Technical specifications for Inverted Fluorescence microscope and imaging system				
Multi-port/multi-deck inverted fully motorized fluorescence microscope with imaging system with onsite upgradability to other optical sectioning modalities e.g. Total Internal Reflection Fluorescence Microscopy (TIRF) for single molecule studies and Spinning Disc Confocal Microscopy for high-speed confocal imaging				
S.No.	**Description**	**Complied (Yes/No)**	**Catalogue No./Pg No.**	**Remarks if any**
Technical Specifications				
Vendor should provide the latest model of the instrument and latest software version as applicable				
1	**Microscope body:**			
1.1	Fully motorized active multi-port inverted fluorescence microscope with bright field (BF), phase contrast (PC), and fluorescence imaging capabilities			
1.2	Scanning capability in X, Y, and Z axis, built-in active double deck/ stratum structure/infinity port system for additional custom upgradations in future (e.g. automated hardware based axial drift correction system)			
1.3	Motorized ergonomic stand with inbuilt Z-focus drive and motorized extra-fine/fine/coarse focus with minimum step resolution of 10-15 nm or better			
1.4	Equipped with side port adapters, side port caps, covers for blocking the stray light			
1.5	Minimum light distribution: 100% side port, 100% eye port			
1.6	Tool set necessary for manual adjustments and replacement of accessories and any other accessories/spares required for regular operation for the system			
1.7	Water-proof and static-proof microscope cover			
1.8	Water-proof body with drainage facility to avoid any leakage into microscope body during long-term live-cell imaging			
1.9	Standalone dedicated vibration-free external TFT/LCD touch screen or digital controller or equivalent hardware capable of controlling all motorized functions of microscope			
1.10	The frame should be able to support future upgrades such as TIRF system, Spinning disk confocal etc.			
2	**Eye piece unit:**			
2.1	Eye piece tube with base unit			
2.2	Focusable 10X eye piece with eye piece guard with minimum field of view (FOV) 22 mm or better (2 nos.)			
3	**Mechanical Stage:**			
3.1	XY Mechanical stage with handle with sufficient travelling range for glass slides, multi-well plates and 35 mm and 60 mm petri dishes			
3.2	Stage inserts for 35 mm/60 mm dish, glass slide, well plate (6 well- to 96 well-plate), T25 tissue culture flask			
4	**Transmitted Light Illumination System and Condensor:**			

4.1	Bright LED transmitted Illumination with intensity control through touch panel and imaging software for fast switching between Fluorescence and BF/Phase contrast imaging during time lapse imaging			
4.2	Tiltable pillar with condenser holder			
4.3	Long/Extra-long working distance motorized condensor with minimum 5 position turret and built-in shutter			
4.4	Adjustable field aperture			
4.5	Condensor focusing mechanism			
4.6	Light-balancing daylight filter			
4.7	Interference green contrast filter			
4.8	Frost free filter			
4.9	Centering tools and accessories			
4.10	Phase contrast ring slits for 4X-40X objectives			
5	**Nosepiece and Filter Turret:**			
5.1	Motorized revolving nosepiece with filter turrets with minimum 6 positions and built-in shutter; motorized functions should be controllable through software and touch panel			
5.2	Field Stop			
5.3	Neutral Density (ND) filter			
5.4	Nosepiece cap (2 nos.)			
6	**Fluorescence Filters:**			
6.1	Pixel shift corrected narrow band pass fluorescence filter cube sets for 1) DAPI, 2) FITC/GFP, 3) TRITC/RFP, and 4) Texas Red/mCherry			
7	**Objectives for Brightfield, Phase Contrast, DIC & Fluorescence Applications:**			
7.1	4X phase objective with N.A. 0.10 or above			
7.2	10X Plan semiapochromat/fluorite phase objective with N.A. 0.25 or above			
7.3	20X Long working distance Plan semiapochromat/fluorite phase objective with N.A. 0.40 or above with coverglass correction			
7.4	40X Long working distance Plan semiapochromat/fluorite phase objective with N.A. 0.60 or above with coverglass correction			
7.5	60X Plan oil-immersion semiapochromat/fluorite objective with N.A. 1.25 or above with coverglass correction			
7.6	Objective cleaning tissue paper set (2 nos.) and immersion oil (50 ml, 3 nos.)			
8	**Fluorescence Light Source:**			
8.1	120W/130W metal halide/mercury lamp with controllable intensity adjustment (built-in attenuator) (0-100%), shutter and minimum working life of 2000 hours			

8.2	Spare metal halide/mercury lamp to be quoted			
8.3	Liquid light guide/fiber guide with adaptor			
8.4	Neutral Density (ND) filter			
9	**Camera**			
9.1	Peltier cooled sCMOS monochrome camera, Cooling temperature: 10°C, Ambient temperature (25°C)			
9.2	Quantum efficiency: 80% or higher			
9.3	Effective number of pixels: 2048 (H) x 2048 (V), Pixel size: 6.5 micron x 6.5 micron			
9.4	Sensor size: 13.3mm x 13.3mm			
9.5	Readout noise: 0.9 electrons median, Dark current: 0.6, Full well capacity 30,000 electrons			
9.6	Frame rate: 30 fps or above at full resolution			
9.7	Pixel binning: 2 x 2, 4 x 4			
9.8	Dynamic range: 33000:1			
9.9	Digital output: 16-bit support			
9.10	Lens mount: Large FOV 1X C-mount suitable for sCMOS Camera without any vignetting effect			
9.11	USB 3.0 data interface with necessary cable			
10	**Image acquisition, and analysis system (Optional, to be quoted separately):**			
10.1	Windows 10 64-bit			
10.2	Intel i7 Processor 10^{th} generation or later version			
10.3	16GB or more RAM			
10.4	2 x 1TB SATA HDD, 256 GB SSD			
10.5	4GB NVIDIA Graphics Card or better			
10.6	30” or higher LED Monitor (branded)			
10.7	USB peripherals (Mouse, Keyboard etc.)			
10.8	UPS with minimum 30 minute backup power			
10.9	Pricing on this system should be quoted separately			
11	**Image Acquisition and Analysis Software (Optional, to be quoted separately):**			
11.1	Advanced research imaging software for fully automated acquisition, device control of motorized components, and experimental manager, including light sources, camera, and other hardware modules			
11.2	Capable of image acquisition and analysis including point, line, area and various combinations of multi-channel and multi-dimensional acquisition of various combinations of XY, XYZ, and XYZT and lambda, 5D imaging and display, overlay of imaging, mark and find for multipoint and mosaic imaging, real-time stitching of large samples with higher magnification with stage movement (to be quoted with optional XY stage), imaging with hardware & software based			

	autofocus. online ratio imaging/physiology with online display of ratio image, real time intensity plot over time and over depth.			
11.3	3D/volume rendering orthogonal slice view of 3D stacks, slice view, intensity measurement over time and over depth, kymograph, dynamic ROI, background subtraction, Z-projection over time and Z-intensity measurement, time lapse recording functions, video recording functions, automated multi-channel fluorescence capturing & merging, fluorescence unmixing, co-localization, wide-field real time 2D deconvolution feature, manual image stitching, interactive measurements etc.			
11.4	The software should be capable of controlling all the motorized components of hardware including optional XY stage, optional hardware based autofocus module, emission filter wheels/λ DG4 for fast sequential imaging, LED light sources for intensity and fast shutter control for multi-channel imaging, third party sCMOS cameras for high-speed ratio imaging, third party TTL/triggered device control, DAQ card control for external light sources/lasers and perfusion systems, on stage CO_2 incubator			
11.5	Software autofocus module for drift-free imaging			
11.6	Saving of all system parameters with the image for multiple independent users for repeatable/reproducible imaging			
11.7	The software must have drivers and modules for upgradable hardware modules such as TIRF, FRAP, Spinning Disc confocal (CSU X1 & CSU W1) and super resolution systems for future upgradation			
11.8	The software should have capability to import and export images in OME (Open microscopy environment) & BioFormats compatible with metadata for offline analysis with open-source platforms such as ImageJ/Fiji			
11.9	Modules to perform design and execute complicated experiments through drag and drop functions (Graphical experimental manager/Jobs/journals/experiment designer etc.)			
11.10	High dynamic range imaging, instant extended focal imaging, simultaneous imaging of two channels with image splitters and multiple cameras, real time/instant EDF, Brightness contrast adjustment, morphological filters, Fluorescence spectral unmixing (to remove the autofluorescence/overlapping dyes), Macro creation editing and batch conversion/processing of large data sets, object classifier/ intensity based automatic segmentation			

11.11	Multidimensional intensity measurement and data export to Excel format for further statistical analysis. Colocalization analysis with scatter plot display and statistical analysis, FRET and FRAP analysis, spatiotemporal measurement modules. Calcium/physiology/ratio analysis module, background subtraction/correction, bleaching correction, cell count and confluency measurements etc.			
11.12	Any optional/add on module mentioned in the software brochure should be quoted with respective part code for better clarity and to avoid confusion fair evaluation.			
12	**USB TTL conversion kit (Optional, to be quoted separately)**			
12.1	USB TTL Conversion Kit for fast triggering of external hardware like perfusion/microfluidic chambers to be synchronised with image acquisition software for seamless integration			
12.2	A 24 channel 8.5mA digital I/O device with an inbuilt data acquisition software to control the entire DAQ card			
12.3	The Imaging software should also have a built-in driver to completely integrate the triggering function with external devices such as light sources and perfusion systems/microfluidic devices for seamless fast sequential multi-channel imaging with the LED light source, perfusion pump and CO_2 incubators.			
12.4	The imaging software should be able to trigger the LED lines through DAQ card in microseconds precision for different wavelengths			
12.5	The I/O device should have at least 24 single-ended digital lines DIO ports: Each DIO line should be individually programmable as a static DI or DO line.			
12.6	The output voltage should at least be +5V			
12.7	The imaging software should be able to send out trigger to LED light source as well as third party hardware such as perfusion system and microfluidic devices/pumps			
12.8	All the cabling and controls required to integrate all the parts and operate from the controlling computer to be quoted			
13	**System Integration:**			
13.1	All the components including microscope, camera, image acquisition hardware and software should be fully integrated.			
14	**Warranty and Maintenance:**			
14.1	2 years warranty to be included on all the above components			
14.2	Spares for all components of the system should be available for the next 10 years (Bidders need to provide undertaking for the same)			

14.3	Latest software upgrades should be provided free of cost for 5 years (Bidders need to provide undertaking for the same)			
15	**Post-installation checks:**			
15.1	The system including all its components should be shown to be fully functional			
15.2	Sample (either provided by IIT Madras or by the Vendor) should be imaged with the system and various attributes of the system should be clearly demonstrated			
15.3	Vendor should conduct workshop/training session as part of equipment installation for internal and external users.			
16	**Optional items (Vendors may quote the following items as optional if available)**			
16.1	IR Laser/LED-based hardware-based automatic focus drift control module			
16.2	Linear encoded XY motorized stage with frictionless, wear-free motor drives controlled by software, Stroke range: X-direction: minimum 114 mm or higher; Y-direction: minimum 73 mm or higher, Speed range: 20-25 mm/s (to be quoted along with multi-point and well navigator modules)			
16.3	3D deconvolution module in image analysis software (for bright field, wide field, and confocal imaging modules)			
16.4	Compact on-stage incubator to maintain the temperature at 37°C and humidity of 90% or more. It should come with suitable holders, for 35mm & 60mm petri dish, & 96 well plate. It should have objective heater as standard feature to avoid any heat sink while using oil immersion objectives. It should have built in touch screen display to modulate all the parameters. The incubator should be upgradable for maintaining the CO_2 level in the future.			
C) Other requirements				
1	**Future upgradability** (Bidders need to provide undertaking for the below mentioned)			
1.1	System should be upgradable to long-term live cell imaging applications with controllable hardware and software modules, including laser-based drift compensation and onstage CO_2 incubator and perfusion/microfluidic device compatibility			
1.2	Mechanical XY stage should be upgradable to motorized linear encoded XY stage			
1.3	The system should be onsite upgradable to IR Laser/LED automatic focus drift control module for long term in focus time lapse imaging			

1.4	All future upgradable modules must be fully integrated with the microscope system in terms of hardware and image acquisition software, including hardware-based drift compensator, live cell imaging module and motorized stage			
1.5	The frame should support future upgrades such as TIRF system, Spinning disk confocal			
1.6	The system should have future upgradability for DIC imaging			
2	**Note to vendor:**			
2.1	IIT Madras reserves the right to reject bids based on adverse feedbacks received from past users.			
2.2	Bidders should give point-by-point compliance with respect to the tender specifications. Bidders should provide technical literature and brochure of the offered model and mention the same in the compliance table. Bids without technical literature will be summarily rejected			
2.3	Non-compliance to any of the two points above shall be treated as incomplete/partial bid & shall not be considered for further process			
2.4	If technical committee wishes to examine the instrument specification, the bidders may also be called for the demonstration of instrument for the various parameters during technical evaluation			
2.5	Bidders should provide the country-of-origin certificate by chamber of commerce or manufacturer			
2.6	Bidders should provide all pre-installation requirements to have the system installed in ideal room conditions			
2.7	90% payment will be made after delivery and remaining 10% after installation and training			

II	**Bidder Eligibility Criteria-II**	**Compliance (Yes/No)**	**Reference Page No.**	**Remarks, If any**
1	Vendor should have a good track record of selling similar systems with at least 5 installations across India especially in Centrally Funded Technical Institutes (CFTIs), Central and State Universities, and Centrally Funded Research Institutes etc. Proof of the same i.e., 5 PO copies or Installation certificates along with contact details has to be provided			
2	Vendor should have a local presence with good track record of after sales support in Chennai, with facility for technical support, troubleshooting & training on the same system (Name, Contact number, Email ID & Address proof has to be submitted)			

(Note: It is mandatory for the bidders to provide the compliance statement in tabular column format along with catalogue page number (comply/not comply) for the Above points with document proof as required. Failing which bidders will be technically disqualified)