TECHNICAL SPECIFICATION OF

PACKAGE- 8D-2

EPCC TENDER FOR AUGUMENTED REALITY, VIRTUAL REALITY, AUDIO & VISUAL WORKS FOR NALANDA UNIVERSITY LIBRARY BUILDING

1. Scope of Work

Summary of Scope of Work

This tender is invited for Engineering, Procurement and Construction (EPC) of AV , VR. AR and IT technologies for the Nalanda Library Building of approximately 16,844 sqm of built-up area at Nalanda University Main Campus at Rajgir, Bihar. The conceptual drawings and floor plans are enclosed separately for reference. The project covers design, procurement, supply, installation, integration, testing, and commissioning of:

High End Wall Size LED Display in Entrance to Display the - A live account of burning Nalanda-what we lost and present through AR+VR

Audio-visual facilities and display systems.

Library IT and digital infrastructure.

Augmented Reality(AR), & Virtual Reality(VR)

The intent is to create a modern, accessible, and sustainable library ecosystem supporting academic, research, cultural, and community functions.

General Requirements for Design and SITC of:

AR and VR in Q4 i.e. at entrance section along with portable AV for book exhibition, wall Display above reception, another display at entrance at mezzanine floor level and its visibility from entry gate of the Library Building.

All items shall conform to BIS/ISO standards and applicable local building codes.

ICT, AR, VR, and AV systems shall comply with international interoperability protocols.

Common Archelogy Resource Center-CARC Lab with its access at a point through QR code scanning system

Installation shall be turnkey including power, data cabling, network integration, training, and documentation.

Ambience lighting as per design approval

Façade Lighting as per the design approval

Digital Library Workstations - modular, wire-managed

All kinds of ICT and AV job as per the design approval

A lift for carrying books for better movability throughout the G+5 floors similar to the lift installed in library of the Indian parliament. Electronic Dumbwaiter Lift.

Information Kiosks

Touchscreen kiosks

Minimum 22” capacitive display, rugged steel enclosure.

Digital Library Stations

Ergonomic workstations with PCs with latest configuration.

Headphones, adjustable chairs, privacy partitions.

Museum & Exhibition Zone

Modular partitions, illuminated showcases, pedestals, and movable display panels.

Integrated podium, backdrop, and dias for launches.

Real-time integration

Display Boards & Signage

Digital signage + static wayfinding boards.

Fire exit, safety, and emergency displays.

Reading Zones with Charging Facilities

Lounge seating, reading lamps, charging points (AC + USB + wireless charging).

Children’s Corner

Interactive displays

Group Discussion Rooms, Recording Studio & AV Rooms

AV facilities as per the design confirmation

Audio Visual Facilities

Interactive flat panels (85”), above 4K resolution, 20-point touch.

Wireless casting, annotation tools, built-in OPS PC.

4.2 Large-format LED Screens

Indoor LED wall (P2.5/P3.0 pixel pitch) for knowledge dissemination.

Content management system integration.

4.3 AV Systems for Seminar/Discussion Rooms

Ceiling-mounted projectors (laser, min. 6000 lumens for short through and others 10,000 lumens).

Motorized projection screens.

Ceiling/wall speakers, wireless handheld/lapel mics.

Digital signal processor (DSP)-based AV controller.

Integrated Digital Signage

Centralized CMS for announcements, navigation, and schedules.

Networked LED/LCD signage displays across floors.

ICT-based Learning Solutions

Virtual classroom integration.

Recording and streaming facility.

Collaboration tools (Zoom/Teams integration).

IT & Digital Systems

OPAC Kiosks

22” touch-enabled terminals.

Dedicated Database Server Systems

Rack servers with redundant power supply.

Virtualization-enabled, scalable storage (SAN/NAS).

Backup and disaster recovery system.

Networking & Structured Cabling

Cat6A/Optical fiber backbone.

Wi-Fi 6 access points for public and staff areas.

Managed PoE switches, UPS backup.

Access Control & Surveillance Integration

AI analytical features for IP-based CCTV with VMS, central storage (90 days)

Smart card/biometric-based access control.

Fire alarm and BMS integration.

Any additional Illumination and LED Lighting confirming to the design suitability shall be included in the scope of the Contractor and it must be supported with latest automation (DALI etc.) under the supervision of the Engineer In charge. Change in the location or design and/or due to be the false ceiling, the exiting or the additional if required as per the direction of the Engineer In charge, the same shall be included in the scope of the contractor means in this tender/contract.

UPS for all AV and IT system – Rating confirming to the design and load requirements with wiring and sockets.

Centre Courtyard: Wifi and CCTV

Networking Point Near Seating Area

Wiring upto Modular charging stations with USB, Type-C, and universal sockets. The Modular charging stations with USB, Type-C, and universal sockets will be provided by the contractor. The AV System integrator has to coordinate with them, and extend the cabling job upto end IO points.

LAN and data points at desk level as per the design confirmation.

Tech desks or smart tables with integrated lighting and device stands.

ICT networking wiring for Table Near Switch Box & Data Point Fixing

Wiring Custom-built furniture with hidden compartments for cables & switches.

Use of pop-up boxes or floor boxes for power & data points.

Clearly labeled switch/data ports for IT management.

Ventilated enclosures for heat-sensitive equipment.

Managed L2 PoE switches 24 ports for IP networking and data points

24 ports PoE+ switches,

Wifi Access Points,

CAT 6A STP cables,

I/O points,

Racks,

UPS supply with wires and cables and industry grade switches

Scanner Machine if requirement confirmed by the University during the design

Dedicated scanning zone near reference desks or networking points.

Power backup and USB/Data ports.

Enclosed desk or booth for privacy while scanning.

If designed Inside Camera

Placement of indoor CCTV cameras:

Entrances, reading areas, networking points, corridors.

Pan-tilt-zoom (PTZ) cameras in large halls.

Signage indicating surveillance for privacy compliance.

Notice Boards & Info Panels

Digital signage screens for library announcements and events.

Physical pin boards or glass notice boards in key areas.

Touchscreen maps for library navigation

Digital Media Zone

Dedicated area for audiobooks, e-learning terminals, podcast stations, VR reading experiences.

Soundproof booths or headphone stations.

Adjustable lighting for screen-based work.

Book Lift - A lift for carrying books for better movability throughout the G+5 floors similar to the lift installed in library of the Indian parliament. Electronic Dumbwaiter Lift.

Conversion of exiting Lift/escalator into talking lift with necessary integration.

Head Phones in Cubical Workspace for audio listening without disturbances to the others

Approx all tother 60 Computers for study and 20 for staffs workstations can be setup in these cubicles for browsing and other works.

Façade and profile Lightings – LED and DMX controlled will be designed and required.

The Wall Size LED Display of 4K resolution would be required in book launch section.

Testing & Commissioning

Factory acceptance test (FAT) and site acceptance test (SAT).

Test cases: LMS integration, RFID transaction accuracy, AV clarity, network redundancy.

Documentation: user manuals, as-built drawings, training materials.

Training & Support

Vendor shall provide end-user and administrator training.

Onsite warranty for minimum 1 year, extendable AMC thereafter.

Remote monitoring and support portal.

Sustainability & Green Features

AV and IT systems with Energy Star-rated equipment.

Smart lighting and HVAC integration for energy efficiency.

GRIHA LD 5 Star Compliances.

It will be decided based on design confirmation by the University. However, minimum sequence of the items is tabulated herein for AR, and VR

Zone	System	Category	Item Description	Technical Specification (Indicative)	Qty	Unit	Scope	Remarks
Entrance – Left Wall	Digital Display	LR / 3D-Ready Display	Indoor LED Wall (Wall-sized)	Fine pixel pitch P1.8–P2.5, indoor, front service, seamless tiles, high brightness, wide viewing angle	1	Set	Vendor	Full-length entrance wall integration
Entrance – Left Wall	Digital Display	Control	LED Video Processor	4K processor, multi-input, redundancy support, scaling & mapping	1	No	Vendor	Central display control
Entrance – Left Wall	Digital Display	Structure	Mounting & Support Framework	Custom MS / aluminum structure with service access	1	Set	Vendor	Coordinated with civil finishes
Entrance – Left Wall	Content	LR / 3D Content	"Nalanda Burning Script" Visual Narrative	Cinematic motion content, historical storytelling, loop-based playback, AR/3D-ready assets	1	Lot	Vendor	Primary storytelling element
Entrance Area	AV System	Portable AV	Portable AV System for Exhibitions	Mobile AV rack with media player, audio interface, power distribution	1	Set	Vendor	Temporary exhibitions & events
Entrance Area	Audio	PA System	Full-Range PA Speakers	Wide-dispersion speakers suitable for indoor public spaces	6	Nos	Vendor	Even audio coverage
Entrance Area	Audio	Low Frequency	Active Subwoofers	Active subwoofer units for speech & cinematic depth	2	Nos	Vendor	Optional during events
Entrance Area	Audio	Processing	Digital Audio Processor (DSP)	EQ, delay, limiter, scene presets	1	No	Vendor	On-demand activation
Entrance Area	Control	Audio Control	Audio Control Interface	Touch / tablet-based basic control	1	No	Vendor	Non-technical operation
Entrance Area	Electrical	Power Backup	Online UPS System	5–10 kVA, minimum 30-minute backup	1	Set	Vendor	AV system protection
Entrance Area	Networking	AV Network	Managed Network Switch	AV-grade gigabit switch	1	No	Vendor	Media & control connectivity
Services	Integration	System Integration	Installation, Testing & Commissioning	Complete system integration & calibration	1	Lot	Vendor	Pre-handover
Services	Handover	Documentation & Training	As-built drawings, SOPs, staff training	1	Lot	Vendor	Operational readiness	

Zone	System	Category	Item Description	Technical Specification (Indicative)	Qty	Unit	Scope	Remarks
AR Studio	AR System	AR Hardware	AR / MR Headsets	Enterprise-grade AR/MR headsets with spatial anchoring	6	Nos	Vendor	Guided visitor experiences
AR Studio	AR System	Tracking	Spatial Tracking System	SLAM / optical tracking with fixed anchors	1	Set	Vendor	Accurate AR alignment
AR Studio	Visual System	LR Display	Laser Projection System	High-lumen laser projectors, edge-blending capable	4	Nos	Vendor	Large-scale immersive visuals
AR Studio	Visual System	3D Display	Volumetric / Holographic Display System	Projection-based holography or volumetric visuals	1	Set	Vendor	3D spatial storytelling
AR Studio	Compute	Rendering	High-Performance Render Servers	GPU-based servers for real-time AR & 3D rendering	2	Nos	Vendor	Real-time content processing
AR Studio	Audio	Immersive Audio	Surround Audio System	Multi-channel surround system with subwoofer	1	Set	Vendor	Spatial sound design
AR Studio	Control	Central Control	Integrated Control System	Unified monitoring, show control & fail-safe modes	1	Set	Vendor	Single-point operation
AR Studio	Lighting	Architectural	Scene-Based Lighting System	DMX-controlled ambient & effect lighting	1	Lot	Vendor	Mood & transitions
AR Studio	Content	3D / AR Content	Immersive Experience Content	Library, Fire & Revival chapters, cinematic quality	1	Lot	Vendor	Core storytelling assets
AR Studio	Software	AR Platform	AR Experience Software & CMS	Custom AR application with content management	1	Lot	Vendor	Scalability & updates
AR Studio	Infrastructure	Electrical	Dedicated Power & UPS	Clean power with backup	1	Set	Client / Vendor	As finalized
Services	Integration	System Integration	Installation, Calibration & Testing	End-to-end system commissioning	1	Lot	Vendor	Pre go-live
Services	Handover	Training & AMC	Operator training DLP with AMC	Training, maintenance & support	1	Lot	Vendor	Post-handover

Sl. No.	Category	Item	Unit	Qty.
1	AV/IT systems	Display units, PA systems, OPAC kiosks, servers, networking as per technical specification	Sqm	16844
2	Lighting & Electrical	Decorative & task lighting, wiring, controls. as per technical specification	Sqm	16844
3				

Design should confirm the floor wise space management master sheet.

TECHNICAL GUIDELINES AND MINIMUM FEATURES/SPECIFICATIONS FOR AUDIO VISUAL SYSTEM.

General : This guidelines are just be reference and minimum subject to confirmation of the design requirements duly approval of the Engineer In charge(EIC). The higher specification will not attract the extra cost towards the betterment and design confirmation. The vendor will be bound to design and execute subject to the confirmation and satisfaction of the EIC.

(1) DESIGN AND SITC OF HDMI TWISTED PAIR RECEIVER WITH 4k COMPATIBLE:

SITC of HDMI Twisted Pair Receiver, for receiving HDMI, control and analog audio up to 230 feet (70 meters) over a shielded CAT6 cable; Input: One CAT6 twisted pair input on RJ-45; Outputs: One HDMI and one Audio; the device shall be HDCP compliant and with EDID support WITH 4k COMPATIBLE.

The device shall receive HDMI plus control signal up to 230 feet (70 meters) over a shielded twisted pair CAT6 cable

Input: 1 x twisted pair on RJ-45

Outputs: 1 x HDMI with audio

Shall be able to accept additional RS232 and IR signals over CAT6 cable

Video standards supported: the unit shall be EDID & HDCP compliant

(2) HDMI TWISTED PAIR EXTENDER TRANSMITTER WITH 4k COMPATIBLE:

SITC of HDMI Twisted Pair Extender, Transmits HDMI and control signal up to 230 feet (70 meters) over a shielded CAT6 cable, Output: One CAT6 twisted pair output on RJ-45, Inputs: One HDMI, Supports EDID and HDCP transmission.

The device shall transmit HDMI plus control signal up to 230 feet (70 meters) over a shielded twisted pair CAT6 cable

Inputs: 1 x HDMI, WITH 4k COMPATIBLE

Output: 1 x twisted pair output on RJ-45

The device shall be capable of transmitting RS232 and IR signals over CAT6 cable

Video standards supported: the unit shall be EDID & HDCP compliant

(3) HDMI ACTIVE WALL PLATE WITH 4k COMPATIBLE

Design and SITC of HDMI active wall plate, 1 x HDMI input & 1 x CAT6 output supporting up to 230 ft. (70 meters), device should support HDCP and EDID transmission WITH 4k COMPATIBLE.

The device shall transmit HDMI plus control signal up to 70 meters over a twisted pair shielded CAT6 cable

Inputs: 1 x HDMI

Output: 1 x Twisted pair output on RJ-45

The device shall be capable of transmitting RS232 and IR signals over CAT6 cable

Video standards supported: the unit shall be EDID & HDCP compliant

(4) WIRELESS PRESENTOR SYSTEM WITH 4k COMPATIBLE

SITC of Wireless Presentation Unit of HD content using laptops, tablets, and smartphones. Compatible with Windows OS X, Apple iOS, and Android, Supports Full HD 1080p display resolutions; shall provide minimum 1 x HDMI output WITH 4k COMPATIBLE

Wireless connection for up to 50 devices

Should support collaboration features
Should support Web Browsers such as Internet Explorer, Mozilla and Chrome
Should support third party app such as Microsoft Office®, Skype®, gotomeeting®, Lync®, and webex®.
Simultaneous content display :- 4 user or higher
Supported Operating System :- Windows / Android / Mac
Should have minimum 1 x HDMI output
Should have Audio output
Should have minimum 1 x USB port

(5) HDMI SCALAR PLUS MATRIX SWITCHER – Minimum 8 video inputs, outputs - minimum 4 x video and 1 x audio WITH 4k COMPATIBLE

SITC of scalar cum matrix switcher having minimum six inputs - 4 x HDMI and 2 x CAT6, and minimum three video outputs - 2 x HDMI and 1 x CAT6, 1 x audio output. It shall support resolutions -4K. It shall support auto selection of inputs, and the device shall be EDID and HDCP compliant WITH 4k COMPATIBLE. The inputs and outputs shall be confirming to the requirements and as per the design approval by the Engineer In charge.

Input signals requirements: minimum 4 x HDMI plus minimum 2 x CAT6 inputs for accepting video over 230 feet (70 meters) over a shielded twisted pair CAT6 cable.

Output signals requirements: minimum 3 x HDMI plus minimum 1 x CAT6 output for transmitting video over 230 feet (70 meters) over a shielded twisted pair CAT6 cable.

Other ports: minimum 1 x RJ-45 based Fast Ethernet port supporting TCP/IP at 10/100Mbps or 1 x RS232 or, 1 x IR port for control

Video standards supported: the unit shall be EDID & HDCP compliant

The device shall support automatic input selection via last detected input source

Resolutions supported – minimum 4K.

(6) 1 x 8 HDMI DISTRIBUTION AMPLIFIER WITH 4k COMPATIBLE:

SITC of 1:8 Distribution Amplifier having 1 x HDMI input and minimum 8 x HDMI outputs, shall be EDID and HDCP compliant.

Input signals requirements : minimum 1 x HDMI

Output signals requirements : minimum 8 x HDMI

Video standards supported: the unit shall be EDID & HDCP compliant

(7) 1 x 4 HDMI DISTRIBUTION AMPLIFIER WITH 4k COMPATIBLE

SITC of 1:4 Distribution Amplifier having 1 x HDMI input and minimum 4 x HDMI outputs, shall be EDID and HDCP compliant.

Input signals requirements : minimum 1 x HDMI

Output signals requirements : minimum 4 x HDMI

Video standards supported: the unit shall be EDID & HDCP compliant WITH 4k COMPATIBLE.

(8) CONTROL PROCESSOR

SITC of Control Processor, with minimum ports as follows: 4 x bidirectional RS-232 serial ports, 1 x bidirectional RS-232/RS-485 serial port with hardware and software handshaking, 4 x IR/Serial ports for one-way control of external devices, 4 x Digital I/O ports, 4 x relays for controlling room functions, 1 x RJ-45 Ethernet monitoring and control, Supports 10/100/1000Base-T.

Control Processor shall have:

At least four bidirectional RS-232 serial ports.

At least one bidirectional RS-232/RS-422/RS-485 serial port.

At least four IR/Serial ports for one-way control of external devices.

At least four Digital I/O ports.

At least four relays for controlling room functions.

At least Ethernet port supporting 10/100/1000Mbps for monitoring and control.

The device shall be rack mountable.

(9) **WIRED** CONTROL PANEL

SITC of podium mountable, minimum 8-Button wired control panel for controlling various devices; it shall have - one volume control knob; minimum 3 x RS 232, 3 x Relays and 2 x IR ports, 1 x LAN, to control the devices.

A wired button control panel shall be provided for control of devices - minimum 8 buttons or more, with required no. of RS232, IR and RJ-45 based Ethernet IP Ports to control up to 1 projectors, 1 screens, 1 - 6x2 switcher, 1 annotation processor, 1 video recording device, 1 – 3 Input transmitter + receiver for (input switching) and audio system DSP as per the requirements of individual room.

However, following minimum requirement of ports shall be met:

Should have minimum 1 x Ethernet on RJ45 for monitoring and control over TCP/IP protocols, supporting minimum Fast Ethernet (10/100Mbps) speeds

Should have minimum 3 x bi-directional RS232 ports for control

Should have minimum 2 x IR ports (source/emitter ports)

Should have minimum 3 x relay ports

Should have minimum 1 x IR sensor for reading IR commands from devices

Should have minimum 8 x programmable buttons with backlighting/LED indication for various AV control functions assignments, including input selections

Should have minimum 1 x rotary dial/knob for volume control

(10) **CEILING** MOUNT DOCUMENT CAMERA

Design and SITC of UHD/4K, ceiling mounted Document Camera with minimum 14 x optical zoom — 1 x HDMI or DVI output and 1 x LAN port. DVi models shall be acceptable with external DVi to HDMI convertor interface unit or cable.

Type: 4K/above Document Camera, Ceiling mounting

Output Resolution: XGA (1024 x 768), SXGA (1280 x 1024), UXGA (1600 x 1200), WXGA (1280 x 800), HD720p, Full HD 1080p and 4K.

Frame Rate: Up to 30 fps or better with all resolutions

Zoom Capacity: Minimum 14 x optical zoom or better

Output Interfaces: 1 x HDMI preferred or 1 x DVI with DVI to HDMI cable adaptor inclusive

Protocols: Ethernet or RS-232 as either RS-232 port on 9-pin D-Sub or via RJ-45 connector

Power Supply: POE preferred or else via OEM’s adaptor

Type of mounting: ceiling mounted

(11) **TABLE** TOP MOUNTABLE DOCUMENT CAMERA

SITC of Full HD/1080p, Table Top Mountable Document Camera with minimum 14 x optical zoom — 1 x HDMI or DVI output and 1 x LAN port. DVi models shall be acceptable with external DVi to HDMI convertor interface unit or cable.

Type: Full HD/1080p Document Camera, Ceiling mounting

Output Resolution: XGA (1024 x 768), SXGA (1280 x 1024), UXGA (1600 x 1200), WXGA (1280 x 800), HD720p and Full HD 1080p

Frame Rate: Up to 30 fps or better with all resolutions

Zoom Capacity: Minimum 14 x optical zoom or better

Output Interfaces : 1 x HDMI preferred or 1 x DVI with DVI to HDMI cable adaptor inclusive

Protocols: Ethernet or RS-232 as either RS-232 port on 9-pin D-Sub or via RJ-45 connector

Power Supply: POE preferred or else via OEM’s adaptor

Type of mounting: table top, movable.

(12) **Supplying**, installation, testing and commissioning of Sleek Digital Podium built in Metallic Frame and Wooden Top with built-in 22" Interactive Panel (Electromagnetic Technology) with Motorized Tilting, Motorized Height Adjustment of the Podium as per user height, Built-in Connectivity for HDMI, USB, Power for External Laptop at the Top, Space to place CPU.

Podium touch monitor shall be compatible with Annotator hardware device.

(13) **SITC** of Desktop PC with Intel Core i7 or higher with min. 16GB of RAM DDR4, 1TB NVME SSD drive, 10/100/1000/2500 Mbps Ethernet Network Interface Card, including additional 2-port Matrox or NVidia Graphics Card with minimum 1GB dedicated Graphics RAM for providing HDMI output to switcher for projection and another HDMI output for connecting 21" LED PC monitor for local display supporting minimum resolution upto 1920x1200 and inclusive of 24" HDMI LED monitor with mounting accessories and customization for flush mounting in furniture.

It shall be supplied with Licensed Operating System Windows 11 pro or above, Licensed Microsoft Office latest version, USB wireless Keyboard, USB wireless Mouse, minimum 1 x USB2.0 spare port

(14) ULTRA SHORT THROW PROJECTOR, if required subject to the design approval.

SITC of Ultra Short Throw Projector - 3LCD Technology, minimum ANSI 6000 Lumens, 16:9 Aspect Ratio, WXGA 1280 x 720 Native Resolution, Minimum Ports - 1 x HDMI, 1 x D-Sub 15 pin VGA + 3.5 mm Audio Jack, 1 x wired (RJ-45) LAN Port or wireless connectivity for configuration, 1 x USB or 1 x RS232 for control. The projector shall be complete with mounting brackets and all such accessories for mounting including poles/rods for ceiling installation, as may be required.

Inclusive of standard or optional lens as per OEM to project on a 120” diagonal size screen.

Should support wall installation, and shall be supplied with all requisite mounting accessories such as brackets, rods and cables

Lens specification: It should permit projection on an approximately 120” diagonal projection screen. This may be a standard or optional accessory; however, cost for the same shall be inclusive.

Brightness: Minimum 6000 ANSI lumens or better

Resolution: Preferably 4K, or if 4K not available in the market then FHD (1920 x 1080) or better with 16:9 Aspect ratio

Supported Interfaces: 1 x HDMI, 1 x VGA on 15 pin, 1 x 3.5 mm audio, 1 x Wired (RJ45) or Wireless LAN for configuration, 1 x RS232 or 1 x USB for control.

(15) MINIMUM 10,000 LUMENS PROJECTOR

SITC of Laser type Projector - Minimum 10,000 ANSI Lumens, 16:9 Aspect Ratio, Resolution : UHD/4K, Minimum Ports - 1 x HDMI, 1 x D-Sub 15 pin VGA + 3.5 mm Audio Jack, 1 x HDBaseT (RJ-45) for receiving video over CAT6 or twisted pair, 1 x wired (RJ-45) LAN port or wireless connectivity for configuration; 1 x USB or 1 x RS232 for control. The projector shall be complete with mounting brackets and all such accessories for mounting including poles/rods for ceiling installation, as may be required.

Inclusive of standard or optional lens as per OEM to project on a 200".

Type of projection technology: Laser based

Should support ceiling suspended installation, and shall be supplied with all requisite mounting accessories such as brackets, rods and cables

Lens specification: It should permit projection on an approximately 200” diagonal screen; however, cost for the same shall be inclusive

For providing projection on a High Gain Material Tubular Motorized Projection screen of size approximately 200” diagonal having aspect ratio of 16:9

Brightness : Minimum 10,000 ANSI lumens or better

Resolution : UHD (4K) or better with 16:9 Aspect ratio

Supported Interface : 1 x HDMI, 1 x HDBaseT (RJ-45), 1 x VGA on 15 pin, 1 x 3.5 mm audio, 1 x Wired (RJ45) or Wireless LAN for configuration, 1 x RS232 or 1 x USB for control.

(16) Gooseneck Microphone

SITC of Gooseneck Microphone consisting of - 1 x Gooseneck Microphone with base and programmable switch; Min. Frequency Response - 80Hz - 13 KHz, Polar Pattern: Cardioid; Transducer: Condenser type; Max SPL: min. 100dB; with 3 pin XLR connectivity, complete with standard accessories.

Frequency response:	80Hz to 13 KHz
Transducer Type:	Condenser
Polar pattern:	Cardioid
Max SPL/dynamic range:	>100dB or better

(17) UHF Wireless Lapel Microphone

SITC of UHF True Diversity Wireless Microphone System consisting of - 1 x Receiver, 1 x Lapel Microphone with body pack; RF Frequency Range - as per respective OEM, however, minimum 8 or higher pre-programmed selectable channels per frequency range shall be available in the receiver; Polar Pattern : Cardioid / Hyper-cardioid / Super-cardioid; THD : <0.9% or better; RF Power : 20mW or better; S/N Ratio : >100 dB or better, PLL synthesized technology, complete with all cables and standard accessories. (All cables shall be original OEM supplied)

The wireless microphone system shall support simultaneous operation of 4 or more wireless microphones per room/area.

Diversity:	True diversity or better
Frequency response:	80Hz to 15 KHz

Radiated Transmitter Power: Min. 20mW or better

Transducer Type: Condenser

Polar pattern: Omni Directional

S/N ratio: >100dB or better

(18) UHF Wireless Head-worn Microphone

SITC of UHF True Diversity Wireless Microphone System consisting of - 1 x Receiver, 1 x Head-worn Microphone with body pack; RF Frequency Range - as per respective OEM, however, minimum 8 or higher pre-programmed selectable channels per frequency range shall be available in the receiver; Polar Pattern : Cardioid / Hyper-cardioid / Super-cardioid; THD : <0.9% or better; RF Power : 20mW or better; S/N Ratio : >100 dB or better, PLL synthesized technology, complete with all cables and standard accessories. (All cables shall be original OEM supplied).

The wireless microphone system shall support simultaneous operation of 4 or more wireless microphones per room/area.

Diversity: True diversity or better

Frequency response: 80Hz to 15 KHz

Radiated Transmitter Power: Min. 20mW or better

Transducer Type: Condenser

Polar pattern: Cardioid

S/N ratio: >100dB or better

(19) UHF Wireless Handheld Microphone

SITC of UHF True Diversity Wireless Microphone system consisting of - 1 x Receiver, 1 x Handheld Microphone with transmitter; RF Frequency Range - as per respective OEM, however, minimum 8 or higher pre-programmed selectable channels per frequency range shall be available in the receiver; Polar Pattern : Cardioid / Hyper-cardioid / Super-cardioid; THD : <0.9% or better; RF Power : 20mW or better; S/N Ratio : >100 dB or better, PLL synthesized technology, complete with all cables and standard accessories. (All cables shall be original OEM supplied).

The wireless microphone system shall support simultaneous operation of 4 or more wireless microphones per room/area.

Diversity:	True diversity or better
Frequency response:	80Hz to 15 KHz
Radiated Transmitter Power:	Min. 20mW or better
Transducer Type:	Dynamic
Polar pattern:	Cardioid
S/N ratio:	>100dB or better

(20) 12 x 8 AUDIO DSP (with AEC feature)

SITC of 12x8 DSP - Digital Matrix Processors, with 12 mic/line inputs and 8 outputs with AEC - Acoustic Echo Cancellation features.

No. of Inputs Channels: should have minimum 12 mic/line inputs

Audio Input DC Phantom Power: should have +48 VDC

Audio Output Interface: should have minimum 8 balanced/unbalanced outputs

Acoustic echo cancellation (AEC) shall be supported

Control Interface: Minimum 1 x RJ-45 based Ethernet port supporting TCP/IP at minimum 100Mbps or 1 x RS232 or 1 x USB port for control and configuration.

Gain : should have unbalanced output: -6 dB; balanced output: 0 dB

Frequency response : should be between 20 Hz to 20 kHz

THD + Noise : should have <0.01%, 20 Hz to 20 kHz

Input Impedance : should be minimum 8K ohm or better

Output Impedance : should be 210 Ohms or better

S/N or Dynamic range : should have >104 dB, 20 Hz to 20 kHz

Mounting Type : should be rack mountable

(21) SITC of 6x4 DSP - Digital Matrix Processors, with 6 mic/line inputs and 4 outputs.

No. of Inputs Channels: should have minimum 6 mic/line inputs

Audio Input DC Phantom Power: should have +48 VDC

Audio Output Interface: should have minimum 4 balanced/unbalanced outputs

Control Interface: Minimum 1 x RJ-45 based Ethernet port supporting TCP/IP at minimum 100Mbps or 1 x RS232 or 1 x USB port for control and configuration

Gain : should have unbalanced output: -6 dB; balanced output: 0 dB

Frequency response : should be between 20 Hz to 20 kHz

THD + Noise : should have <0.01%, 20 Hz to 20 kHz

Input Impedance : should be minimum 8K ohm or better

Output Impedance : should be 210 Ohms or better

S/N or Dynamic range : should have >104 dB, 20 Hz to 20 kHz

Mounting Type : should be rack mountable

(22) Ceiling Mount Speaker

SITC of full-range or 2-way minimum 4" ceiling mount loudspeaker, 4/8 ohms or 70V/100V operation, Frequency Response - 80 Hz - 19 kHz (-10dB), Power handling@70/100V : 30W or better, Sensitivity : SPL/W@1 Mtr - 86 db or better, Max SPL@1 Mtr - 100dB or better and inclusive of all mounting brackets, assemblies, hardware and standard accessories.

Frequency range (-10dB) : should be between 80 Hz to 19 kHz or better

Power Rating : minimum 30 W or better

Maximum Peak SPL @ 1m : 100dB or better

Drivers: Full range driver or 2-way - minimum 1 x 4” LF Driver & minimum 1 x 0.75” HF Driver

Coverage (conical): 100 degrees or higher

Sensitivity 1W @1m : 86dB or better

Impedance : 4/8 Ohms or 70/100V tapping operation

(23) Surface/Wall Mount Speaker (Wattage as per the design requirement)

SITC of full-range, minimum 3'' surface/wall mount loudspeaker, 4/8 ohms or 70V/100V operation, Frequency Response - 80 Hz - 19 KHz (-10dB), Power handling@70/100V : Capacity as per the design requirement or better, Sensitivity : SPL/W@1 Mtr - 84 dB SPL or better, Max SPL@1 Mtr - 100dB or better and inclusive of all mounting brackets, assemblies, hardware and standard accessories.

Frequency range (-10dB) : should be between 80 Hz to 19 kHz or better

Power Rating : Confirming to the design requirements and better

Maximum Peak SPL @ 1m : 100dB or better

Drivers: Full range driver or 2-way - minimum 1 x 3” LF Driver & minimum 1 x 0.5” HF Driver

Coverage (conical): 100 degrees or higher

Sensitivity 1W @1m : 84dB or better

Impedance : 4/8 Ohms or 70/100V tapping operation

(24) Column Loudspeaker (Rating Confirming to the design requirement and approval of EIC)

SITC of full-range 150W or better confirming to the design requirements column type left and right loudspeaker, 8 ohm impedance, frequency response : 120 Hz - 16 KHz, Sensitivity : SPL/W@1 Mtr - 85 dB SPL or better, Max SPL@1 Mtr - 100 dB or better and inclusive of all mounting brackets, assemblies, hardware and standard accessories.

Frequency range : should be between 120 Hz to 14 kHz or better

Power Rating (Average) : minimum 150 W or better confirming to the design requirements

Power Rating (Max/Peak): minimum 600 W or better confirming to the design requirements

Maximum Peak SPL @ 1m : 100dB or better confirming to the design requirements

Sensitivity 1W @ 1m : 85dB or better confirming to the design requirements

Coverage (conical): 125H x 20V degrees or better confirming to the design requirements

Driver : should be full range type or three way driver

Impedance : 8 Ohms or better confirming to the design requirements

(25) Four Channel Power Amplifier 4 x 250 W or better confirming to the design and approval of the EIC.

SITC of Class D Power Amplifier, 4 x 250 W, selectable 4/8 ohms or 70/100V operation, Power @ 70/100V: 500W or better, supporting short circuit, thermal, and under-voltage protection, 1U/2U form factor. Or the better specification confirming to the design requirements duly approved by the EIC.

Frequency Response : should be between 40 Hz to 20 KHz or better confirming to the design requirements

No. of Channels : should have minimum 4 channels

Output Power per Channel: minimum 250 Watts per channel

selectable 4/8 ohms or 70/100V operation

S/N Ratio : minimum 98dB or higher

THD 20 Hz - 20 kHz, 1 W: less than 0.4%

Channel Separation (Crosstalk) : 64dB or better

Input Impedance : minimum 20kOhms or better

Amplifier Class : Class D Amplifier

Cooling requirement : temperature level controlled fans for front to rear airflow

Protection : should have overload protection, mains under-voltage and over-voltage protection

(26) Dual Channel Power Amplifier 2 x 60 W or higher rating confirming to the design requirements

SITC of Dual Channel Class D or Class AB Power Amplifier, 2 x 60 W @ 8 ohms, Comprehensive short circuit, thermal, and under-voltage protection, 1U/2U form factor. Or higher rating confirming to the design requirements.

Frequency Response : should be between 40 Hz to 20 KHz

No. of Channel : should have minimum 2 Channels

Output Power per Channel: minimum 60 Watts per channel at 8 ohms

S/N Ratio or dynamic range : minimum 75dB or higher

Total Harmonic Distortion : less than 0.5%

Channel Separation (Crosstalk) : 60dB or better

Input Impedance : minimum 10kOhms or better

Amplifier Class: Class AB or Class D

Cooling requirement : minimum 1 fan for front to rear airflow

Protection : should have overload protection

(27) 19” Floor Standing AV Racks – 15U, 17U, 22U, 36U or any size higher rating confirming to the design requirements duly approved by EIC.

Construction shall be high strength robust aluminium extruded frame structure with ventilation slots on the sides and top & bottom covers with provision to mount 4 fans on top cover.

The thickness of the CRCA sheets used for doors and side panels shall be 1.2mm and 1mm respectively.

Front and rear open-able doors shall be provided.

The cabinet design shall be confirming to DIN 41494 or EIA 310D standards.

Top and bottom covers and side panels shall be of sheet steel and shall be powder coated.

Vertical 19” metric panel mounts and door trims shall be of sheet steel and powder coated.

The top and bottom covers shall be provided with number of 50mm and 75mm round cable knockouts for cable entry and cable knockouts shall be edge protected with rubber grommets.

Perforation - for full / split perforated doors the style should be” Honeycomb” type of perforation for maximum air circulation and stiffness.

Cabinet shall be capable of dismantling and reassembling at the site, i.e., SKD or semi-knocked-down condition.

Locks options shall be available such as slam lock - common key, unique key or a swing handle lock.

Side panels must contain slam latches for locking purpose and option of providing slam locks, if required.

Two pairs of 19” or better confirming to the design requirements Equipment mounting angles with mounting holes conforming to IEC 2973 shall be provided.

Front glass door shall be made of toughened glass, tinted with easily detachable hinges.

Two Pair of slotted vertical cable channel shall be provided at front and back for managing cables.

Lockable industrial grade castors with foot brakes.

Rack shall be supplied with 2 x 90 CFM fans at top (for 15U) and 4 x 90 CFM fans at top (for 22U and 36U).

Rack shall be supplied with equipment mounting hardware in pack of 100s such as mounting nuts and screws either 12-24 or M6 type as applicable

Rack shall be equipped with minimum 2 nos. of 8 x 5/15 Amps power supply sockets, 2 nos. of vertical cable managers and 2 no. of 19" 1U size horizontal cable managers.

Finish – cabinet shall be black or grey epoxy powder-coated of durable quality.

Product must be UL listed and certified for use in Information Technology or Communication Equipment.

EIA standard pattern design with 12-24 tapped holes (EIA-310-E compliant) or EIA standard pattern design with 3/8" (9.5mm) square punches for Cage Nuts for mounting.

Powder Coating – at least 80 Microns.

Rack sizes – 600mmW x 600mmD for 15U, 17U & 22U, 800mmW x 800mmD for 36U.

(28) Various AV Cables

Cables should meet following minimum specifications or better:

1	Microphone Cable	2 core 20 AWG shielded twisted pairs cable with individual drain wires or 20 AWG copper braided shielded cable for serial control/audio signals, non-plenum
2	Speaker Cable	14 AWG Speaker Cable in existing conduit. Two X 14 AWG conductors, High performance cable for audio signals, Non-Plenum
3	Control Cable	2 core 20 AWG shielded twisted pairs cable with individual drain wires or 20 AWG copper braided shielded cable for serial control/audio signals, non-plenum

4	HDMI Cables (1.5mtr/5ft, 5mtr/15ft, 10mtr/30ft, 15mtr/50ft, 20mtr/75ft)	Male to Male - Moulded Connector, 1080p/60 verified, Gold plated contacts
5	VGA with Audio (1.5mtr/5ft)	Male to Male VGA Cables With Audio- Moulded Connectors. VGA Cable: 15-pin HD Male to Male Moulded & Mini Stereo Audio Cable: 3.5 mm Stereo- 6' (1.5 m)
6	VGA Cable (5mtr/15ft, 10mtr/30ft)	Male to Male VGA Cables - Moulded Connectors, High performance cable designed for transmission of computer video and ID bit signals, Pin 9 is passed through from end to end, Terminated with high quality VGA moulded connectors
7	Shielded Twisted Pair Cable	24 AWG solid copper construction Shielded Twisted Pair Cable, SF/UTP design with four unshielded twisted pairs inside an overall braid and foil shield, IEEE/EIA/TIA 568.C2

(29) 24 PORT POE LAYER 2 MANAGEABLE NETWORKING SWITCH

SITC of Layer2 manageable networking switch, minimum 24 # 10/100/1000Tx ports, all ports capable of providing PoE+ as per 802.3at, switch having a PoE power budget of minimum 740 Watts, minimum 4 dedicated SFP ports.

Switch Architecture

The switch should have 24 X 10/100/1000 Base-Tx ports; all ports shall be 802.3at-compliant PoE+ capable, with the switch capable of providing minimum 370 Watts of PoE power budget.

The switch should also support PoE as per 802.3af on all ports.

Switch should have 12 Nos. 10 Base-T/100Base-Tx/1000Base-Tx auto-sensing ports complying to IEEE 802.3, IEEE 802.3at, IEEE 802.3u and 802.3ab standard, supporting half duplex mode, full duplex mode and auto-negotiation on each port.

Switch should have minimum 4 dedicated SFP ports.

The switching fabric for all the LAN ports shall be non-blocking and each port shall run at wire-speed / line-rate. Switching fabric capacity of the switch should be capable to run all the ports at line-rate.

Switch should support both IPv4 and IPv6 – Switch should support features like Neighbour Discovery, Syslog, Telnet, SSH, Web GUI, SNMP, NTP, DNS, RADIUS over IPv6

Switch should have non-blocking switching bandwidth of minimum 24Gbps.

Switch should be IPv6-Ready from Day 1

Layer 2 Features

IEEE 802.1Q VLAN tagging

802. 1Q VLAN on all ports with support for minimum 255 VLANs.

Support for minimum 8k MAC addresses.

Spanning Tree Protocol as per IEEE 802.1d.

Multiple Spanning-Tree Protocol as per IEEE 802.1s.

Rapid Spanning-Tree Protocol as per IEEE 802.1w.

Self-learning of unicast & multicast MAC addresses per switch port.

Jumbo frames up to 9000 bytes.

Link Aggregation Control Protocol (LACP) as per IEEE 802.3ad.

Security Features

Switch should support MAC Address based Filters / Access Control Lists (ACLs) on all switch ports.

Switch should support Port based Filters / ACLs.

Switch should support RADIUS and TACACS+ for access restriction and authentication.

Secure Shell (SSH) Protocol, HTTP and DoS protection.

ARP spoofing, DHCP snooping etc.

Switch should support static ARP, Proxy ARP, UDP forwarding and IP sourceguard.

Management Features

The switch should support CLI as well as web-based Management.

Switch should be SNMP manageable with support for SNMP Version 1, 2 and 3.

Switch should support all the standard MIBs (MIB-I & II).

Switch should support TELNET and SSH Version-2 for Command Line Management.

Switch should support 4 groups of embedded RMON (history, statistics, alarm and events).

Switch should support System & Event logging functions as well as forwarding of these logs to multiple syslog servers.

Switch should support on-line software reconfiguration to implement changes without rebooting. Any changes in the configuration of switches related to Layer-2 & 3 functions, VLAN, STP, Security, QoS should not require rebooting of the switch.

Switch should have comprehensive debugging features required for software & hardware fault diagnosis.

Switch should support multiple privilege levels to provide different levels of access.

Switch should support SNTP (Network Time Protocol).

Switch should support FTP/TFTP for software upgrade.

Switch support multiple configuration file & backup configuration file.

(30) WIRELESS ACCESS POINT -Wifi 7 Compatible with standalone working support

IEEE 802.11ac compliant, dual radio (2.4 GHz & 5GHz) concurrent operation

3X3 Multiple Input / Multiple Output (MIMO) access point

Internal/external antennas for 2.4Ghz & 5GHz operations

One 10/100/1000 Base-Tx auto-sensing (RJ45) PoE port

AP must have two radios (2.4GHz & 5GHz)

Maximum Associated Users: 240 (120 per radio)

Power Supply: via an 802.3at POE switch port or OEM supplied Power Injector

IEEE 802.3 10-BASE-T, IEEE 802.3u 100BASE-TX, 1000BASE-T, IEEE 802.3ab 1000BASE-T

AP must include OEM supplied mounting brackets and accessories for both mounting options such as ceiling or wall

Security:

WPA

IEEE 802.11i WPA2

RFC 2246 TLS protocol version 2.0

RFC 3280 Internet X.509 PKI certificate and CRL profile

RFC 4346 TLS protocol version 1.1/1.0

Encryption:

WEP – 64 and 128 bit, TKIP-MIC: RC4 40 bit, 104 bit and 128 bit, SSL & TLS: RC4 128-bit

PHY data rates up to 1.8Gbps per AP

Support for band steering, client load balancing, LLDP

Should support 802.1X authentication

Should support centralized configuration and management and reporting

Solution should have Bonjour Support for supporting Apple devices

Should support Wi-Fi Alliance Protected Access 1.0 (WPA) and 2.0 (WPA2)

(31) CORDED VOCAL MICROPHONE

SITC of Corded Vocal Microphone with Dynamic Neodymium Magnet microphone element, with frequency response 80Hz-16kHz, Cardioid, Super-Cardioid polar pattern or better pattern, sensitivity of min. 2.2mV/Pa or better and min. impedance 600 ohm or better including microphone stand.

Frequency response:	80Hz to 15 KHz
Transducer Type:	Dynamic
Polar pattern:	Cardioid, Super-Cardioid or better
Connection:	3-pin XLR

(32) 1x12'' OR BETTER PASSIVE LOUDSPEAKER OR HIGHER RATING CONFIRMING TO THE DESIGN REQUIREMENTS

SITC of 1x12'' or better passive loudspeaker having 70Hz - 16kHz (-10dB), Max. SPL: 126dB SPL, Coverage (H X V) 90 X 60 degree, Power handling capacity: minimum 800 Watts or better. Inclusive of all mounting brackets, assemblies, hardware and standard accessories for portable/outdoor application.

Frequency range : should be between 70 Hz to 16 kHz or better

Power handling capacity (Max/Peak) : minimum 800 W or better

Maximum Peak SPL @ 1m : 126dB or better

Sensitivity 1W @ 1m : 93dB or better

Coverage (conical): 90H x 60V degrees or better

Driver : 1 x 12'' 2-way or better

Impedance : 8 Ohms or better

(33) 1x12'' OR BETTER PASSIVE SUBWOOFER OR HIGHER RATING CONFIRMING TO THE DESIGN REQUIREMENTS

SITC of 1x12'' or better passive subwoofer having 40Hz - 200Hz (-10dB), Max SPL 123dB SPL. Max. power handling capacity of 1600 Watts with 8 Ohm impedance. Inclusive of all mounting brackets, assemblies, hardware and standard accessories for portable /outdoor application.

Frequency range : should be between 40 Hz to 200 Hz or better

Power handling capacity (Max/Peak) : minimum 1600 W or better

Maximum Peak SPL @ 1m : 123dB or better

Sensitivity 1W @ 1m : 93dB or better

Driver : 1 x 12'' or better

Impedance : 8 Ohms or better

(34) 2 x 600 W Class D Power Amplifier OR HIGHER RATING CONFIRMING TO THE DESIGN REQUIREMENTS WITH DANTE SUPPORT.

SITC of Class D Power Amplifier, 2 x 600 W, selectable 8 ohms operation, Power @ 70/100V : 450W or better, supporting short circuit, thermal, and under-voltage protection, 1U/2U form factor.

Frequency Response : should be between 40 Hz to 20 KHz or better

No. of Channels : should have minimum 2 channels

Output Power per Channel: minimum 600 Watts per channel

selectable 4/8 ohms or 70/100V operation

S/N Ratio : minimum 98dB or higher

THD 20 Hz - 20 kHz, 1 W: less than 0.4%

Channel Separation (Crosstalk) : 64dB or better

Input Impedance : minimum 20kOhms or better

Amplifier Class : Class D Amplifier

Cooling requirement : temperature level controlled fans for front to rear airflow

Protection : should have overload protection, mains under-voltage and over-voltage protection

(35) Specifications of 4K HDMI to USB Capture Device

Video Inputs (1) HDMI 2.0

Video Outputs(1) USB 3.0; supports UVC 1.1

Video Input Resolutions Up to 4096×2160p@60fps (4:4:4 10-Bit HDR)

UVC Output Resolution 4096×2160p@60/50fps and 3840×2160p@60/50fps

inputs will be output at 3840×2160p@30fps

(NV12, I420) or 1920×1080p@60fps (YUY2, P010)

For all inputs below 3840×2160p@30fps, UVC1-4K outputs will match the input resolution

Audio Inputs HDMI Embedded Audio / 3.5mm Analog Stereo Audio

Ports HDMI Input: (1) HDMI Type A Socket; Analog Stereo Input: (1) 3.5 mm TRS audio jack; USB 3.0: (1) USB Type C Socket

Environmental Temperature (Operating): 32°F (0°C) to 104°F (40°C)

Temperature (Storage): -4°F (-20°C) to 158°F (70°C)

Humidity (Operating): 10% to 90% RH (non-condensing)

Humidity (Storage): 10% to 90% RH (non-condensing)

Regulatory Compliance FCC Part 15 Class B

EN 55032

EN 55035

RoHS/REACH

EMC (Australia)

EMC (Canada)

EMC (UKCA)

(36) Specifications of Lecture Recording Camera subject to confirmation of the design and specs is minimum as listed below :

Parameter	Specification
Sensor	1/1.8" 9.17MP CMOS
Video Format	2160p: 59.94 / 50 / 29.97 / 25 1080p: 59.94 / 50 / 29.97 / 25 1080i: 59.94 / 50 720p: 59.94 / 50 / 29.97 / 25
Video Output (HD) Interface	12G-SDI / HDMI 2.0 / Ethernet / USB 3.0
Optical Zoom	30x
Digital Zoom	12x
Viewing Angle	63° (H) 35.4° (V) 72.3° (D)
Aperture	F1.6 ~ F4.8
Focal Length	6.5mm ~ 202mm
Shutter Speed	1/1 ~ 1/10,000 sec
Minimum Object Distance	1.5m (Wide/Tele)
Video S/N Ratio	> 50dB
Minimum Illumination	0.05 lux (F1.6, 50IRE, 30fps)
Focus System	Auto / Manual / Smart AF
Gain Control	Auto / Manual

White Balance	Auto / Manual
Exposure Control	Auto / Manual / Smart AE
IQ Sync	Yes
WDR	Yes
3D NR	Yes
Image Flip	Yes
Color Space	Standard / BT.2020 / REC.709
AR/VR Systems	FreeD
Tally Light	Yes
Panning Angle	+170° ~ -170°
Panning Speed	300°/sec
Tilting Angle	+90° ~ -30°
Tilting Speed	300°/sec
Preset Positions	256
HDMI / 12G-SDI	2160p59.94
IP Stream	HEVC(H.265) 4K 59.94fps H.264 1080p 59.94fps H.264 640x360 29.97fps
IP Compression	HEVC(H.265) / H.264
USB Output	H.264 4K30fps MJPEG 1080p30
USB Compression	H.264 / MJPEG
IP Protocol	RTSP / RTMP / RTMPS / MPEG-TS / SRT
PoE	PoE++ (IEEE802.3bt)
Audio Input	Line In / MIC In, Phone Jack 3.5mm x1
Audio Output	Ethernet / 12G-SDI / HDMI 2.0 / USB
Audio Compression Format	AAC / G.711 / PCM
Control Interface	RS-232 / RS-422 / Ethernet / USB 3.0/ Remote
Control Protocol	VISCA / VISCAIP / PELCO D / ONVIF / UVC
UVC	1.1
UAC	Yes

(37) Product Type: Motorized Tab-Tensioned Electric Projection Screen

Diagonal Size: 200 inches
Aspect Ratio: 16:9
Viewing Area (W x H): 174.4" x 98.0" (4430mm x 2490mm)
Gain: 1.1
Viewing Angle: 160°
Case Color: Matte White or Black

Screen Material
Material Name: CineWhite® UHD
Composition: PVC (Polyvinyl Chloride) with a smooth, matte white finish.
Features:

Tension System: A robust tab-tensioning system on both sides of the screen to ensure a perfectly flat and wrinkle-free projection surface, ideal for 4K and 8K content.

Black Borders: 2.0" (50.8mm) black masking borders on all four sides to enhance contrast and absorb projector overshoot.

Black Backing: Opaque black backing to prevent light penetration from behind the screen.

Compatibility: Optimized for Ultra HD, 4K, 8K, Active 3D, and HDR content.

Certifications: Greenguard Gold Certified for low chemical emissions.

Motor & Control System
Motor Type: Synchronous Silent Tubular Motor
Operation: Smooth, quiet, and precise operation with a stop-start function.
Power Requirement: AC 110-120V, 60Hz or AC 220-240V, 50Hz
Control Options:

Infrared (IR) Remote: Standard remote for line-of-sight control.

Radio Frequency (RF) Remote: Allows control from a distance without line-of-sight.

12V Trigger: Automatically deploys the screen when the projector is turned on and retracts it when the projector is turned off.

Wall Switch: A wired, 3-way wall switch for up, down, and stop functions.

Optional: RJ45 port for integration with third-party control systems (e.g., Crestron, AMX).

Installation & Dimensions
Case Dimensions:

Length: 190.5" (4840mm)

Width: 5.5" (140mm)

Height: 6.0" (152mm)

Mounting:

Designed for wall or ceiling installation using a sliding bracket system for easy horizontal alignment.

The tension cables are adjustable to maintain perfect flatness over time.

Weight:

Product Weight (Net): Approximately 220 lbs (100 kg)

Shipping Weight (Gross): Approximately 260 lbs (118 kg)

(38) **Specification** Sheet: 55-Inch 4K Professional Confidence Monitor with VESA mounting with suitable interior support

Display Specifications

Feature	Specification
Screen Size (Diagonal)	55" (139.7 cm)
Panel Technology	IPS (In-Plane Switching)
Resolution	4K UHD (3840 x 2160 pixels)
Aspect Ratio	16:9
Brightness	500 cd/m² (nits)
Contrast Ratio	4000:1 (Static)
Color Depth	10-bit (1.07 Billion Colors)
Viewing Angle (H/V)	178° / 178°
Response Time	8ms (Gray to Gray)
Refresh Rate	60Hz
Surface Treatment	Anti-Glare, Haze 25%
Backlight Type	Direct LED
Display Orientation	Landscape & Portrait
Expected Panel Life	50,000+ Hours
Operation Rating	24 hours / 7 days

Connectivity

Port Type	Quantity & Description

HDMI Input	2x HDMI 2.0 (HDCP 2.2 Compliant)
DisplayPort Input	1x DisplayPort 1.2a
SDI Input	1x 3G-SDI BNC
HDMI Output	1x HDMI 2.0 (Loop-through)
SDI Output	1x 3G-SDI BNC (Loop-through)
USB Port	2x USB 2.0 (for media playback & firmware)
Audio Output	1x 3.5mm Stereo Mini-Jack
External Control	1x RS-232C (In/Out), 1x RJ45 (LAN)

Mechanical & Physical

Feature	Specification
Dimensions (W x H x D)	48.9" x 28.1" x 2.5" (1241mm x 714mm x 64mm)
Bezel Width (T/L/R/B)	9.9mm / 9.9mm / 9.9mm / 11.5mm
Weight (Without Stand)	45.2 lbs (20.5 kg)
VESA Mounting Pattern	400 x 400 mm
Housing Material	Metal Chassis
Color	Matte Black

Power

Feature	Specification

Power Supply	AC 100-240V~, 50/60Hz
Power Consumption (Typ.)	125W
Power Consumption (Max)	150W
Power Consumption (Standby)	<0.5W

Special Features

- **Image Flip:** Horizontal and Vertical image flip for teleprompter applications.
- **Built-in Speakers:** 2x 10W integrated speakers.
- **On-Screen Display (OSD):** Full control over picture, color, and signal settings.
- **Key Lock:** Disables buttons to prevent accidental changes.
- **Scheduler:** On/Off scheduling for automated operation.
- **Control System Compatibility:** Compatible with major control systems via LAN and RS-232.

Environmental

Feature	Specification
Operating Temperature	0°C to 50°C (32°F to 104°F)
Operating Humidity	10% to 80% (non-condensing)

(39) **UPS**:

2x (designed rating) UPS for all AV and IT System with 30 Minutes of backup and communication port for remote monitoring – Rating confirming to the design requirement :

Uninterruptible Power Supply (UPS)

1. General Requirements

- The UPS shall be a high-efficiency, true online, double-conversion system complying with IEC/IS standards.
- Designed for 24×7 operation, suitable for IT, audio-visual, and building automation loads.
- Modular/scalable architecture preferred for future capacity expansion.
- In-built static and manual bypass for uninterrupted maintenance.

2. Capacity and Configuration

- Rated Capacity: [Specify kVA/kW as per requirement].
- Input: Single of three phase as per the design need, in case if design will be for three phase then 3-Phase, 4-wire + Earth, 415V ± 20%, 50Hz ± 5%.
- Output: 230/415V AC ± 1% (configurable single or three-phase depending on load).
- Power Factor: ≥ 0.9 lag to unity at full load.
- Efficiency: ≥ 94% in online mode, ≥ 98% in ECO mode.
- Crest Factor: 3:1 to handle high inrush IT loads.

3. Battery System

- VRLA / Lithium-ion sealed, maintenance-free batteries in a dedicated battery rack with isolator.
- Backup time: Minimum [30/60/120 minutes – as per requirement].
- Battery monitoring system with temperature and voltage sensing.
- Recharge time: < 6 hours to 90% after full discharge.

4. Electrical & Performance Features

- True online double conversion (VFI-SS-111 as per IEC 62040).
- Total Harmonic Distortion (THDi): < 5% at full load.
- Input Power Factor: ≥ 0.99 with Active Power Factor Correction (APFC).
- Voltage Regulation: ±1% for balanced load.
- Frequency Regulation: ±0.1 Hz (free-running).
- Overload Handling: 125% for 10 minutes, 150% for 1 minute.
- Short-Circuit Protection: Electronic + Fuse.
- Surge Protection: In-built SPD meeting IEC 61643-1.

5. Mechanical & Safety

- Enclosure: Powder-coated, IP20 minimum (IP31 optional).
- Cooling: Forced air cooling with intelligent fan speed control.
- Noise Level: ≤ 55 dB at 1 meter.
- Safety Standards: IEC 62040-1 / IS 16242 compliant.
- EMC Standards: IEC 62040-2 Class A.

6. Monitoring & Controls

- Digital LCD/LED display showing load %, battery %, input/output voltage, frequency, alarms.
- Communication Ports: RS-232, USB, SNMP (optional), Modbus (optional).
- Remote monitoring capability with auto-shutdown software for servers.
- Event logging and fault diagnostics.

7. Environmental

- Operating Temperature: 0°C to 42°C.
- Relative Humidity: 0–95% non-condensing.
- Altitude: Up to 1000 m without derating (higher with derating factor).

8. Accessories

- Input and output distribution panels with MCCBs.
- Battery rack/cabinet with DC isolator.
- Maintenance bypass switch mechanical and soft both.

40. Digital Signage System: Technical Specifications or higher subject to the design confirmation

Digital Signage Displays with Embedded Players and a central **Content Management Server (CMS)**.

A. Digital Signage Display Specifications (Per Unit)

These specifications apply to all display screens to be installed. The screens must have an integrated media player capable of running the specified signage software.

Feature	Minimum Requirement	Notes
Panel Type	Commercial-Grade IPS LED/LCD	Designed for long operational hours, superior to consumer-grade televisions.
Screen Sizes	To be specified per location (e.g., 32", 43", 55", 75")	Screen size will vary based on viewing distance and installation area.
Resolution	- **Up to 55"**: Full HD (1920x1080p) - **55" and above**: 4K UHD (3840x2160p)	Higher resolution is critical for larger screens to maintain text clarity.

Brightness	400 cd/m² (nits) or higher	Ensures visibility in well-lit indoor library environments.
Operating Hours	Rated for 16/7 or 24/7 continuous operation	Critical for reliability and longevity of the displays.
Orientation	Supports both Landscape and Portrait modes	Allows for flexible content design and installation.
System-on-Chip (SoC)	Powerful Quad-Core+ processor with dedicated GPU. Must be capable of smooth 4K playback and rendering HTML5 content.	Example: Samsung's SSSP (Samsung SMART Signage Platform) Tizen OS.
Embedded Software	Must include a built-in, licensed, commercial signage platform.	Example: **Samsung MagicINFO**. The platform must connect to the central CMS.
Connectivity	- 1x HDMI 2.0+ (for optional input) - 1x Gigabit Ethernet (RJ45) - Wi-Fi (802.11ac) - 2x USB 2.0+	Wired Ethernet is the required connection method for reliability.
Storage	16 GB internal storage or greater.	For caching and storing signage content locally on the display.
Bezel	Narrow or ultra-narrow bezel design	Provides a modern look and is suitable for potential video wall setups.
Warranty	3-Year On-site Commercial Warranty	Ensures support and minimizes downtime.

B. External Media Player Specifications (For Special Cases Only)

An external media player is not required for the standard deployment. This section applies only if a specific location requires a display without a compatible SoC or for running exceptionally demanding interactive content beyond the SoC's capabilities.

Feature	**Minimum Requirement**	**Notes**

Processor	Quad-Core ARM Cortex-A55 / Intel Celeron N-series or equivalent	Must be capable of smooth 4K video playback and rendering complex HTML5 content.
RAM	4 GB DDR4	Sufficient for caching content and smooth OS operation.
Storage	32 GB eMMC or SSD	Solid-state storage for reliability and fast content loading.
Operating System	Must be fully compatible with the chosen CMS software.	The OS must be stable and supported by the signage vendor.
Video Output	HDMI 2.0 with 4K@60Hz support	To match the resolution capabilities of the displays.
Connectivity	- 1x Gigabit Ethernet (RJ45) - Dual-Band Wi-Fi (802.11ac) - 2x USB 3.0	Wired Ethernet is strongly preferred for stability and faster content delivery.

C. Content Management Server (CMS) Specifications

The CMS will be the central hub for creating, scheduling, and deploying content to all displays. It must be the corresponding server software for the displays' embedded platform.

4.1. On-Premise Server Hardware

Component	Minimum Requirement	Notes
Server Type	1U or 2U Rack-mountable Server	To be installed in the library's server room.
Processor	Intel Xeon E-2300 series (4 Cores / 8 Threads) or AMD EPYC equivalent	Provides sufficient processing power for multiple users and devices.
RAM	32 GB DDR4 ECC RAM	Error-correcting code (ECC) memory for server stability.

Storage	- **OS/Application:** 2x 512 GB NVMe/SSD in RAID 1 (Mirror) - **Content:** 2x 4 TB Enterprise SATA HDD in RAID 1 (Mirror)	RAID 1 ensures data redundancy and high availability.
Network	2x 1 Gigabit Ethernet (RJ45) ports	One for network connection, one for redundancy or management.
OS	Windows Server 2022 or a stable Linux distribution (e.g., Ubuntu LTS).	The OS must be compatible with the chosen CMS software.
Power Supply	Redundant Power Supply Units (PSUs)	Prevents downtime in case of a single PSU failure.

4.2. Content Management Software (CMS)

Feature	**Requirement**
Platform Compatibility	**Must be the native server software for the displays' embedded platform (e.g., MagicINFO Server for Samsung Displays).**
Architecture	Web-based interface, accessible via a browser on the local network.
User Management	Role-based access control (e.g., Administrator, Content Manager, Viewer). LDAP/Active Directory integration is a plus.
Content Creation	- Drag-and-drop template designer. - Support for multi-zone layouts (splitting a screen into multiple regions).
Media Support	Upload and management of videos (MP4), images (JPG, PNG), documents (PDF), and web/HTML5 content.

Scheduling & Playlists	- Advanced scheduling by date, time, and day-parting. - Create and manage content playlists.
Device Management	- Group screens by location or function. - View real-time status (online/offline) of all players. - Remotely push content updates to individual screens or groups.
Monitoring & Reporting	- Health dashboard for the entire network. - Proof-of-play logging. - Email/SMS alerts for device failures.
API / Integration	A REST API for potential integration with other library systems (e.g., event calendar, room booking).

41. Audio Librray Network, hardware , system and software to ensure the audio library without any disturbances to the others, capacity confirming to the design requirements and master plan sheet.

The minimum requirements are mentioned herein subject to design confirmation and higher specifications:

i. Dedicate audio players – Raspberry PI based devices or locked down tablets
ii. Headphones over ear headphones with reinforced cords
iii. Headphone jack splitters
iv. Secure multiport USB charger
v. Audio Content Storage server
vi. Content management software
vii. Mat for protection against the charge accumulation or shock , non-slip mat etc

Etc.. as per the directives, formation and approval of the University without any extra cost.

LIST OF ACCEPTABLE MAKES / MANUFACTURERS

Sr. No.	**Item Description**	**Acceptable Make/Brand/Manufacturer or Equivalent as per the approval of Engineer In charge**
1	Video Signal Equipment – Switcher, Cable Cubby, Scalars, Extenders for HDMI, VGA, Distribution Amplifiers, Control Processor, Wired Button Panel etc.	Crestron, Extron, Kramer or Equivalent as per the approval of Engineer In charge
2	Wireless Touch Screen device for Control (iOS or Android based).	Apple, Samsung or Equivalent as per the approval of Engineer In charge
3	Lecture Recording and Streaming Device	Extron, Lumens, Mediasite, Panopto or Equivalent as per the approval of Engineer In charge

4	i) Live Streaming and VoD Application Software Platform, Hosting Solution	
	ii)Servers and Storage for Live Streaming and VoD Platform as above; OS platform and other environment such as databases etc., if any, shall be as per software application OEM requirements	Dell, HPE, Lenovo or Equivalent as per the approval of Engineer In charge
5	Wireless Presenter System	Barco, Vivitek, Crestron or Equivalent as per the approval of Engineer In charge
6	Lecture Capture Camera (AV Camera)	Lumens, Sony, Panasonic or Equivalent as per the approval of Engineer In charge
7	Document Camera – Ceiling Mounted and Desktop Mountable	Lumens, Vaddio, WolfVision or Equivalent as per the approval of Engineer In charge
8	Digital Signage Sever	HPE, Dell, IBM or Equivalent as per the approval of Engineer In charge
9	Digital Podium with 22" Interactive Panel	AHA, Tecom, UNI or Equivalent as per the approval of Engineer In charge
10	Headphones	Sennheiser, BOSE, SONY, or Equivalent as per the approval of Engineer In charge
11	Desktop PC for AV	Dell, HP, Lenovo or Equivalent as per the approval of Engineer In charge
12	Ultra Short Throw /Laser Projectors	Barco, Christie, Digital Projection or Equivalent as per the approval of Engineer In charge
13	Motorized Projection Screens	Dalite, Draper, Prima or Equivalent as per the approval of Engineer In charge
14	LED Display	Panasonic, Samsung, LG,SONY or Equivalent as per the approval of Engineer In charge

15	Wired and Wireless Microphone System including cables for wireless antenna	Beyerdynamic, Electrovoice, Sennheiser, Audio Technica or Equivalent as per the approval of Engineer In charge
16	Microphone, Speaker and Control Cable	Belden, Klotz, Kramer or Equivalent as per the approval of Engineer In charge
17	Audio DSP	Bi-amp, Bose, Audio Technica or Equivalent as per the approval of Engineer In charge
18	4" and 3" Speakers, 12" & 15" Loudspeaker and Subwoofer	Bose, Electrovoice, Tannoy or Equivalent as per the approval of Engineer In charge
19	Column Speakers	Bose, Renkus-Heinz, Tannoy or Equivalent as per the approval of Engineer In charge
20	Audio Amplifiers	Bose, Dynacord, Labgruppen, Power Soft or Equivalent as per the approval of Engineer In charge
21	AV Racks	Panduit, Rittal, Legrand or Equivalent as per the approval of Engineer In charge
22	Confidence Monitor	Samsung, LG, SONY, PANASONIC or Equivalent as per the approval of Engineer In charge
23	Video Cables (HDMI, VGA+Audio, DisplayPort DP/miniDP) and USB, Shielded CAT6 cable	Crestron, Extron, Kramer, Kanex Pro or Equivalent as per the approval of Engineer In charge
24	AV Networking Switch and AV-Wireless Access Point	Cisco, HPE, Juniper, Allied Telesis or Equivalent as per the approval of Engineer In charge
25	Mixer	Behring, Allen & Heath, Yamaha or Equivalent as per the approval of Engineer In charge

26	AV Connectors as may be required	OEM Standard or Amphenol, Neutrik or Equivalent as per the approval of Engineer In charge
27	IP CCTV	BOSCH, PANASONIC, PELCO, Axis, or Equivalent as per the approval of Engineer In charge
28	VMS – Video Management System	Genetec, Milestone, BOSCH
29	Data Cables	CommScope, Belden, Molex, or /Equivalent as per the approval of Engineer In charge
30	VMS Storage Servers	DELL, HPE, IBM/Equivalent as per the approval of Engineer In charge
31	Tab	Apple, Samsung//Equivalent as per the approval of Engineer In charge

Note: Any others make as per the approval of the EIC.