	INDIAN INSTITUTE OF TECHNOLOGY BOMBAY **MATERIALS MANAGEMENT DIVISION** **Powai, Mumbai 400076.**

Ref. PR No. 1000054114 **RFQ No. 3000014997**

Item Name: Wireless three-dimensional inertial measurement unit (IMU)-based motion capture system (Qty-1)

Sr. No.	Tender Specifications	Compliance (Yes/No)	Additional Information
1.	General Description: One unit of wireless three-dimensional inertial measurement unit (IMU)-based motion capture system. The system must utilize body-worn sensors secured via adjustable straps and/or specialized garments to deliver high-fidelity, real-time kinematic data. It must be designed for rapid deployment, reliable data capture without line-of- sight restrictions, and continuous tracking.		
2.	a) The wireless three-dimensional inertial measurement unit (IMU)-based motion capture system should have the following hardware specifications listed below: i. Sensor Architecture: 9 Degrees of Freedom (9-DOF) Inertial Measurement Units containing a 3-axis accelerometer, 3-axis gyroscope, and 3-axis magnetometer. ii. Kinematic Accuracy: Static and dynamic accuracy for roll, pitch, and yaw/heading must be < 1°. iii. Accelerometer Range: Dual-range or high-capacity accelerometers capable of measuring low-g and high-g impacts with a minimum dynamic range of ±16g. iv. Gyroscope Range: Minimum dynamic measuring capability of ±2000°/s to capture rapid, explosive movements. v. Magnetic Immunity: Sensors must feature built-in hardware or algorithmic immunity to ambient magnetic disturbances to ensure drift-free heading data. vi. Sampling & Output: Internal sensor sampling rate must be ≥ 1000 Hz. The processed/fused output rate for a full-body setup (17+ sensors) must be at least 60 Hz. vii. Synchronization: Ultra-low inter-tracker synchronization latency, strictly < 10		

	milliseconds, to prevent temporal phase errors in joint angle calculations. viii. Wireless Telemetry: Must support continuous, real-time wireless data transmission with an operational range between 25 meters and 50 meters. ix. Form Factor: Ultra-lightweight sensor design, strictly weighing < 20 grams per unit to avoid encumbering the subject. x. Power & Battery: Built-in rechargeable batteries delivering 8 to 12 hours of continuous operational battery life. xi. Robustness: Must be ruggedized for on-field outdoor environments, diverse weather conditions, and adaptable for subjects with mobility constraints (e.g., wheelchair users). b) The wireless three-dimensional inertial measurement unit (IMU)-based motion capture system must be supplied as a complete, ready-to-use kit for one full-body subject, including necessary backup sensors and mounting hardware, as follows: i. 18x Primary IMU Sensors (for full-body segment placement) ii. 1x Full Body Strap Set (minimum 11 individual straps) iii. 3x Specialized Mounting Garments (e.g., Lycra mounting T-shirts) iv. 1x Headband Mount & 1x Pair of Foot Patches v. 1x Pair of Gloves to mount sensors for the hands vi. 1x Wireless Receiver Station (with integrated sensor charging slots) vii. 2x Dedicated Multi-Sensor Charging Stations viii. 3x Power Adapters & 1x USB Cable ix. 1x USB Authentication Dongle (for software licensing) x. 1x Anthropometric Measurement Tape		
3.	Software specifications for data acquisition and analysis: i. Multi-Subject Tracking: Must natively support the simultaneous capture and processing of at least 4 concurrent subjects in the same environment. ii. Anatomical Modeling: Must feature a validated biomechanical model compliant with International Society of Biomechanics (ISB) standards, incorporating at least 23 body segments and 22 joints. iii. Model Demographics: Must include separate, scientifically validated biomechanical scaling models for Male,		

	Female, and General demographics. iv. 3D Kinematic Outputs: Must calculate and output continuous 3D global position, 3D velocity, 3D acceleration, 3D orientation, 3D rate of turn, and 3D rotational acceleration. v. Sensor Data Access: Software must allow direct access and visualization of raw/processed sensor data: 3D Magnetic Field, Free Acceleration, and 3D Orientation. vi. Advanced Biomechanics: Must track the 3D coordinates of the subject's Center of Mass (CoM). Must also provide scapula-humerus joint angles using at least two different Euler sequences to mathematically prevent Gimbal lock. vii. High-G Algorithm: Must utilize advanced kinematics to interpolate or calculate overall impact forces extending beyond the 16g sensor		
4.	Warranty: The entire hardware suite must be covered under a comprehensive 2-year manufacturer's warranty.		
5.	To guarantee scientific accuracy and reliability, the underlying technology must be backed by documented patents covering: i. Inertial motion tracking systems. ii. Inertial sensor kinematic coupling and skeletal constraints. iii. Wireless IMU data compression and transmission protocols. iv. Motion tracking calibration methodologies via external units. Secure wireless synchronization and communication between a master unit and sensor nodes.		
6.	Installation/demonstration, support and training should be included without additional cost.		