

Annexure I
Detailed Technical Specifications of
High-Performance Computing (HPC) System (Quantity: 4 Nos.)

Sr. No.	Item	Item Description
1.	Processor	Single Physical CPUs with x86_64 architecture, each having: <ul style="list-style-type: none"> • Single 96 cores, 384MB cache, and 192 threads per processor of the latest Generation. • Each core should have a base clock frequency of CPU 2.5GHz. • At least four memory channels supported per CPU. • Max Memory supported 1TB overclock able RDIMM should support. • Support mini 48 PCIe 5.0 lanes supported.
2.	Memory	Mini 256GB of latest DDR5 5200Mhz ECC RDIMM memory.
3.	Chipset	The latest Chipset should be compatible with the above-quoted CPU.
4.	Storage	2x 960GB NVMe M.2 for OS (RAID1) 4 x 3.84 TB SATA 2.5" SSD.
5.	Hardware RAID	SAS Gen-3 RAID card H/W Controller: The Card should support RAID 0, 1, and a minimum of 1GB or more cache should be available.
6.	Accelerator Cards	GPUs should Deliver below performance. <ul style="list-style-type: none"> • Memory 24GB DDR6 ECC or higher. • Minimum Four DP1.4a ports and should support PCIe 4.0 x16 support. • HDCP 2.2 should be supported by AV1 encode and decode support. • VR ready should be enabled and supported. • Graphic and Compute APIs should be enabled, and DirectX 12, Shader Model 6.7, OpenGL 4.6, Vulkan 1.3 and CUDA 12.2, OpenCL 3.0, and Direct Compute. • Active thermal should be available. • Simultaneous Display should support mini below or batter. • 4x 4096 x 2160 @ 120Hz, 4x 5120 x 2880 @ 60Hz, 2x 7680 x 4320 @ 60Hz • All the required cables needed to be supplied the GPU.

7.	Security & Management Features	<p>TCG 2.0 compliant</p> <p>Trusted platform module (TPM 2.0)</p> <p>Compliant embedded software</p> <p>EEPROM for TCG firmware enhancements and for user data and keys</p> <p>Hardware accelerator for SHA-1 and SHA-256</p> <p>Random Number Generator (RNG)</p> <p>Protection against Dictionary Attack</p> <p>SPI interface</p> <p>Intel Trusted Execution Technology Support (TXT)</p> <p>AMD Secure Virtual Machine Architecture Support</p> <p>Pre-Generation of RSA Keys</p> <p>Power-saving sleep mode</p> <p>3.3 V power supply</p> <p>Built-in support by Linux Kernel</p> <p>Operating temperature range: -20°C to +80°C</p>
8.	Hardware Security	<p>The hardware security feature below should be available.</p> <ul style="list-style-type: none"> • Hardware-based security feature designed to enhance system security by providing cryptographic functions and secure storage of cryptographic keys. • RSA (Rivest-Shamir-Adleman) with key lengths of 2048 bits or greater. • ECC (Elliptic Curve Cryptography) with curves specified in the TPM 2.0 specification. • SHA-256 (Secure Hash Algorithm 256-bit) or higher. • AES (Advanced Encryption Standard) with 128-bit and 256-bit keys.
9.	Expansion Slots	<p>Mini 2 PCIe 5.0 x16 and 2 PCIe 5.0 x8 Slots should be available.</p>
10.	N/W Ports	<p>The system should have a dual Gigabit Ethernet LAN port or higher.</p>
11.	HDD Bays	<p>It should support mini 4x 3.5" internal drive bays and 2x 2.5" drive bays or a higher configuration.</p>
12.	System Utility with AI Frameworks Preloaded	<p>The system should be preloaded with pre-compiled frameworks (CPU & GPU optimised MxNet, CuDNN, Caffe and PyTorch) to be supplied with the system; the license must be in the name of the Customer organisation (IIT Gandhinagar), the Datasheet of the utility must be submitted with the bid.</p>

13.	Software Stack	<p>The application should have the following features:</p> <p>Orchestration layer for managing and deployment of various services, applications, and resources to ensure that different components work together seamlessly</p> <p>Hybrid Support: to provide flexibility for managing and deploying containers (such as CPU, GPU and AI/ML-based) across different environments.</p> <p>Workload Management: to handle job scheduling and resource (such as CPU, memory, and storage) allocation appropriately.</p> <p>Version Control Integration: to integrates with Git repositories for collaboration among team members and ensures version control.</p> <p>Multi-Tenancy: Securely isolate resources for different users or teams. Each tenant (user or group) has its own dedicated space, ensuring privacy and resource separation.</p>
14.	Software Installation and Configuration	<p>The solution features a comprehensive containerisation platform providing ready-made containers for major AI tools and applications from day one, including Quantum Espresso and NAMD for applications; TensorFlow, Keras, and PyTorch for AI/ML; Gromacs, LAMMPS, NAMD, VMD, and Quantum Espresso for GPUs; and Gromacs, LAMMPS, NAMD, GAMESS, SIESTA, and AutoDOC4 for CPUs. These containers are stored in a local repository and can be updated based on requirements.</p>
15.	Operating System	<p>Latest Ubuntu</p>
16.	Power Supply	<p>Minimum 2000W Platinum Certified Multi-output Power Supply or higher should be proposed.</p>
17.	Monitor	<p>1x 27" IPS W-LED with UHD resolution 3840x2160 pixels between 40Hz – 61Hz.</p> <p>Static contrast 1200:1 with 2x HDMI 2.0, 1x DP 1.4 port and 1x 3.5mm Audio Out</p> <p>Aspect Ration 16:9, HDCP 2.2 and VESA 100x100mm</p> <p>Colour depth is 16.7 million, and features like HDR10 and Display HDR 400 should be available.</p> <p>User comfort Tilt stand minimum 5 degrees forward and 20 degrees backward.</p> <p>Features like:</p>

		<ul style="list-style-type: none"> • AMD FreeSync technology • Black Stabilizer • Flicker Free Technology • Dynamic Action Sync and HDR effect • 3-Side Virtually borderless <p>Super Resolution+ should be available.</p>
18.	Keyboard Mouse	<p>The keyboard and mouse should be from the same OEM as the proposed system.</p> <p>The datasheet for the keyboard and mouse should be attached to the proposal.</p> <p>Keyboard: Membrane-wired KB, mini 104keya and minimum 10 million keystrokes capacity. Multimedia function enabled and strong tilt legs. LED indicator and</p> <p>Mouse: 3 Button optical wired mouse (1.5meter length) with a minimum of 1.5 million clicks. USB plug-and-play with 1200DPI resolution. MTBF should be more than 15000 hours and Support Windows/Linux and MAC.</p>
19.	Ports	<p>Mini 4 USB 3.2 Gen ports should be available (2 Rear; 2 Front)</p> <p>Audio 5.1 HD Channel and 1x VGA port should be available.</p>
20.	Form factor	<p>Tower chassis equipped with necessary FAN modules.</p>
21.	Software (Cluster manager)	<p>All four systems should be configured within an HPC environment. The solution should include a job scheduler and cluster manager to manage the cluster efficiently. The vendor is expected to set up user accounts and effectively manage resource quotas. Below are features that need to be offered.</p> <p>Automatic Node Discovery: Enable automatic discovery of nodes without powering them individually. Easily replace failed nodes and bring them back online by simply powering them on.</p> <p>Resource Allocation: The job scheduler should efficiently allocate CPU, memory, and GPU resources based on job requirements.</p> <p>Customizability: The solution should be highly customisable, allowing administrators to configure policies and resource allocations tailored to specific needs.</p>

		<p>Scalability: The job scheduler must be highly scalable and capable of managing thousands of nodes in a cluster, making it suitable for large HPC environments.</p> <p>Fair Share Scheduling: The scheduler should enforce fair usage of resources among users through fair share scheduling, ensuring balanced access to the cluster.</p> <p>Quick Cluster Setup and Reliable Operation: Ensure clusters are quickly set up and maintain reliable performance throughout their lifecycle.</p> <p>Ease of Deployment and Provisioning: Simplify the cluster deployment and provisioning process.</p> <p>User-Friendly Interface: Provide a simple, web-based GUI for targeted workload management, making the system easy to use.</p> <p>Flexible Installation Options: Support various installation methods, including installation to hard disk, running in a stateless mode (diskless), and running diskless with some state.</p> <p>Dynamic Node Provisioning: Support dynamic provisioning of nodes to adapt to changing workloads.</p> <p>Job Prioritization: It should support job prioritisation, ensuring that high-priority tasks are executed first according to predefined policies.</p> <p>Fault Tolerance: It should provide fault-tolerant capabilities, automatically handling node failures and rescheduling jobs as needed.</p>
22.	<p>Regulatory Compliance</p>	Windows Certified System, certificate copy must be attached with the bid. OEM must be ISO 45001, ISO 22301, ISO/IEC 27001, ISO 14001, ISO 9001, Govt. of India E-Waste Regulation Compliance/Certificate. All certificate copies must be attached to the bid.
23.		Bidder/OEM must not be put on a holiday period or banned or debarred by any govt organisation for >3 months during last five years
24.		OEM must have an online current warranty status portal available. Details of the same must be submitted with bid.
25.		The offer must include installation, Testing, Training, and Implementation. (Installation Should be done by OEM /Bidder-certified engineers)

26.	warranty	<p>5 - Years onsite warranty</p> <p>a) Hardware: Comprehensive 05-year warranty and support with 8x5 (except for National holidays and Saturday and Sunday) support after Go-Live. Back-to-back warranty support from OEM is required. OEM undertaking in original, sealed and signed for the onsite warranty support must be submitted along with the technical bid.</p> <p>b) Software: Comprehensive 05-year warranty and support for software with 8x5 (except for National holidays and Saturday and Sunday) support after Go-Live.</p> <p><u>The system hardware should be recovered within the next business day.</u></p> <ul style="list-style-type: none"> • The warranty shall include advanced replacement for all 05 years (<u>Replacement part should be provided before removing the faulty part</u>). • A sufficient number of all such replacement parts, like Motherboard, RAM, Processor, HDD, SMPS, cables, etc. components, should be available at the nearest service centre.
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27.	<p>Service Level Agreement (SLA) Requirement:</p> <p>Priority 1 Call: The system is completely down, and business is severely impacted; the production is unusable. (covered on Saturday & Sunday & Holidays as well)</p> <p>Priority 2 Call: The system is degraded with no impact on business.</p> <table border="1" data-bbox="183 1332 1460 1971"> <thead> <tr> <th data-bbox="183 1332 327 1411">Priority</th> <th data-bbox="327 1332 566 1411">Classification of Issue</th> <th data-bbox="566 1332 805 1411">Category</th> <th data-bbox="805 1332 1125 1411">Response Time</th> <th data-bbox="1125 1332 1460 1411">Resolution Time</th> </tr> </thead> <tbody> <tr> <td data-bbox="183 1411 327 1780">1</td> <td data-bbox="327 1411 566 1780">The system is down, and business is impacted. (covered on Saturday & Sunday and Holidays)</td> <td data-bbox="566 1411 805 1780">Software, Network and Hardware (selective systems)</td> <td data-bbox="805 1411 1125 1780">Within 2 hours after the lodge of the ticket (for all cases - hardware, software, network) The ticket or docket number should be provided in the email.</td> <td data-bbox="1125 1411 1460 1780">4 days (including working and non-working and holidays) in person or remotely.</td> </tr> <tr> <td data-bbox="183 1780 327 1971">2</td> <td data-bbox="327 1780 566 1971">Intermittent issue with no business impact.</td> <td data-bbox="566 1780 805 1971"></td> <td data-bbox="805 1780 1125 1971"></td> <td data-bbox="1125 1780 1460 1971">4 days either in person or remotely</td> </tr> </tbody> </table>				Priority	Classification of Issue	Category	Response Time	Resolution Time	1	The system is down, and business is impacted. (covered on Saturday & Sunday and Holidays)	Software, Network and Hardware (selective systems)	Within 2 hours after the lodge of the ticket (for all cases - hardware, software, network) The ticket or docket number should be provided in the email.	4 days (including working and non-working and holidays) in person or remotely.	2	Intermittent issue with no business impact.			4 days either in person or remotely
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28.	Complete admin-level training (hands-on) must be provided, and the entire documentation (step-by-step) with screenshots, commands, and installation syntax must be captured and submitted to IITGN. Submitting complete documentation is an important part of project sign-off; the documentation must be prepared so that IITGN can reinstall everything from scratch without the bidder's help as and when necessary.
29.	IITGN will not provide tools and devices like laptops, cables, testing equipment, etc. The bidder shall bring all the required tools and devices and no extra cost will be borne by IITGN.
30.	Any damage to movable/immovable property while carrying out the installation/delivery/maintenance shall be rectified by the bidder, at its own cost, in a manner acceptable to IITGN, and the site must be handed back in neat and clean condition to the satisfaction of IITGN.
31.	The bidder will be responsible for any liability and safety of its engineers engaged by them for carrying out installation or maintenance work at the site under this contract. IITGN will not be responsible for any injury/loss of life to the service engineers due to their negligence or incompetency.
32.	IITGN will call the bidders for a technical presentation (virtual/physical) as part of the technical bid assessment to evaluate the bidder and their work done/expertise. The financial bids for only those bidder(s) who qualify for the technical bid evaluation will be opened.

Evaluation Criteria for the Supply of “High-Performance Computing (HPC) System”

Technical offers will have a maximum score of 30. The bidders may be called for a presentation during the technical bid assessment. To qualify technically, the bidder must score at least 22 points out of 30 (Bidder Evaluation + Technical Evaluation). The financial bids for the bidders who do not technically qualify will not be opened.

Guidelines for technical bid evaluation:

- 1) The technical Bid Evaluation comprises of three parts:
 - Bidder Evaluation- 20 points
 - Technical Evaluation - 10 points
- 2) All documents towards the Bidder evaluation and technical evaluation (physical or virtual) must be submitted along with the bid. The list of submitted documents towards evaluation must be mentioned in the Bidder, Technical, and presentation evaluation sheet and submitted along with the bid to qualify.
- 3) The technical compliance report must be duly filled, and deviations (if any) must be mentioned clearly.
- 4) Further discussions related to the awarded scores by the committee will not be entertained.
- 5) Bidders blacklisted or ever banned in the past by any Central/State Government Institutions and Autonomous Institutes or Institute of National Importance/Eminence, IISc/IITs/IISER/NITs/NISER etc need not apply. If they still apply, then their bids will be summarily rejected.

Technical Bid Evaluation

BIDDER EVALUATION - TOTAL 20 POINTS					
Sl No	Particulars	Points System	Max Points	Points Awarded	Remarks
1	How many years has the bidder been engaged in supplying HPC (as of the date of bid published date); supporting documents are to be submitted like previous POs based on which the scoring will be given.	>10 yrs 5 points > 8 yrs to ≤ 10yrs 4 points > 6 yrs to ≤ 8yrs 3 points > 4yrs to ≤ 6yrs 2 point > 2 yrs to ≤ 4yrs 1 point ≤ 2 yrs 0 point	5		
2	How many such supplies and installations were executed by the bidder in any PSU/Autonomous Bodies declared by the Govt. of India/Educational Institutions(as of the date of bid published date); supporting documents to be submitted like previous POs and Installation reports or End-User Experience Certificates based on which the scoring will be given.	>10 5 points > 8 to ≤ 10 4 points > 6 to ≤ 8 3 points > 4 to ≤ 6 3 points > 2 to ≤ 4 1 point ≤ 2 0 point	5		
3	The average annual turnover of the bidder in the last three financial years. Year 2023-2024 Year 2022-2023 Year 2021-2022	> ₹ 200 L 5 points > ₹ 160 L to ≤ 200 L 4 points > ₹ 120 L to ≤ 160 L 3 points > ₹ 80 L to ≤ 120 L 2 points > ₹ 40 L to ≤ 80 L 1 points ≤ ₹ 40 L 0 point	5		

	Audited balance sheets are to be submitted along with the technical bids.				
4	Bidder has an active support desk/manufacturing unit within a given km from IITGN.	Within 50Kms 3 Points 51-200 Kms 2 Points >200 Kms 0 Points	3		
5	OEM of the proposed solution should have a presence in India. OEM should have exclusive support stations in India for back-to-back OEM support for all hardware, wherever required.	a) Presence of OEM in India for more than three years will get 2 points b) Presence of OEM in India for 1-3 years shall get 1 point c) Less than one year will get 0 point	2		
Bidder Evaluation: Total Points Awarded			20		
TECHNICAL EVALUATION - TOTAL 10 POINTS					
1	No. of deviations cited in the Technical Compliance Sheet submitted by the bidder. Positive deviation will not be counted for Penalty.	0 10 points 1 8 points 2 6 points 3 4 points 4 2 points ≥ 5 0 point	10		
Technical Evaluation: Total Points Awarded			10		