalities can either be retrieved via DICOM Q/R function or (USB / DVD) DICOM media.

iv. Tracking of the Ultrasound transducers movement in space is done via Magnetic sensor system. The strength of the Magnet should be indicated on the system monitor

v. Total Registration of those datasets and real time ultrasound images should be 2 Steps maximum. 1st Step for Angle Synchronization for Magnetic Strength and 2nd Step for Position Synchronization is achieved by using anatomical landmarks.

vi. The Window level of Data set should be adjustable in Ultrasound system.

vii. The system should capable of operating in Biopsy mode while performing Fusion study. The Biopsy line should display on both Fusion and Ultrasound Images.

viii. Fusion Imaging should be possible with at least Convex Probe. Mention additional probe on which fusion is available and price should be quoted separately.(will not be included in calculation of L1)

ix. The system should capable of Contrast imaging in Fusion mode.

32. The System should have **Needle Navigation** which Utilizes Fusion mode and following should be possible:

i. A virtual biopsy line generated using a position sensor (up to 3 lines) is displayed on the screen during ultrasound-guided diagnostic/therapeutic procedures. Deviation of the needle tip from the image plane is displayed in different colors according to the direction of deviation. Smart Fusion can be used in combination.

ii. Ruler with Tip Distance

33. The System Should have advanced **Contrast Package** available.
    i. During contrast examination the system should be able to Display Wash In, retention and wash out information in the lesion with Time intensity curves.
    ii. The system offer user selectable tint maps to allow enhanced visual conspicuity of contrast agent.
    iii. The System should have Contrast Quantification package so that it able to measure the arrival time of contrast agent at any point of time.
    iv. The system shall provide a toolbox of at least five contrast imaging technologies:
        a. - detection of the fundamental response of the CM
        b. - detection of the harmonic response of the CM
        c. - agent destruction imaging
        d. - contrast capture imaging
        e. - micro-bubble destruction imaging
    v. The system shall offer contrast imaging package with Contrast Harmonic and Quantification.
    vi. CPS & CHI Switching Between Contrast Modes:

34. Should offer low MI contrast agent imaging techniques and provides highly sensitive agent detection with outstanding enhancement information System should have Biopsy Enhancement mode for better Needle Insertion and Multiple Enhancement Level Adjustment should be possible.

35 The System should have 3D and live 3D/4D acquisition possible with Volume convex probe.

36. The system should have advanced DICOM Modalities work list

37. **Sophisticated Ergonomics:**

A flexible multi joint arm supports the LCD monitor, allowing appropriate positioning for operations in the standing or sitting posture to be achieved easily.

38. **Monitor:**
    i. Monitor should be high resolution, 19" (inch) or more Back Lit LED/ LCD Monitor with 1080 x1080 matrix or more. Please specify resolution range with IPS technology.

39. **Console:**
    i. The freely programmable, mode-sensitive 10" or more Color Touch Command Screen which enables direct access to all basic and advanced system controls.
    ii. Convenient transducer trays on both sides should put. up to Six transducers within easy reach in any scanning position.
    iii. Basic and advanced quantification functions should be activated directly on the

programmable console.

iv. All Mode keys concisely arranged with multi-gain controller should enable direct access to all imaging modes.
v. A retractable alphanumeric keyboard should be available to manually enter comments or patient data
vi. Control panel can be moved horizontally and vertically according to user comfort
vii. Integrated gel warmer.

40. **Data management:**

i. A large-capacity minimum 1TB HDD should be provided in the standard configuration, facilitating efficient management of acquired images. Images can be viewed in Image Review Mode. Also cine memory of more than 2000 frames should be available.
ii. Filed images can have output via the USB port (USB Memory or USB HDD) or stored on CD/DVD by Image Management.
iii. Should be able to integrate with the then existing PACS in the institute with no extra cost.

41. **Measurements and Calculations:**

i. Auto measurement should be possible on frozen images and Images Recalled from the Image archive.
ii. The System should have Comprehensive set of Measurements in OB/ Gyn/ Carotid/ Lower Limb/ Upper Limb / Thyroid / Testis / Abdominal Applications
iii. Template customization should be possible.
iv. On Board Report for all Packages – Report transfer to Print Page along with Selected Images will be Printed using normal PC Printer.

42. **Following Probes should be supplied along with system:**

i. Convex Probe with Band width of 1MHz to 6MHz OR MORE with Biopsy Guide for Abdominal applications and Support for Strain and Shear wave Elastography and Fusion with Navigation Application.
ii. Convex volume probe 2-7MHz with 4D package.(including multislice ,MPR, curved VOI, fetal stic)
iii. Linear probe of 5 to 9 MHz with Biopsy guide and should support Strain, Shear wave Elastography and Fusion with Navigation Application.
iv. Linear Probe of 7-17 MHz with strain Elastography.
v. Dedicated Transvaginal Probe with Band width of 4MHz to 9MHz OR MORE with

Biopsy Guide and should Support Strain Elastography. (If shear wave elastography is available on this probe quote as optional. Price will not be included for calculation of L1)

vi. Dedicated Trans-Rectal Probe with Band width of 4MHz to 9MHz OR MORE with Biopsy Guide and should Support for Strain Elastography (If shearwave elastography is available on this probe quote as optional. Price will not be included for calculation of L1)

vii. Phased Array probe of 1-5 MHz for Trancranial application.

viii. Pediatric probe convex 3-8 MHz .

43. **ACCESSORIES**

a)Suitable Online UPS with 30 min. backup

b)Dry Chemistry Laser camera of 500dpi with two active trays. should be capable of printing 8x10 inches and 11x14inches (both active)

44. Onsite demonstration of the quoted unit may be asked for

45. **Application Training** engineer should be available for one month continuously and for five month thereafter as and when required after date of installation.

46. **Warranty** Five years complete warranty for the entire equipment, probes and accessories which should include service as well as parts with 98% uptime. In case of downtime exceeding 2% it will be extended by double the down time.

TECHNICAL SPECIFICATIONS FOR MID END COLOR DOPPLER

1. The system must be latest and state of the art with fully digital technology equipment to incorporate the facility of 2D, M-Mode, CDI, PW Doppler, CW Doppler, Power Doppler, directional power angio, real time 3-D(4-D) Elastography imaging and **upgradable for contrast enhanced ultrasound (CEUS)**. The vendor should have at least 3 installations in Government Institution in India in last 5 years.
2. Machine should be USA FDA and CE certified
3. System should have 60,000 digital processing channels or more.
4. System should have dynamic range of 200dB or more.
5. System should be offered with a 2D frame rate of at least 630 or more frames/second.
6. Advanced measurements & calculation package for abdominal, obst./gynae, urology, vascular and Intracavitory intervention applications should be available.
7. System should have THI & should be able to work in combined mode of harmonic imaging and real time imaging to get excellent image quality. The system should offer Tissue Harmonic Imaging in Power Doppler mode for improved sensitivity.
8. **The system should be upgradable to Contrast Harmonic Imaging** and should have optimization settings to detect the Contrast Agents. Please specify other available advanced Technology to perform better Contrast Harmonic Imaging. **(The contrast package is to be quoted as optional and price will not be included for calculation of L1).**
9. Automatic real time & frozen tracing of instantaneous peak velocity & instantaneous mean velocity (or frequency) should be available. Triplex Imaging should be standard on the system.
10. Should be offered with Speckle reduction Imaging/artifact reduction technology.
11. System should be offered with a 19 inch or more high resolution flat panel medical grade display monitor with facility for position adjustments.
12. System should have at-least four universal active probe ports with electronic switching facility from key board without probe adapter.
13. Operating modes B-mode, M-Mode, B/M Mode, Doppler Mode, Color flow, Power Doppler, DCA/DPA, Contrast Imaging, B/Color flow, PW Doppler, Real time 3D (4-D imaging).
14. Probes should be of broad band type and system should support probes from 1-18 MHz frequency.
15. B mode & color-flow images should be simultaneously available side by side in real time. Digital zoom facility for region of interest in real time and frozen images (8 x).
16. Image storage facility on inbuilt hard disc or MOD/CD/DVD-RW facility should be available. Inbuilt hard disk or external storage with minimum capacity of 1

TB or more. System should have extensive image management capability including thumb nail review & Cineloop editing etc.

17. Cine loop as well as cine scroll facility in B mode with storage of 10,000 or more images should be available.

18. Should have Real Time Compound Imaging Technology with Multiple (Five or more) transmitted lines of sight in convex, linear and endocavitary probes.
19. System should be capable of scanning upto depth of 30cm or more
20. The system should be DICOM 3.0 (or higher version) ready (like send, receive, print, record on CD/DVD, acknowledge etc.) for connectivity to any network, PC/computer etc. in DICOM format. Vendor will connect the machine to existing PACS with no extra cost.
21. The system should be DICOM ready. System should have capability of HIS and RIS connectivity and should also be connected to the dry chemistry printer. Should provide advanced DICOM connectivity to an enterprise data management system or PACS with advanced DICOM features: DICOM Store, Modality Work list, Performed Procedure Step and Structured Reporting. Please specify the advance DICOM features available on the quoted system.
23. The System should have Panoramic imaging / Sie-scape and extended field of view imaging.
24. The System should be quoted along with strain based Elastography Imaging as standard.
25. System should have high resolution 10 inch or more user interface touch panel.
26. On site demonstration is mandatory.

SYSTEM SHOULD BE OFFERED WITH THE FOLLOWING TRANSDUCERS (all probes should come with biopsy attachment)

1. 2–6 MHz or better Broadband Convex Transducer for General Imaging, Abdomen, Renal, OB/GYN imaging with capabilities of CEUS and strain elastography.
2. 3-9 MHz linear probe with strain elastography.
3. 5–17 MHz or better Linear Array Transducer for Vascular, breast, Musculoskeletal, small parts imaging.
4. 4–9 MHz or better Broadband endocavitary transducer with FOV of 135 degrees or more with CEUS and strain elastography capabilities.
5. 2-6 MHz or better Broadband Volume Transducer.
6. Pediatric probe 3-8 MHz.

Upgrading requirements

1. **Continuous free, comprehensive software upgrade (compatible with the existing platform) guarantee for 10 years (after installation) of the ultrasound unit must be provided**.
2. **The system should be upgradable to Contrast Harmonic Imaging** and should have optimization settings to detect the Contrast Agents. Please

specify other available advanced Technology to perform better Contrast Harmonic Imaging. **(The contrast package is to be quoted as optional and price will not be included for calculation of L1).**

Accessories:

1. On-line UPS with capacity for at least one hour backup to support all functions of the equipment i.e. Performing Ultrasound procedure, exposure on to films or copy on a CD.
2. Servo Digital Voltage stabilizer
3. A Dry chemistry camera of 500 DPI or more with two active trays.
4. Essential furniture

Application Training:

Engineer should be available for one month continuously and for 5 months thereafter as and when required after date of installation.

Guarantee/Warranty

1. Five years comprehensive onsite warranty of entire system (Spares and labour), without exclusion, including all transducers, all other accessories and also UPS including batteries. This will be followed by 5 years CMC to be quoted separately, year wise.
2. 95% uptime guarantee should be given. In case down time exceeds 5% penalty in the form of extended warrantee, double the number of days for the which the equipment goes out of service, will be applied.

General Instructions for the Vendor

1. Supplier must ensure availability of expertise service and maintenance at site of installation. Uninterrupted availability of spare parts and repair for next ten years must be assured.
2. Two bid system: vendor is required to make separate bids for technical and price components. These should be quoted in two separate sealed envelopes
3. Please note that all technical features, facilities and accessories mentioned in the tender document are standard requirements and hence, these should be offered as the standard feature. None of these should be offered as optional items **except for upgrade to contrast imaging for which price to be quoted separately**.
4. In price bid, cost of locally supplied items must be quoted separately in Indian currency
5. Please respond to each specification in the same format and order as mentioned in the tender document and specify/indicate the

verification document form the product data sheet against each column.

6. When required, information other than those in the data sheets should be provided as separate document from the principals only and should refer to the specific sections being addressed. When standard vendor data sheet disagrees with the bid response (offer/compliance statement), clarification should accompany in the form of certificate from the principals only. In absence of this, the vendor data sheet will prevail for the purpose of evaluation and decision of the technical committee shall be final and binding on the supplier.
7. The vendor has to station one application specialist and service engineer at site for a period necessary to familiarize the medical and technical staff to the scanner protocols and enable them to achieve fast and efficient service.
8. Mention the number (with addresses, phone numbers, e-mails) of installations of the quoted unit in the Delhi and India.

Technical Specification of Portable Ultrasound with Color Doppler System

1	A state of art fully digital, compact portable Colour Doppler machine is required with following technical features :-
	The equipment including transducers must be US FDA & European CE approved and capable of operating in B Mode, M Mode, Color M Mode, Color Doppler, Color Power Doppler, PW modes, one touch 2D image optimization and panoramic view. It should weigh less than 10 kg including weight of integrated battery.
	a) The system should have integrated trolley with height adjustable with 3 active ports and facility for electronic switching of probes.
	b) Total weight of trolley and machine to be mentioned.
	c) Lightest weight combination (weight of the machine and trolley) will be preferred for easy portability.
2	Triplex imaging should be standard on the system
3	System should be offered with a 2D frame rate of 750 /sec or more. Acquisition frame rate to be specified.
4	No. of effective processing channels 80,000 or more.
5	The system must display at a maximum depth of 30 cm and shall process a dynamic range that is at least 170db.
6	System must be offered with following application: Abdominal, Ob/Gyn, Renal, Small Parts, MSK, TCD imaging.

7	It must support transducers with linear, transvaginal and curved array probes. EachTransducer quoted should be of the latest technology. Specify the technology foreach probe. Matrix technology will be preferred.
8	The system shall have broadband architecture with an operating frequency of at least 1 -13 MHz.
9	The system shall have the ability to enhance tissue margins and improve contrast resolution by reducing artifacts. Image processing technology to reduce clutter and speckle artefact.
10	System must be offered with enhanced tissue harmonic imaging in standard configuration
11	System must be offered with frequency compounding facility or equivalent technology
12	System should possess software for Enhanced Needle Visualization to track the needle clearly at steep angles during the procedures while maintaining good image quality of the target structures and the surrounding anatomy with simple On/Off functionality. This facility should be available on High frequency Linear transducer.
13	System should have zoom capability upto 8 times or more.
14	The system shall provide the user with minimum 8 generic digital calipers.
15	The system must have a dedicated calculation packages for all applications.
16	System should offer Auto IMT capability to measure carotid Intima media thickness

17	The system should provide a backlit keypad with ease of use with facility to disinfect the keypad of system so that it is possible to avoid any cross contaminations &nosocomial infections in Wards/ ICU.
18	The boot uptime of the machine should be less than 45 seconds.
19	The system should have an LCD screen size of 15 inch or more in size.
20	The system shall have digital Video Interface (DVI), S-Video, VGA, USB and audio output with provision for storage of images 150 GB or more. There should be CD/DVD writer integrated in system
21	The system shall have the ability to function by AC/DC or battery power with the same degree of functionality, the battery life (run time) shall be at least 45 minutes.
22	The system shall support the DICOM function with ability for storage, print and work list, also ready to connect PACS.
23	On site demonstration is a must for confirming and evaluating technical features.
24	Virus protection software should be provided within the system which should be regularly upgraded during entire life span of the machine.
25	
A	6-13 MHz multi-frequency, broadband linear array transducer for vascular, MSK and small parts. Higher frequency will be preferred.
B	2-5 MHz multi-frequency broadband curved array transducer for general abdominal and obst.-gynae imaging.
C	5-8 MHz Intra-cavity transducer for obstetrical and gynecological applications.
26	

A	B/W Thermal printer with 1000 rolls.
1	The complete unit, transducers including accessories should be covered with comprehensive onsite warranty for five years commencing from the date of issue of installation certificate.
2	The firm should also quote the rate for CMC for whole machine including probes for next 5 years after the expiry of warranty period of 5 years.

Technical Specification of Bi-Plane DSA

A. Minimum recommended technical specifications of the machines and applications.

Sr. No.	Specifications as per tender
	The system should be the state of the art model to be quoted with feature equivalent to the latest model launched at RSNA 2014 or later. It should be FDA and CE approved in addition to AERB approved.
A.	**Gantry:**
	1. The system should have two gantries: one floor mounted and one ceiling suspended providing full body coverage. The lateral plane should have motorized longitudinal C-arm movement.
	2. It should be possible to pre-program the gantries for multiple examination positions.
	3. All movements of the gantries should be controlled from the joystick on the table side as well as from the control.
	4. The system should have adequate collision protection for the safety of the patient.
	5. Both gantries should have fast speed for angulations and positioning. The frontal system should have a speed of at least 15 degree/sec. for all positions and lateral plane should have a speed of at least 8 degree/sec.
	6. Gantry angulations in both planes frontal and lateral should be freely user selectable to satisfy clinical imaging needs.
	7. Both the gantries should have an automatic positioning capability dependent on the reference image being selected and possibility to select reference image depending on the gantry position.
B.	**Patient Table:**
	1. The table should have motorized longitudinal, horizontal and vertical travel.
	2. It should have the facility for automatic bolus chase for peripheral angiography.
	3. The table with trendelenberg tilt facility.
	4. It should be possible to swivel the table in case of emergencies.
C.	**X-Ray Generator:**
	1. Generator should be multi-pulse/high frequency for constant output.
	2. Output should be 100 KW or more.
	3. Radiography KVP range should be 40 KV – 125 KV or more.
	4. Output at 100 KV should be 1000 MA or more.
	5. It should have automatic exposure control device for radiographic fluoroscopy and angio mode.
	6. It should have digital display or KVP & MAs.
	7. Anatomical programming radiography should be possible.
	8. It should have over loading protection.
	9. It should have the facility for pulsed fluoroscopy at variable rates for reducing the x-ray dose to the patient during intervention procedure.
D.	**X-Ray Tubes:**
	1. Both planes should be provided with rotating anode high speed tubes.
	The focal spot should have the following sizes:
	i) 1.0 mm or less with load 80 KW or more in minimum one plane.

	ii) 0.5 mm or less with load 15 KW or more in minimum one plane.
	2. Anode heat storage capacity should be 1.7 MHU or more having liquid bearing technology or metal lubricant.
	3. The system should have adequate cooling facility for the x-ray tubes for uninterrupted performance during procedure.
E.	**Collimator**
	1. One collimator for each plane is to be provided.
	2. The collimator should have facility for automatic copper pre-filtration for reducing the x-ray dose.
	3. The collimator leaf should have IRIS/rectangular type arrangement.
	4. The collimator should have the facility for the dose measurement chamber in order to display the skin dose on the monitors in the lab.
F.	**Biplane Digital System:**
	1. Dynamic flat detector system with high spatial and 14 bit contrast resolution.
	2. Size of frontal plane should be at least 40 cm diagonal.
	3. Size of lateral plane should be at least 40 cm diagonal.
	4. It should provide multiple formats/fields at least of 4 sizes.
	5. Spatial resolution should be at least 3.0 LP/mm in frontal plane and 2.5 LP/mm in the lateral plane.
	6. Three monitors of at least 19" size TFT/LCD for each plane for display of live, reference and subtracted image with high resolution flicker free display should be provided. Monitors should have anti-glare provision.
	7. Similarly 4 monitors, two for each plane (live & reference image) with high resolution display in the control room should be provided.
	- Console Monitor for patient registration.
	- Physiology monitor in examination room and in console with the requisite computer system for NIBP, IBP, SpO2 measurement, display and analysis.
G.	**Digital Imaging System and essential softwares:**
	1. Road mapping facility (Real time 2D & 3D) should be available with possibility of superimposing of fluoro image on reference image. Facilities for unlimited subtracted high resolution fluoroscopy should be available.
	2. It should have the capability to acquire images in 1024 x 1024 matrix with a maximum speed of 6 frames or more per second on-line subtraction. Specify the maximum image acquisition rate without subtraction.
	3. Post processing software facilities with real time edge enhancement, positive/negative image display windowing, electronic shuttering, roaming, image reversal, zooming and magnifying with text and annotation junctions.
	4. a. Rotational angiography facility (2D & 3D) at a speed of at least 30 degree/sec. with acquisition frame rate of at least 25 frames/sec. in 1k matrix with facility for online display of subtracted images should be available. Specify if the rotational angiography is with on-line subtraction in 1024 matrix.
	4 b. Rotational data acquisition with an output of cross sectional CT like images should be provided.
	5. Last image hold or reference image toggling with fluoro should be available.
	6. It should have minimum image storage capacity of 1,00,000 images in the 1024 x 1024/12 bit.
	7. Digital subtraction angiography software of automatic pixel shift enhancement for iodine and CO2 contrast should be possible.

	8. A separate workstation for 3D reconstruction of the rotational angiography images should be provided. The 3D image measurement and slicing should be possible. Facility to display reconstructed images in the procedure room should be provided.
	9. The complete digital system along with workstation should be networked and connected to a DICOM compatible laser camera.
	10. The digital system should have software for vascular analysis and quantification including stenosis %. All measurement should be possible from the patient table side.
	11. Archiving on a CD/DVD recorder should be provided. Juke box/RAID (4TB) and 5000 CD's R/W or 1000 DVD should be supplied with the unit
	12. An additional workstation for processing of the DSA images and their documentation should be provided in addition to 3D workstation.
	This workstation should have the facility to reconstruct the long leg view for peripheral images.
	13. The system should be able to receive/display on reference monitor, DICOM format images from other modalities like CT & MR. DICOM print facility should be available.
	14. Bolus chase software should be provided.
	15. It should have facility to measure dose during the procedures.
	16. Specify the time limit for minimum 30 seconds for uninterrupted acquisition of on-line subtracted images at 1024 x 1024 matrix with maximum frame rate.
H.	**Essential accessories:**
	The following essential accessories to be provided with the unit:-
	1. On line UPS for the complete system excluding the x-ray system for both planes with 30 min. back up. (Prices to be quoted separately)
	2. Pressure injector of reputed make along with 500 disposable syringes sets.
	3. Dry Chemistry Laser Imager with resolution of 600 DPI or more. DICOM ready and online for film size of 14‖x17‖ (Prices to be quoted separately).
	4. Ceiling suspended radiation protection system and table side protection system.
	5. Focused ceiling mounted light with a handle for positioning the light.
	6. Ultra-light Weight Lead free gown as per the following specifications: 8 Nos.
	i) It should have lead equivalent of 0.5 mm.
	ii) It should be double sided type lead free apron
	iii) It should be light in weight.
	7. Lead free Thyroid Guard – 6 Nos.
	8. Lead spectacles – 6 Nos.
	9. Foot switch for fluoro/acquisition control.
	10. Multichannel monitor (with essential accessories) for monitoring physiology. It should be able to record and print the pressures in general and also for stenosis analysis (catheter gradient). It should have a pulse oximeter module, ECG module, SpO2 module, etc.
	11. Lead protected viewing glass (Size: 200cm X 100cm)
	13. Anaesthesia workstation with ventilator.
	14. Bi Phasic Defibrillator
I	**Warranty:**
	A. 98% uptime should be maintained during the entire CONTRACT period

K	**Certifications:**
	I. Offered model should be European CE and US FDA approved. Copy of certifications should be submitted with bid
	II. The quoted model should be AERB approved. Copy of AERB type approval should be submitted with bid.

B. Investigations

Non-vascular:

1. Percutaneous nephrostomy

2. Peructaneous Transhepatic Biliary Drainage

3. Biliary stenting

4. Percutaneous cholecystostomy

5. Percutaneous gastrostomy

6. Percutaneous ethanol injection / Percutaneous acetic acid injection (PAI) for liver HCCs/ mets

7. Radio-frequency Ablation (RFA) for small liver HCCs, liver mets, renal masses, lung masses etc

8. Percutaneous thrombin injection for aneurysms/pseudo-aneurysms

9. Percutaneous Aspiration Injection Re-aspiration (PAIR) for hydatid

10. Vertebroplasty/kyphoplasty

11. Lumbar Sympathetic nerve block

12. Celiac plexus/ hypogastric block for pain

13. Trans-jugular liver biopsy (TJLB)

14. Phlebosclerotherapy for vascular malformations

Vascular:

15. Diagnostic Angiographies

16. Tran-arterial Chemotherapy (TAC), Tran-arterial Chemo-embolisation (TACE), Tran-arterial radiotherapy (TARE) for HCCs, liver metastases

17. Central venous access

18. Permacath insertion

19. Peripherally Inserted Central catheter(PICC) line

20. IVC filter placement

21. Angioplasty for peripheral arterial disease with or without stenting

22. Renal artery stenting (hypertension management)

23. Aneurysm coiling/stenting

24. AVM embolisation

25. Bronchial artery embolisation (BAE)

26. Uterine artery embolisation (UAE)

27. Prostatic artery embolisation

28. Pre-op embolisation for JNA

29. Pre-op embolisation for bone tumors

30. Pre-op embolisation for other vascular tumors

31. Pseudo-aneurysm management in pancreatitis

32. Dialysis fistuloplasty

33. Glue embolisation procedures

34. Balloon-retrograde transverse obliteration (BRTO) for varices

35. Trans-jugular intrahepatic portosystemic shunts (TIPS)

36. Endovenous laser ablation for varicose veins (EVLA)

37. MAPCA embolisation

38. Carotid artery stenting (CAS)

39. Stroke interventions (thrombectomy, intra-arterial thrombolysis)

40. Intracranial aneurysm coiling

41. AVM embolisation in brain and spine

42. Trauma interventions including splenic artery embolisation, pseudo-aneurysm management, AVF management etc.

Technical Specification of Bone Mineral Densitometer

Minimum recommended technical specifications of the machines and applications.

S.no	Tender Specification
	BONE MINERAL DENSITY DETERMINATION USING DUAL ENERGY X-RAY SOURCE
1	**Scanning**
	Method-Fan Beam & Narrow Angle Fan Beam
2	X-ray Source: Constant Potential Source/ Switched Pulse Dual Energy
3	Detector System : Multi Element / Direct Digital Detectors –
4	BMD Precision : Better Than 1%
5	Scan Time: A/P Spine </ = 30 Secs; Femur </ = 30 Secs
6	Calibration: Automatic calibration Technique for test Programme & quality Control
7	Patient Position : Cross Hair Laser Light
8	Scan region -190cmx60cms or more for total body
9	Patient Weight Limits: more than 155kg
10	Databases: Reference data: >11,000 USA/Northern European Subjects, as well as NHANES, and Numerous regional
11	Table Height: 25"
12	Magnifications: None
13	Sample Size (mm): 0.60x1.05 or less for AP Sine & Femur
14	**Software for the following:**
	a) AP Spine
	b) Dual Femur
	c) Total Body with Body Composition
	d) Vertebral Assessment (AP & Lateral Views)
	e) Lateral spine BMD
	f) Fore Arm
	g) Comparison to previous Scan 1
	h) Composer (reporting software).
	I) Pediatric software (Spine, femur & Total Body for age group 5-19)
	j) Orthopedic Hip Analysis
	k)DICOM
	l) Visceral fat software (must).
15	**Standard Information required from Vendor**
	Pre -installation requirements -Please Specify Including Room Size & Site Plan
	No of Installations in India
	No of Trained Service Engineers
16	**Computer System:**
	a) Workable with most Advanced configuration
	b) Hard Disk Minimum - 60GB
	c) RAM : Minimum 1 GB
	d) CD ROM (write/ read) drive
	e) Monitor: At least 17" Color monitor
	f) Printers: Laser/ inkjet
17	Online UPS: 2KVA with 30 mins Backup
18	AERB Type approval: Type approval must be provided for the model quoted

19	FDA & CE certification must

S.No	TECHNICAL SPECIFICATIONS FOR DIGITAL MOBILE RADIOGRAPHY UNIT
1	The unit should be compact easily transportable digital mobile radiographic unit with articulated or telescopic arm and built in monitors.
2	It should be suitable for bedside x-ray for ward patients, intensive care units and operation theatres.
3	The unit should be a digital system with flat panel detector.
4	If the DR system is inoperable it should be able to function as conventional system.
5	Out of three major components (Detector, X-Ray Tube & X-Ray Generator) at least two should be from the same manufacturer.
6	It should be FDA approved.
7	Type approval from AERB is mandatory. In case vendor is supplying a new model, NOC from AERB is mandatory and subsequently obtaining type approval from AERB within 8 weeks of installation shall be the responsibility of the vendor.
8	The vendor should have prior experience of supplying same/similar equipment in India in the reputed government or private institutions as per DGHS /MOHFW guidelines
9	The order copies and performance certificates from these reputed(Govt./Private institutions)should be available
10	The system should have the following essential features. The bidder should quote their latest model. Please mention year of launch.
11	Supplier should have a trained service engineer in the state of supply for better uptime.
	The system must include the following:
1	**Power Line Connection:**
	The unit should operate on single-phase power supply with plug in facility to any standard wall outlet with automatic adaptation to line voltage 200 to 240 Volts, 15 Amp plug.
2	**The Generator:**
i	Must be microprocessor controlled high frequency, output 30 KW or above.
ii	It should have a digital display of mAs and kV and an electronic timer.
iii	KV range: 40kV to 125kV or more in increments of 1kV
iv	Max. current: 300 mA or more at 100 KV.
v	mAs range: 0.1 – 350 mAs(to specify mA and seconds separately)
vi	Exposure time range: 0.004 – 10 s
3	**X-Ray Tube:**
i	Output of the tube should match the output of the generator.
ii	Focal spot should be less than 1 mm
iii	Rotating anode with 3000 rpm or more
iv	heat storage capacity of the anode : 120 KHU or better
v	Tube overload protection should be available
4	**EXPOSURE**
i	Vendor must provide with exposure technique chart
ii	exposure status lights on main control and collimator
iii	exposure indicator or air kerma indicator to be available.

5	**Flat panel detector:**
i	Detector should be wireless , cesium iodide scintillator with amorphous silicon technology
ii	The flat detector should be of the size 14 x 17 inch or more.
iii	The detector pixel matrix size should be 2.0K x 2.0K or more.
iv	Pixel size 200 microns or less
v	The machine should have a detector storage compartment.
vi	The image viewing time after exposure should not be more than 10 sec.
6	**Battery:**
i	The machine should be able to run on mains as well on battery supply
ii	Specify Battery charging time and battery operation time
iii	Number of exposures which can be done on fully charged battery should be greater than 150.
iv	The battery should also provide power for the motor to move the machine.
v	The battery should be able to be charged from a normal 15A 230 V single phase socket in less than 6 hours.
7	**Workstation:**
i	The machine should have an integrated workstation with a TFT touch screen.
ii	The workstation should enable to view the image, and provide post processing features, using touch screen.
iii	The post processing features should include, zoom, contrast and brightness adjustment, storage of image with a memory of at least 2000 images.
iv	The touch screen size should be at least 15 inches.
8	**Connectivity:**
	The machine should be fully network ready and it should be possible to transfer images and patient data from and to hospital network using LAN connectivity and wireless LAN. System should be DICOM 3 compatibility and DICOM functions including DICOM Print,Image Export, WLM, MPPS. It should provide the possibility to write all Patient images, Studies and single images onto CDs/pen drive directly on work station Interface. The system should have DICOM 3.0 Ethernet 10/100 Base T . DICOM worklist interface , storage service class (SCU) and others. Antivirus software to be inbuilt/updated continuously.
9	The unit must have an effective braking system for parking, transport and emergency braking. The tube stand must be fully counterbalanced with rotation in all directions.
10	It must have an articulated or telescopic arm for maximum positioning flexibility in any patient position. The angles in various planes to be specified by the manufacturer.
11	The exposure release switch should be detachable with a cord of at least 5 meters. Exposures with remote control should be possible. Remote control should be offered with system.

12	The Dose Area Product meter should measure the X-ray dose output at the collimator and reports the measured Dose Area Product (mGy*m2) to the DICOM header of the image should be provided.
13	Four light weight 'zero lead' aprons should be provided.
14	2 Grids of at least 8:1 or better ratio and frequency should be provided.
15	Dry Chemistry Printer:- The System should be supplied with dry imager (dry chemistry) with a spatial resolution of 500 ppi/dpi or more. It should have contrast resolution of 12 bits/pixel or more. It should have all possible film sizes. The imager should preferably come with standard films sorter at the output for sorting the films based on modality connected. It should have a normal through put of 75 films per hour for the largest size. Access time for 1st film 90 seconds or less. The imager should be DICOM compatible for receive send and print facility. The system allow alteast 3 sizes from the five sizes to be loaded at any time. Printer status should be displayed for any error status etc.
16	Five years comprehensive on site warranty of entire system (Spares and labour), without any exclusion, including detector, X-ray tube, computers and all other accessories. This will be followed by 5 years CMC to be quoted separately, year wise.
17	98% uptime guarantee should be given. In case down time exceeds 2%, penalty in the form of extended warranty, double the number of days for which the equipment goes out of service, will be applied
18	The supplier must ensure the availability of expertise for service and maintenance at New Delhi. Uninterrupted availability of spare parts and repair for the next ten years must be assured by the principal in the form of an undertaking. Undertaking by the principal also to be given for providing maintenance services for 10 years in case there is change of local agent.
19	The tender should be quoted in 2 bids-technical and price bids should be quoted in two separate, sealed envelopes. Quotations should be filled strictly under the headings given in the tender document. Incompletely filled quotations or information provided haphazardly will not be considered. All technical information provided in the quotation must be substantiated with attached original product data sheets. The compliance statement must include the page number and paragraph/line no. from the technical datasheet (in original) where the particular specification is being complied.