SPECIFICATION FOR FLAT PANEL DETECTOR SINGLE PLANE CARDIAC CATHETERISATION SYSTEM

S. No.	Specifications
	Expected function of the System
	Dedicated flat panel detector angiography system with DSA for all angiographies and interventional procedures (cardiac).
1	**Technical specifications:**
A.	**Gantry:**
I	The system should be a floor mounted/ceiling suspended C Arm / G ARM System. The C Arm/G Arm should move freely to either side of the patient by 90 degree (+90, 0, -90 degree) for free access to the patient.
Ii	It should be possible to pre-program the gantries for at least two examination positions.
Iii	All movements of the gantry should be controllable from the table side.
Iv	Should have multiple knobs with differentiation for each functionality of the Gantry, IITV, table , etc.
v.	The system should have an in-built collision protection.
vi	The gantry should have fast speed for angulations at least 18-degrees/sec
vii	RAO/LAO Angle should be for at least +/- 100 degrees
viii	Cranio/Caudal movement should be at least +/- 45 degrees
Ix	Isocentre to floor distance for frontal C arm should be at least 105 cm.
B.	**Table:**
I	Floor mounted floating top:. Table top length should be at least 280 cm. Width at least 45cm.
Ii	Should have motorized longitudinal, vertical and horizontal movement. Must have radiolucent carbon fiber table top or equivalent. Transverse travel at least +/- 10 cm. Longitudinal travels at least l00cm. Facility for bolus chase must be there.
iii.	Accessories for the table should include head fixing aids, mattress, four radiolucent carbon fiber arm supports, drip stand, .peripheral filter set, and catheterization arm support.
C.	G**enerator:**
I	High frequency power unit that provides grid pulsed fluoroscopy capability.
Ii	Max power at least 100 KW. Maximum KVp at least 125 KVp.
Iii	Radiographic KVp range to be 40 - 125 KVp or more. Fluoroscopy KVp range to be 60 -120 KVp or more. Output at 100 KVp to be 1000 mA or more
Iv	Should have automatic exposure control device for radiographic fluoroscopy and angio mode.
V	Should have an overloading protection.
D.	**Tube**
I	The tube should be rotating anode high-speed tube.
Ii	Small focal spot not more than 0.6mm with power of at least 30 KW
Iii	Large focal spot not more than 1.0 mm with power at least 75 KW
iv.	Anode heat storage capacity 2.4 MHU or more, with advanced cooling mechanism.
V	Maximum continuous heat dissipation rate not less than 3 kW.
vi.	At least 3 selectable programmable cu filters for reducing the dose to the patient.

E.	**Detector of the C ARM / G ARM**
I	Detector size should be 25cm diagonally or more with at least 3 zoom fields.
Ii	At least 3 zoom fields, the smallest being 11 cm. or less
Iii	Acquisition; speed of at least 25 frames per sec. Acquisition speed for DSA should be 0.5 frames/sec to 6 frames/sec or higher.
Iv	Pixel size not more than 200 microns. Matrix at least 1K x 1K, in 12/14-bit depth
V	Detector quantum efficiency at least 70%.
F.	**Collimator**
	At least one collimator per plane to be provided, preferably with IRIS/square type arrangement
I	Should have facility for dose measurement chamber in order to display the skin radiation dose on the monitors in the lab.
Ii	Collimator, should have facility for copper pre filtration for reducing the x-ray dose.
Iii	Software controlled, integrated special filters should be present in collimation assembly.
Iv	Radiation free positioning of primary and semitransparent collimators via graphic display on live monitor.
G.	**LCD/TFT image monitors**
I	Examination room: at least 3 monitors, at least 17"monochrome LCD/TFT or more. Two monitor each Plane Live and roadmap. Monitor for Physiology Display.
Ii	Must be mounted together on a ceiling suspension to allow free positioning at any location: Height adjustment should be possible.
Iii	Control room: One LCD/TFT monitors of 17" or more for data and image viewing. Brightness should be at least 500 Cd/m^2. These monitors should have the facility for all review post processing and quantification of coronary and ventricular function for training and teaching.
H.	**Digital imaging system** with digital angiography and pulse fluoroscopic acquisition capabilities.
I	High resolution imaging capable of acquiring, processing, storing, displaying and reviewing in up to at least 1024 x 1024 matrix.
Ii	Continuous acquisition with digital storage in the digital mass storage device at1024 x l024 matrix at 12/10 bit, with real time instant access to all required images.
Iii	Real time image processing algorithm applicable for both fluoroscopy and acquisition.
Iv	Road mapping and landscaping facility should be available.
V	Disc storage capacity of at least 100000 uncompressed images of 1024 x 1024 matrix at a minimum of 10-bit/ pixel.
Vi	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.
Vii	Rotational angiography facility at a speed of at least 45 degrees per second with acquisition frame rate of at least 25 frames per second in 1 k matrix with facility for display of subtracted and un subtracted images in the examination room.
Viii.	The possibility of acquiring 3D Coronary Arteriography package along with the stent enhancement package. Stent enhancement with lumen subtraction facility will be preferred.
ix.	The complete digital system should be networked and connected to a DICOM compatible laser/ thermal camera.
x.	Complete cardiovascular computation software package. This should include

	clinically validated coronary, ventricular quantification software packages (QCA, LVA),
xi.	Algorithm/ software for real time stent visualization should be possible. An easy to operate rapid calculation software for offline coronary quantification should be available
xii.	Should have dose measuring capacity.
xiii.	DICOM 3 ready and PACS connectivity should be feasible without any additional hardware/software requirement.
xiv.	The system should be supplied with DICOM CD recorder for storing DSA runs, photo file images and it should be possible to review the same in any PC.
2	**Essential accessories.**
A	**Foot switch** for fluoroscopy and acquisition to be provided
B	**Pressure injector** compatible with the system
C	**Lead aprons:** of standard state of the art make, light weight, with a lead equivalent of 0.5mm. Should be double sided, 12 such aprons to be provided 6 of which should be two piece and 6 should be single piece. Design should be wrap around.
D	**Thyroid guards:** Twelve to be provided.
E	**Lead spectacles** : Four to be provided.
F	**Lead lined gloves :** Two pairs to be provided
G	**Focused ceiling mounted light** with a handle for positioning the light. This handle should be removable.
H	**Ceiling suspended radiation shield**.
I	Additional Table mounted radiation shield to be provided
l.	**Hemodynamic Recorder** (for Cardiac Catheterisation) with 4 pressure and 12 ECG
m.	**Lead Glass:** 100 x 150 cm or bigger with lead equivalent as prescribed by ICRP or BARC/AERB recommendations to be fixed between console room and gantry room for radiation protection.
3.	**The CATH Lab should have the facility of FFR.**
4.	**The CATH machine should be US FDA & EU CE Approved.**
5	**Live Stent Enhancement facility should be provided.**