



INDIAN INSTITUTE OF TECHNOLOGY BOMBAY
MATERIALS MANAGEMENT DIVISION

PR No. 1000057978

RFx No.6100003147

Part A- Confocal Microscope facility with Laser Scanning with Multiphoton laser

Part B- Spinning Disc

Part C- FLIM modules

The technical specifications for the procurement above is detailed under Part A, Part B, and Part C respectively

- (i) The tender document has three separate parts, **Part A, Part B and Part C**. Technical and Financial comparisons will be made item wise for **Part A, Part B and Part C** independently.
- (ii) Vendors are free to quote for all parts or any one part or combination of two parts (**Part A + Part B, Part A + Part C, or Part B + Part C**), or all three parts (**Part A + Part B + Part C**), subject to compliance with the respective technical and commercial requirements specified for each part.
- (iii) **Part A** is a Confocal Microscope with Laser Scanning module and Multiphoton laser capable of carrying out imaging with resolution in the X-Y (transverse plane) of 120 nm or better (i.e. less than 120 nm), and a resolution of 350 nm or better in the Z-direction.
- (iv) **Part B** is a Spinning Disc confocal module mounted on a suitable microscope base capable of fast imaging (100 fps or better) for long duration with auto drift correction, with resolution in the X-Y (transverse plane) of 120 nm or better (i.e. less than 120 nm), and a resolution of 350 nm or better in the Z-direction.
- (v) **Part C** is a Fluorescence Lifetime Imaging Microscopy (FLIM) module integrated with the confocal microscope (**Part A**), capable of high-speed and accurate fluorescence lifetime imaging with dedicated acquisition and analysis software.
- (vi) Equipment in **Part A and Part B** should be provided with an active vibration free isolation table having honeycomb table-top for mounting of optics and other accessories.
- (vii) Each system in **Part A, Part B and Part C** should be Modular, having the capability of being upgraded in future with several add-ons.
- (viii) IIT Bombay reserves the right to evaluate and award the tender on a Part-wise basis, considering the overall technical specifications of each respective Part, and may select different vendors for different Parts.
- (ix) In the event of any bidder submitting quotes for more than one part, IIT Bombay shall not be obligated to procure all parts. Non-selection of any Part quoted by bidder shall not create any liability or obligation on the part of IIT Bombay towards the bidder.
- (x) The successful bidder shall complete delivery within 3–4 months from the date of the Purchase Order (PO). Failure to deliver within the stipulated or approved extended period may result in cancellation of the PO including forfeiture of PBG and debarment in future bidding process of IIT Bombay.



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Compliance Sheet for Confocal Microscope facility with Laser Scanning with Multiphoton laser, Spinning Disc and FLIM modules

PART A: Confocal Microscope with Laser Scanning module and Multiphoton laser

1. The system is expected to provide high-resolution, high-sensitivity fluorescence imaging for fixed and live biological specimens through advanced laser scanning confocal microscopy, while also enabling deep tissue imaging using multiphoton excitation.
2. It should support multidimensional imaging (XYZ, time-lapse, spectral, and tile scanning), quantitative image analysis, and advanced applications such as super-resolution imaging, FRET, FRAP, photo activation, and quantitative image analysis.
3. The system should be equipped with high-performance detectors, flexible laser excitation, environmental control for live-cell imaging, and comprehensive analysis software to facilitate cutting-edge biological and biomedical research.

Sr. No	Technical Specifications	Compliance (Yes/No)	Deviation if any
A1	<u>Microscope System</u>		
(a)	<u>Microscope Stand:</u>		
	Research-grade fully motorized inverted microscope with a motorized Z-focus drive		
	Integrated transmitted light illumination with automatic illumination intensity control and contrast optimization		
	Integrated TFT/LCD touchscreen /Control Pad display for microscope status, imaging parameters, and full software control		
	Motorized Z-focus drive with a minimum movable step resolution of 10 nm or better, with an integrated laser safety interlock system for safe laser operation		
	IR laser Based (>830nm) Drift compensation and hardware-based auto-focus for long duration imaging		
	Transmitted-light illumination: LED illumination for Bright field and DIC imaging		
	Transmitted light illumination with adjustable brightness, aperture diaphragm, and field diaphragm for optimized brightfield imaging		
	10x wide-field eyepieces with a field number (FN) of at least 22 mm or higher, with adjustable eyecups		
	Integrated fluorescence illumination with a long-life LED source ($\geq 20,000$ hours; CoolLED or equivalent), fully motorized and software-controlled, with fast electronic shuttering/switching and intensity control		
	The system shall include a motorized objective turret with a minimum of six objective positions, and full software integration. The system shall support motorized control of the correction collar for compatible objectives, where applicable		
	Motorized long working distance condenser ($NA \geq 0.55$) with analyser, polarizer, DIC prisms/sliders, supporting Bright field,		



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	Phase Contrast, and DIC imaging		
	Fully motorized fluorescence filter turret equipped with high-transmission, hard-coated filter sets for DAPI/Hoechst, CFP, YFP, FITC/GFP, TRITC/Rhodamine, and Cy5, or equivalent fluorophores		
	Motorized/electronic transmitted-light fast shutter compatible with automated multidimensional brightfield imaging, if applicable		
	Motorized high-precision XY stage with universal sample holder attachments compatible with microscope slides, glass-bottom dishes, Petri dishes, chambered coverslips, and multi-well plates, and multi-position imaging		
	An enclosed cabinet with a transparent door for housing lasers and associated components is preferred		
	Dust cover for the complete microscope system		
(b)	<u>Objectives:</u>		
	10x Air, NA $\geq$ 0.40, WD $\geq$ 2.5 mm		
	25x/30x/40x water/silicone/glycerol immersion, NA $\geq$ 0.95, WD $\geq$ 0.8 mm, Transmittance > 70% from 700-1300 nm (Dedicated MPE Objective)		
	40x/60x/63x Water/Glycerol, NA $\geq$ 1.1, WD $\geq$ 0.25 mm		
	40 $\times$ Oil, NA $\geq$ 1.30, WD $\geq$ 0.13 mm		
	60 $\times$ /63 $\times$ Oil, NA $\geq$ 1.40, WD $\geq$ 0.13 mm		
	100 $\times$ Oil, NA $\geq$ 1.40, WD $\geq$ 0.13 mm		
	All objectives shall be Plan Apochromatic or equivalent, with high NA, broad UV–Visible–NIR transmission, and compatibility with DIC, confocal, multiphoton, and super-resolution imaging where applicable		
	Correction collars shall be provided where applicable (automated)		
	Vendor shall supply sufficient fluorescence-grade immersion oil/silicone immersion oil/ Glycerine (glycerol) immersion liquid with annual replenishment for five years		
A2	<u>Scanning Unit</u>		
	The system shall feature a hybrid scanning architecture comprising a high-speed scanner and a high-resolution (galvanometric or equivalent) scanner. The high-speed scanner shall achieve an imaging speed of ≥ 25 fps at 512×512 pixels and support scan formats of at least 2048×2048 pixels. The high-resolution scanner shall support scan formats of at least 8192×8192 pixels		
	The system shall also support Region of Interest (ROI) imaging, line scanning, optical zoom, digital zoom, bidirectional scanning, variable scan speeds, and user-selectable scan formats		
	FOV of the system should be 20 mm or more		
	Compatible with photo manipulation, spectral imaging, multiphoton imaging, and other advanced imaging modalities		



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	Support for multidimensional imaging (2D, 3D, 4D, time-lapse, and spectral imaging) with 12-, and/or 16-bit or higher image acquisition		
A3	<u>Resolution</u> <i><u>Dedicated hardware-based real-time online super-resolution imaging</u></i> The system shall provide lateral (XY) resolution ≤ 250 nm and axial (Z) resolution ≤ 600 nm under conventional confocal imaging conditions, and shall support real-time/on-the-fly super-resolution imaging with lateral (XY) resolution ≤ 120 nm and axial (Z) resolution ≤ 350 nm, utilizing an established optical, detector-based, computational, structured illumination, or equivalent super-resolution technology, with demonstrable improvement in spatial resolution over conventional confocal imaging		
A4	<u>Lasers</u>		
(a)	<u>Excitation lasers(Visible):</u>		
	Integrated computer-controlled solid-state laser system comprising the following excitation wavelengths:		
	UV: 405/408 nm		
	Violet: 445/448/458 nm		
	Blue: 488 nm		
	Green: 514/520 nm		
	Yellow: 561 nm		
	Red: 633/640 nm		
	Each excitation laser shall provide a continuous-wave (CW) output power of at least 20 mW		
	OR		
	Integrated computer-controlled White Light Laser (WLL) covering a wavelength range of 485–790 nm, together with dedicated excitation lasers (CW) at:		
	UV: 405/408 nm		
	Violet: 445/448/458 nm		
	The system shall support excitation in the green, yellow (561 nm), and red spectral regions using the white light laser. Each continuous-wave excitation wavelength shall provide an output power of at least 20 mW		
	Laser's shall have independent computer-controlled power regulation and high-speed modulation (AOTF, AOBS or equivalent)		
	The system shall support simultaneous and sequential multi-laser excitation and be upgradeable with additional laser lines in visible and NIR spectrum		
	Independent software control of each laser with adjustable output power (0–100%) and fast electronic modulation		



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	Provision for future addition of laser wavelengths without replacement of the complete laser launch system		
	Stable laser output with low power fluctuation suitable for quantitative fluorescence imaging		
	Integrated laser safety interlocks and complete software control of all laser functions		
(b)	<u>Multiphoton laser:</u>		
	The system shall be equipped with a tunable femtosecond pulsed laser multiphoton excitation. The tunable laser shall provide an excitation wavelength range of at least 690–1040 nm or wider, the system shall be suitable for multiphoton fluorescence imaging, FRET, SHG, and other nonlinear optical imaging applications with AOM control or equivalent		
	The femtosecond laser shall provide excitation suitable for commonly used fluorophores, with a pulse width of ≤ 100 -120 fs or better, repetition rate of approximately 80 MHz or equivalent, and an average output power of ≥ 2.4 W at 800 nm or equivalent		
	The laser shall provide automated beam alignment and optimization, or an equivalent mechanism, to ensure stable and efficient multiphoton excitation with minimal user intervention		
	The laser shall include motorized power attenuation/control and be fully integrated with the microscope through a single software platform for system control, image acquisition, and laser operation		
	The laser shall support software-controlled selection and rapid switching of user-selectable excitation wavelengths within the specified tuning range		
A5	<u>Detectors</u>		
(a)	<u>Confocal Detection System:</u>		
	Minimum four independent detection channels equipped with Hybrid Detectors (HyD), GaAsP Array, Silicon, or equivalent high-sensitivity detectors for confocal. Low-sensitive normal multi-alkali PMTs won't be considered		
	The system shall be equipped with dedicated transmitted light detector for transmitted light imaging, including Brightfield and DIC imaging		
	Detectors shall support photon-counting capability or equivalent high-sensitivity photon detection, with low-noise electronics, high dynamic range, and adjustable gain/offset, with QE/PDE $\geq 45\%$, where applicable to the detector technology		
	The system should be capable of performing real-time, simultaneous two-channel super-resolution imaging with a spatial resolution of up to 120 nm in the lateral direction and 350 nm in the axial direction		
	All detectors shall be directly coupled to the scan head, with an integrated optical design that maximizes photon collection efficiency and minimizes signal loss during transmission. External		



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	or remotely mounted primary detection units shall not be considered equivalent		
	All four detectors should offer continuous spectral detection covering 400 – 850 nm or wider with user-selectable emission bandwidths and support for simultaneous multichannel imaging		
	Support for lambda imaging, spectral un-mixing, auto-fluorescence separation, and lambda stack acquisition		
	Simultaneous fluorescence and transmitted light detection with the dedicated transmitted light detector		
	Modular, upgradeable detection architecture for future expansion and advanced imaging modalities		
(b)	<u>Multiphoton Detection:</u>		
	Non-descanned Detection (NDD): The system shall be equipped with a minimum of two high-sensitivity, dedicated non-descanned detectors (NDDs), separate from the confocal detection pathway. The detectors shall be based on HyD, GaAsP PMT, silicon-based detectors, or equivalent high-sensitivity detector technology, suitable for multiphoton and nonlinear optical imaging		
	Appropriate detection filters shall be provided for DAPI, CFP, EGFP, YFP, mCherry, and second-harmonic generation (SHG) imaging. The detectors shall support software-controlled gain adjustment, with photon-counting capability preferred		
A6	<u>Software</u>		
	The system shall be supplied with fully integrated software for microscope control, image acquisition, visualization, processing, quantitative analysis, and reporting. The software shall support the following:		
	Complete control of all motorized microscope functions, including objectives, stage, focus, filter wheels, scanners, detectors, excitation lasers, multiphoton laser(s), super-resolution module(s), environmental control devices, and all image acquisition parameters through a single software platform		
	Automated multidimensional imaging, including multi-channel, multi-position with independent Z-stacks, Z-stack, time-lapse, tile scan, autofocus, ROI imaging, and customizable acquisition workflows		
	Advanced image processing and quantitative analysis, including 2D/3D visualization, 3D time-lapse reconstruction, 2D and 3D deconvolution, denoising, spectral un-mixing, co-localization, FRET, FRAP, and fluorescence quantification		
	Interactive measurements, image segmentation, documentation, report generation, and user-defined protocols/templates		
	Integrated software for multiphoton microscope control, image acquisition, visualization, analysis, and reporting. Support multidimensional imaging (Z-stack, time-lapse, tile scan, and multi-position), automated workflows, device control, quantitative		



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	image analysis, and export of raw and processed data in standard formats		
	All software, firmware, driver updates, and version upgrades released by the manufacturer during the period of 5 years shall be provided and installed at no additional cost		
A7	<u>PC Workstation</u>		
(a)	<u>Acquisition workstation</u>		
	A high-performance acquisition workstation shall be supplied, pre-installed with advanced fluorescence imaging software and factory-tested		
	Processor: Latest high-performance multi-core CPU (Intel Xeon / Core Ultra / AMD Threadripper or equivalent) ECC memory support, PCIe Gen5 support, and optimized for high-speed scientific image acquisition, processing, and analysis		
	RAM: ≥ 128 GB DDR5		
	GPU: Professional GPU with ≥ 20 GB VRAM (expandable preferred)		
	Storage: ≥ 2 TB NVMe SSD (OS) ≥ 2 TB NVMe SSD (Dedicated for realtime data acquisition) ≥ 12 TB usable RAID 10 storage for analysis and reconstruction		
	Display: Dual 32" or larger 4K high-resolution monitors factory color-calibrated for quantitative imaging		
	Peripherals: Backlight Keyboard and high-precision mouse		
	OS: Licensed 64-bit professional OS (Windows 11)		
(b)	<u>Offline Analysis Workstation:</u>		
	High-performance offline analysis workstation with identical or equivalent configuration to the acquisition workstation shall be provided, with 12 TB storage, 64 GB Ram and 16 GB VRAM backlit keyboard, HD webcam, and speakers		
	The system shall be supplied with a licensed offline image analysis software enabling full access to acquired data, comprehensive image analysis, and advanced image processing for both confocal and super-resolution datasets. The software shall support simultaneous offline analysis independent of image acquisition, without interrupting system operation		
A8	<u>Stage and Sample Handling Accessories</u>		
	Motorized high-precision XY stage with a universal specimen holder compatible with microscope slides, Petri dishes, glass-bottom dishes, chambered coverslips, multi-well plates, and similar sample formats		
	Adjustable heating stage top chamber with temperature control from ambient +3 °C to 45 °C or higher, with temperature stability of ± 0.1 °C or better		



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	The system shall be supplied with a fully integrated on-stage live-cell incubation system providing independent control of temperature, CO ₂ , O ₂ , N ₂ , and humidity, including all necessary controllers, gas mixing modules, sensors, tubing, regulators, stage enclosure, and accessories. The system shall support long-term live-cell imaging under stable physiological conditions and be fully integrated with the microscope and imaging software		
A9	<u>Warranty and Maintenance</u>		
	The system shall be covered by a minimum one (1) year standard manufacturer's warranty from the date of successful installation, commissioning, and acceptance, followed by two (2) years of extended warranty and after completion of extended warranty, two (2) years of Annual Maintenance Contract (AMC).		
	The cost of the extended warranty and AMC shall be included in the tender as mandatory items and shall not be quoted as optional items		
	In the event of a system breakdown, service support shall be initiated within 48 hours of complaint registration		
	Remote diagnostics and technical support shall be provided throughout the five (5)-year period		
	The bidder shall provide a minimum of two preventive maintenance visits per year and unlimited breakdown service visits during the warranty, extended warranty, and AMC periods at no additional cost		
	During the warranty and extended warranty period, all hardware, including lasers, scanners, detectors, objectives, controllers, workstations, software, and other critical system components, shall be comprehensively covered and repaired or replaced at no additional cost		
	If a critical component cannot be restored within a reasonable time, the bidder shall provide a temporary replacement/loaner of equivalent or better performance, wherever feasible, at no additional cost		
	All software, firmware, driver updates, and version upgrades released by the manufacturer during the period of 5 years shall be provided and installed at no additional cost		
A10	<u>Service, Maintenance, and Spare Parts Commitment</u>		
	The vendor shall ensure the availability of service, maintenance, and spare parts support for a minimum period of 10 years from the date of installation and commissioning of the system		
	A commitment to this effect shall be provided by the manufacturer on the company's official letterhead and submitted along with the bid		
A11	<u>Power backup</u>		



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	Suitable online UPS (minimum 6 kVA) with automatic voltage regulation (AVR) and a minimum 30-minute backup at full system load shall be provided for uninterrupted operation of the complete microscope system		
	The UPS shall be supplied with a portable enclosure/trolley with lockable castor wheels for easy and safe movement within the facility		
A12	<u>General Requirements</u>		
	100% CO ₂ , O ₂ , N ₂ gas cylinders with regulators, tubing, and all required accessories for system operation		
	Fluorescent standard slide for confocal microscopy – Mouse Fibroblast, 4-color (Nuclei (405/Blue), Peroxisomes (488/Green), Vimentin + cells (568/Red), and Stress Fibres (647/Cyan)).		
	Fluorescent standard slide for confocal microscopy – Mouse Fibroblast, 6-color (Wheat Germ Agglutinin (405/Cyan), Peroxisomes (488/Green), Microtubules (561/Magenta), Stress Fibres (640/Grey), and Nuclei (730 & 785/Blue)).		
	High-capacity dehumidifier		
	One ergonomic operator chair and two user chairs		
	Separate sturdy computer tables for the acquisition workstation and the offline analysis workstation		
	Comprehensive on-site user training shall be provided during installation and as required throughout the 5-year warranty/support period.		
	The bidder shall also provide technical and financial support for conducting one user workshop every two years during this period		
	About 1000 cover slips of varied thickness applicable for measurements with the microscope system and different objectives should be provided		



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Part B: Spinning Disk Confocal module mounted on a suitable microscope base

1. Research-grade, fully motorized spinning disk confocal microscope for high-speed, high-resolution fluorescence imaging
2. The system shall provide high sensitivity with minimal photobleaching and phototoxicity, enabling live-cell and fixed-sample imaging
3. The system shall support rapid multichannel, multidimensional (XYZT), and long-term time-lapse imaging
4. The system shall be modular, upgradeable, and supplied with all necessary hardware, software, accessories, and installation required for complete operation

Sr. No	Technical Specifications	Compliance (Yes/No)	Deviation if any
B1	<u>Microscope System</u>		
(a)	<u>Microscope Stand:</u>		
	Research-grade fully motorized inverted microscope with a motorized Z-focus drive		
	Integrated transmitted light illumination with automatic illumination intensity control and contrast optimization		
	Integrated TFT/LCD touchscreen /Control Pad display for microscope status, imaging parameters, and full software control		
	Motorized Z-focus drive with a minimum movable step resolution of 10 nm or better, with an integrated laser safety interlock system for safe laser operation		
	IR laser Based (>830nm) Drift compensation and hardware-based auto-focus for long duration imaging		
	Transmitted-light illumination: LED illumination for Bright field and DIC imaging		
	Transmitted light illumination with adjustable brightness, aperture diaphragm, and field diaphragm for optimized brightfield imaging		
	10x wide-field eyepieces with a field number (FN) of at least 22 mm or higher, with adjustable eyecups		
	Integrated fluorescence illumination with a long-life LED source ($\geq 20,000$ hours; CoolLED or equivalent), fully motorized and software-controlled, with fast electronic shuttering/switching and intensity control		
	The system shall include a motorized objective turret with a minimum of six objective positions, and full software integration. The system shall support motorized control of the correction collar for compatible objectives, where applicable		
	Motorized long working distance condenser (NA ≥ 0.55) with analyser, polarizer, DIC prisms/sliders, supporting Bright field, Phase Contrast, and DIC imaging		
	Fully motorized fluorescence filter turret equipped with high-transmission, hard-coated filter sets for DAPI/Hoechst, CFP, YFP, FITC/GFP, TRITC/Rhodamine, and Cy5, or equivalent fluorophores		



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	Motorized/electronic transmitted-light fast shutter compatible with automated multidimensional brightfield imaging, if applicable		
	Motorized high-precision XY stage with universal sample holder attachments compatible with microscope slides, glass-bottom dishes, Petri dishes, chambered coverslips, and multi-well plates, and multi-position imaging		
	An enclosed cabinet with a transparent door for housing lasers and associated components is preferred		
	Dust cover for the complete microscope system		
(b)	<u>Objectives:</u>		
	5× Air NA ≥ 0.15 WD ≥ 12 mm		
	10× Air NA ≥ 0.40 WD ≥ 2.5 mm		
	20× Air NA ≥ 0.7 WD ≥ 0.8 with correction collar		
	40× Oil, NA ≥ 1.30 , WD ≥ 0.13 mm		
	60×/63× Oil, NA ≥ 1.40 , WD ≥ 0.13 mm		
	100× Oil, NA ≥ 1.40 , WD ≥ 0.13 mm		
	All objectives shall be Plan Apochromatic or equivalent, with high NA, broad UV–Visible–NIR transmission, and compatibility with DIC, confocal, multiphoton, and super-resolution imaging where applicable		
	Correction collars shall be provided where applicable (automated)		
	Vendor shall supply sufficient fluorescence-grade immersion oil and silicone immersion oil with annual replenishment for five years		
B2	<u>Scanning Unit</u>		
	High-speed spinning disk confocal scan head capable of real-time super-resolution imaging with lateral (X-Y) resolution of ≤ 120 nm and acquisition speed of ≥ 100 fps at full $2K \times 2K$ resolution or equivalent		
	The system shall utilize hardware-based super-resolution technology (e.g., dual Nipkow disk or equivalent) providing lateral resolution of 150–170 nm, with further resolution enhancement using low-frequency suppression/filtering, high-frequency or radial frequency pattern collection, or equivalent technology to achieve 100–120 nm lateral resolution in real time. Online image processing and reconstruction shall support 50–60 FPS at full FOV and full pixel resolution ($\geq 2.3K \times 2.3K$) and shall not rely on 3D deconvolution		
	The spinning disk scan head shall incorporate a high-efficiency excitation optical design, with TWO dual Nipkow disk with Microlens arrays on both the illumination/excitation and emission/pinhole disks, or equivalent to maximize laser transmission through the pinhole array, providing high excitation efficiency, increased image brightness, improved signal-to-noise ratio, and reduced photo-bleaching and photo-toxicity and		



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	enhanced resolution. Scanning optics with broad spectral transmission, compatible with the supplied excitation sources and fluorescence imaging applications should be provided		
	The super-resolution optical path shall provide appropriate intermediate optical magnification ($\geq 2\times$) or an equivalent optical arrangement to achieve Nyquist-compliant sampling and the specified super-resolution performance		
	The system shall support high-speed multidimensional imaging, including simultaneous dual-channel acquisition, multichannel imaging, multi-position acquisition, Z-stack imaging, time-lapse imaging, tile scan/stitching, and rapid volumetric (3D/4D) imaging		
	The image acquisition system shall support user-selectable digitization of 8-bit, 12-bit, and 16-bit or higher		
	The system shall be modular and upgradeable to additional laser lines, imaging modalities, detectors, and software features		
	The scan head shall be fully integrated with the microscope, cameras, stage, autofocus, lasers, and acquisition software for synchronized automated imaging		
	Appropriate filters/filter wheel should be provided for imaging of DAPI, FITC/EGFP, TRITC/mCherry and Cy5. Filters for simultaneous dual channel imaging of EGFP & mCherry or equivalent should be included		
B3	<u>Resolution</u> <i><u>Dedicated hardware-based real-time online super-resolution imaging</u></i> The system shall provide a lateral (XY) resolution of ≤ 250 nm and an axial (Z) resolution of ≤ 600 nm under confocal imaging conditions, and shall support real time/on the fly super-resolution imaging with a lateral resolution of up to 120 nm and axial (Z) resolution of ≤ 350 nm or better using hardware-based resolution enhancement technology		
B4	<u>Lasers</u>		
	Integrated, computer-controlled solid-state laser system with a minimum of four excitation wavelengths (405 nm ≥ 50 mW, 488 nm ≥ 100 mW, 561 nm ≥ 100 mW, and 633 nm/640 nm ≥ 100 mW or higher/equivalent), independent power control, high-efficiency fiber delivery, and full software integration		
	Independent software control of each laser with adjustable output power (0–100%) and fast electronic modulation		
	High-efficiency single-mode fiber delivery or equivalent for uniform illumination		
	Provision for future addition of laser wavelengths without replacement of the complete laser launch system		



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	Stable laser output with low power fluctuation suitable for quantitative fluorescence imaging		
	Integrated laser safety interlocks and complete software control of all laser functions		
B5	<u>Detectors</u>		
	Dual back-illuminated scientific CMOS (sCMOS) cameras (e.g., Fusion BT or equivalent) for simultaneous dual-color imaging		
	Sensor resolution $\geq 2300 \times 2300$ pixels (≈ 5.3 MP) with field of view (FOV) ≥ 18 mm		
	High quantum efficiency ($\geq 95\%$ preferred), low read noise (≤ 1 e ⁻ preferred), 16-bit or higher digitization, scientific-grade cooling, and spectral sensitivity of 400–900 nm or wider		
	Acquisition speed ≥ 90 –100 fps at full-frame resolution, with ROI-based higher frame rates		
	High dynamic range ($\geq 30,000:1$) with low dark current and efficient cooling		
	High-speed data interface (e.g., Camera Link HS, CoaXPress, 10GigE, USB 3.0, or equivalent)		
	Provision for future upgrade to advanced detectors (e.g., back-illuminated sCMOS or equivalent) without replacement of the complete imaging system		
	If the supplied spinning disk imaging cameras do not support widefield fluorescence imaging, the system shall include one dedicated high-sensitivity monochrome scientific camera (sCMOS or equivalent), fully integrated with the microscope control and acquisition software, to enable high-performance widefield fluorescence imaging		
B6	<u>Software</u>		
	The system shall be supplied with fully integrated software for microscope control, image acquisition, visualization, processing, quantitative analysis, and reporting. The software shall support the following:		
	Complete control of all motorized microscope functions, including objectives, stage, focus, filter wheels, scanners, detectors, excitation lasers, environmental control devices, and all image acquisition parameters through a single software platform		
	Automated multidimensional imaging, including multichannel, multi-position (independent Z-stacks), time-lapse, tile scan/stitching, movie acquisition, software autofocus, and multi-experiment workflows		
	Support for 3D visualization, rendering, 2D and 3D deconvolution, image processing, quantitative fluorescence analysis, and advanced image analysis including co-localisation, cell segmentation, particle and morphometric analysis, batch processing, and macro/script creation		



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	Real-time (on-the-fly) super-resolution reconstruction software module		
	Interactive image measurements, segmentation, documentation, report generation, and user-defined acquisition and analysis protocols		
	Modular software architecture with provision for future upgrades to imaging modalities, analysis modules, and software features		
	All software, firmware, driver updates, and version upgrades released by the manufacturer during the period of 5 years shall be provided and installed at no additional cost		
B7	<u>PC Workstation</u>		
(a)	<u>Acquisition workstation</u>		
	A high-performance acquisition workstation shall be supplied, pre-installed with advanced fluorescence imaging software and factory-tested		
	Processor: Latest high-performance multi-core CPU (Intel Xeon / Core Ultra / AMD Threadripper or equivalent) ECC memory support, PCIe Gen5 support, and optimized for high-speed scientific image acquisition, processing, and analysis		
	RAM: ≥ 256 GB DDR5		
	GPU: Professional GPU with ≥ 20 GB VRAM (expandable preferred)		
	Storage: ≥ 2 TB NVMe SSD (OS) ≥ 4 TB NVMe SSD (Dedicated for realtime data acquisition) ≥ 16 TB usable RAID 10 storage for analysis and reconstruction		
	Display: Dual 32" or larger 4K high-resolution monitors factory color-calibrated for quantitative imaging		
	Peripherals: Backlight Keyboard and high-precision mouse		
	OS: Licensed 64-bit professional OS (Windows 11)		
(b)	<u>Offline Analysis Workstation:</u>		
	High-performance offline analysis workstation with identical or equivalent configuration to the acquisition workstation shall be provided, with 16 TB storage, 128 GB Ram and 16 GB VRAM backlit keyboard, HD webcam, and speakers		
	The system shall be supplied with a licensed offline image analysis software enabling full access to acquired data, comprehensive image analysis, and advanced image processing for both confocal and super-resolution datasets. The software shall support simultaneous offline analysis independent of image acquisition, without interrupting system operation		
B8	<u>Stage and Sample Handling Accessories</u>		
	Motorized XY stage with object guide and universal specimen holder compatible with slides, Petri dishes, glass-bottom dishes, chambered coverslips, and multi-well plates		



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	Adjustable heating stage top chamber with temperature control from ambient +3 °C to 45 °C or higher, with temperature stability of ± 0.1 °C or better		
	Cage type enclosed live-cell incubation system with temperature, CO ₂ , and humidity control, including all necessary controllers and accessories		
	Full microscope environmental enclosure and stage-top incubation system for live-cell imaging with independent control of temperature, CO ₂ , humidity, O ₂ , and N ₂ , including all required controllers, gas mixing system, regulators, tubing, adapters, and accessories for complete long term live-cell and hypoxia imaging experiments		
B9	<u>Warranty and Maintenance</u>		
	The system shall be covered by a minimum one (1) year standard manufacturer's warranty from the date of successful installation, commissioning, and acceptance, followed by two (2) years of extended warranty and after completion of extended warranty, two (2) years of Annual Maintenance Contract (AMC).		
	The cost of the extended warranty and AMC shall be included in the tender as mandatory items and shall not be quoted as optional items		
	In the event of a system breakdown, service support shall be initiated within 48 hours of complaint registration		
	Remote diagnostics and technical support shall be provided throughout the five (5)-year period		
	The bidder shall provide a minimum of two preventive maintenance visits per year and unlimited breakdown service visits during the warranty, extended warranty, and AMC periods at no additional cost		
	During the warranty and extended warranty period, all hardware, including lasers, scanners, detectors, objectives, controllers, workstations, software, and other critical system components, shall be comprehensively covered and repaired or replaced at no additional cost		
	If a critical component cannot be restored within a reasonable time, the bidder shall provide a temporary replacement/loaner of equivalent or better performance, wherever feasible, at no additional cost		
	All software, firmware, driver updates, and version upgrades released by the manufacturer during the period of 5 years shall be provided and installed at no additional cost		
B10	<u>Service, Maintenance, and Spare Parts Commitment</u>		
	The vendor shall ensure the availability of service, maintenance, and spare parts support for a minimum period of 10 years from the date of installation and commissioning of the system		



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	A commitment to this effect shall be provided by the manufacturer on the company's official letterhead and submitted along with the bid		
B11	<u>Power backup</u>		
	Suitable online UPS (minimum 6 kVA) with automatic voltage regulation (AVR) and a minimum 30-minute backup at full system load shall be provided for uninterrupted operation of the complete microscope system		
	The UPS shall be supplied with a portable enclosure/trolley with lockable castor wheels for easy and safe movement within the facility		
B12	<u>General Requirements</u>		
	100% CO ₂ , O ₂ , N ₂ gas cylinders with regulators, tubing, and all required accessories for system operation		
	Fluorescent standard slide for confocal microscopy – Mouse Fibroblast, 4-color (Nuclei (405/Blue), Peroxisomes (488/Green), Vimentin + cells (568/Red), and Stress Fibres (647/Cyan)).		
	Fluorescent standard slide for confocal microscopy – Mouse Fibroblast, 6-color (Wheat Germ Agglutinin (405/Cyan), Peroxisomes (488/Green), Microtubules (561/Magenta), Stress Fibres (640/Grey), and Nuclei (730 & 785/Blue)).		
	High-capacity dehumidifier		
	One ergonomic operator chair and two user chairs		
	Separate sturdy computer tables for the acquisition workstation and the offline analysis workstation		
	The bidder shall provide details of three (3) or more installations of the quoted or equivalent system commissioned in India, including the user/institution name and contact details, along with an after-sales service and support report for these installations		
	Comprehensive on-site user training shall be provided during installation and as required throughout the 5-year warranty/support period.		
	The bidder shall also provide technical and financial support for conducting one user workshop every two years during this period		
	About 1000 cover slips of varied thickness applicable for measurements with the microscope system and different objectives should be provided		



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Part C: Fluorescence-lifetime imaging microscopy module

1. The FLIM module shall utilize Fast FLIM, frequency-domain FLIM, or equivalent digital fluorescence lifetime acquisition technology
2. The system shall provide high temporal resolution and accurate fluorescence lifetime imaging over a wide dynamic range
3. The system shall support quantitative, pixel-wise fluorescence lifetime mapping with appropriate software for lifetime fitting, visualization, and analysis

Sr. No	Technical Specifications	Compliance (Yes/No)	Deviation if any
C1	<u>Lasers</u>		
	The system shall include an integrated pulsed excitation source for FLIM, comprising tunable pulsed laser(s) and/or fixed-wavelength pulsed laser lines at 485/488 nm and 560/561 nm		
	The excitation source shall provide picosecond and/or nanosecond pulses, synchronized with the FLIM electronics, with adjustable repetition rates, where applicable		
	The laser delivery system shall provide stable beam quality and polarization, using polarization-maintaining optical fibers or an equivalent optical delivery system, with full software integration for synchronized FLIM image acquisition and lifetime measurements		
	Laser power shall be software-controlled and adjustable for each excitation wavelength		
	The system shall permit independent selection and control of the available pulsed excitation wavelengths for multicolor FLIM applications		
C2	<u>Detectors</u>		
	The system shall have two or more high-sensitivity photon-counting detectors, based on HyD, GaAsP PMTs, SPADs, MCP-PMTs, or equivalent, with high temporal resolution, low timing jitter, high count-rate capability, and simultaneous multi-channel FLIM		
	The detectors shall provide high photon detection efficiency and low dark counts for accurate lifetime measurements, including low-intensity signals		
	The system shall support multi-channel detection for multicolor FLIM and FLIM-FRET applications		
	The system shall support fluorescence lifetime measurements over a broad temporal range with full software integration		
C3	<u>Software</u>		
	Dedicated FLIM software shall be provided for lifetime acquisition, analysis, visualization, and reporting, with support for exponential fitting, phasor analysis, FLIM-FRET, multidimensional imaging, and standard data export formats		
	The fluorescence lifetime acquisition architecture shall support hardware-based synchronization of excitation and detection to minimize cross-talk between excitation channels, enabling		



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	accurate lifetime measurements for advanced applications such as FLIM-FRET, FCCS, and related techniques		
	The FLIM software shall be fully compatible and integrated with the confocal microscope control and imaging software, enabling seamless acquisition, analysis, and management of FLIM and confocal imaging data		
	All software, firmware, driver updates, and version upgrades released by the manufacturer during the period of 5 years shall be provided and installed at no additional cost		
C4	<u>Warranty and Maintenance</u>		
	The system shall be covered by a minimum one (1) year standard manufacturer's warranty from the date of successful installation, commissioning, and acceptance, followed by two (2) years of extended warranty and after completion of extended warranty, two (2) years of Annual Maintenance Contract (AMC).		
	The cost of the extended warranty and AMC shall be included in the tender as mandatory items and shall not be quoted as optional items		
	In the event of a system breakdown, service support shall be initiated within 48 hours of complaint registration		
	Remote diagnostics and technical support shall be provided throughout the five (5)-year period		
	The bidder shall provide a minimum of two preventive maintenance visits per year and unlimited breakdown service visits during the warranty, extended warranty, and AMC periods at no additional cost		
	During the warranty and extended warranty period, all FLIM-related hardware and software, including detectors, timing/synchronization electronics, lasers, scanners, objectives, controllers, workstations, and acquisition/analysis software, shall be fully covered and repaired or replaced at no additional cost		
	If a critical component cannot be restored within a reasonable time, the bidder shall provide a temporary replacement/loaner of equivalent or better performance, wherever feasible, at no additional cost		
	All software, firmware, driver updates, and version upgrades released by the manufacturer during the period of 5 years shall be provided and installed at no additional cost		
C5	<u>Service, Maintenance, and Spare Parts Commitment</u>		
	The vendor shall ensure the availability of service, maintenance, and spare parts support for a minimum period of 10 years from the date of installation and commissioning of the system		
	A commitment to this effect shall be provided by the manufacturer on the company's official letterhead and submitted along with the bid		



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	The bidder shall provide details of three (3) or more installations of the quoted or equivalent system commissioned in India, including the user/institution name and contact details, along with an after-sales service and support report for these installations		
	Comprehensive on-site user training shall be provided during installation and as required throughout the 5-year warranty/support period.		