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Package 5C
AV SYSTEMS WORKS – TECHNICAL SPECIFICATION

DEVELOPMENT OF PERMANENT CAMPUS (PHASE-I) FOR NALANDA UNIVERSITY, RAJGIR, BIHAR

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TECHNICAL SPECIFICATIONS FOR AUDIO VISUAL SYSTEM

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1.1.   BOQ ITEM NO. 2

3 I/P SWITCHER PLUS TRANSMITTER WITH AUDIO EMBEDDING

SITC of 3 I/P Switcher cum Transmitter with Audio embedding; supporting video output on a cable length up to 230 ft. (70 meters) on CAT6; Input: 1 x HDMI, 1 x Display port, 1 x VGA + Audio 3.5mm; utput: 1 x HDMI, video output shall be on a single CAT6 shielded twisted pair cable; Auto switching between inputs; the device shall be HDCP compliant and with EDID support.

- Input signals requirements : Minimum 1 x HDMI, 1 x Display port, 1 x VGA on 15-pin D + 1 x unbalanced analog audio on 3.5mm connector

- Output signals requirements : 1 x RJ-45 connector for HDMI video to be transmitted over CAT6 based shielded twisted pairs cable conforming EIA/TIA568 compliant transmission

- Video transmission: shall support video transmission over CAT6 up to 230 feet (70 meters)

- Other ports: 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

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

1.2.   BOQ ITEM NO. 3

HDMI TWISTED PAIR RECEIVER

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.

- 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

1.3.   BOQ ITEM NO. 4

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HDMI TWISTED PAIR EXTENDER TRANSMITTER

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

- 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

1.4.   BOQ ITEM NO. 5

HDMI ACTIVE WALL PLATE

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.

- 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

1.5.   BOQ ITEM NO. 7

WIRELESS PRESENTOR SYSTEM

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

- Wireless connection for up to 50 devices
- Should support collaboration features
- Should support Web Browsers such as Internet Explorer, Mozilla and Chrome

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- 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

1.6. BOQ ITEM NO. 8

HDMI SCALAR PLUS MATRIX SWITCHER – Minimum 6 video inputs, outputs - minimum 3 x video and 1 x audio

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 upto 1920 x 1200. It shall support auto selection of inputs and the device shall be EDID and HDCP compliant.

- 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 2 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 up to 1920 x 1200

1.7. BOQ ITEM NO. 9

HDMI SCALAR PLUS MATRIX SWITCHER – Minimum 6 video inputs, outputs - minimum 2 x video and 1 x audio

SITC of scalar cum matrix switcher having minimum six inputs - 4 x HDMI and 2 x VGA+Audio, and minimum 2 x HDMI outputs; It shall support resolutions upto 1920 x 1200. It shall support auto selection of inputs and the device shall be EDID and HDCP compliant.

- Input signals requirements: minimum 4 x HDMI plus minimum 2 x VGA+Audio.

- Output signals requirements: minimum 2 x HDMI

- 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

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- 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 up to 1920 x 1200

1.8.   BOQ ITEM NO. 10

1 x 8 HDMI DISTRIBUTION AMPLIFIER

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

1.9.   BOQ ITEM NO. 11

1 x 4 HDMI DISTRIBUTION AMPLIFIER

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

1.10.   BOQ ITEM No. 12

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.

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- 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.

1.11. BOQ ITEM NO. 13

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

1.12. BOQ ITEM NO. 15 & 16

SPECIFICATIONS FOR VIDEO MANAGEMENT PLATFORM

OVERVIEW

The video streaming platform should provide a complete solution to upload, manage, publish and measure video content. It should be possible to broadcast live events, upload existing videos and organize & distribute videos using the video streaming platform. Devices such as iPhones, iPads, Android phones, Android tablets, Windows tablets and all leading browsers and operating systems shall be recognized and supported.

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ESSENTIAL COMPONENTS OF VIDEO MANAGEMENT PLATFORM

a.   MEDIA/VIDEO LIBRARY

The provided solution shall include online video library so as to sort, manage and organize the entire media library. It shall be possible to upload all popular formats of video, tag them, categorize them and generate a thumbnail automatically. It shall be possible to specify an expiry date so as to automatically make the video unavailable beyond a certain time frame.

b.   LIVE VIDEO STREAMING

The video platform shall provide streaming facility. It shall be capable of delivering high-quality live HD video streaming broadcasts to any device or browser besides allowing sharing of desktop presentation.

c.   VIDEO PLAYER

The video management platform shall provide intelligent video players that will automatically detect a viewing device and select the correct video type matching that viewing device. The video player shall have user-friendly features such as playlist viewing, in-player chatting or access restrictions when required. It shall be possible to provide a customized or proprietary appearance to the user interface matching the university requirements of intranet access and website. The video player shall support standard features such as volume control, full-screen playback, e-mail sharing and auto-start playback.

d.   MOBILE DEVICE SUPPORT

Via the video management platform it shall be possible to play any video on any device. Using features such as intelligent video encoding and intelligent video player, it shall allow an easy, simplified access of videos for mobile users. Whether the users are accessing the videos on a computer, at home or on the go using a mobile device(s) such as mobile phones, tablets and other smart devices, the videos shall be appropriately formatted for viewing on their respective devices.

e.   INTELLIGENT TRANSCODING

The video streaming platform shall provide intelligent transcoding thereby automatically preparing the videos for all devices. The video streaming platform should be able to automatically determine the appropriate translation into multiple types of videos for supporting a variety of viewing devices.

VIDEO MANAGEMENT PLATFORM FEATURES

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- The video platform shall allow multi-platform delivery; it shall support viewers irrespective of whatever device they may be using, e.g., desktops, smartphones/mobiles, laptops or tablets.

- The video management platform shall provide HD format viewing and adaptive streaming; it shall provide dynamic streaming capabilities to provide high quality videos depending upon the available bandwidth at that time.

- The video management platform shall provide live broadcasting; it shall be possible to broadcast live any events such as lectures, seminars, training sessions, webinars any other events such as sports or cultural which can be broadcast live or may be offered as on-demand after the live broadcast.

- The video management platform shall provide syndication capabilities for both controlled and viral syndication so as to help reach the possible broadest audience.

- The video management platform shall be able to integrate with popular global content distribution networks allowing for access to vast number of viewers.

- The video management platform shall provide efficient content management features; it shall provide for comprehensive cloud-based digital asset library management system.

- The video management platform shall support various media formats such as H.264, Flash, HTML5, QuickTime, Silverlight, and Windows Media based content delivery.

- The video management platform shall provide facilities for media publishing; the media player framework shall be able allow the users to create dynamic media players and media portals.

- The video management platform shall provide intelligent video search facilities using intelligent techniques such as semantic search to help identify relevant videos.

- The video management platform shall adequate mechanism in place for providing video security & encryption using platforms and protocols such as - AES for live video, https, ftps and sftp.

- The video management platform shall provide intelligent transcoding capabilities for the various target viewing devices such as by trans-coding or trans-rating video between protocols for both live and file based processing.

1.13. BOQ ITEM NO. 18

CEILING MOUNT DOCUMENT CAMERA

SITC of Full HD/1080p, 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: Full HD/1080p Document Camera, Ceiling mounting

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- 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: ceiling mounted

1.14. BOQ ITEM NO. 19

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.

1.15. BOQ ITEM NO. 20

SITC of 4K Video Conferencing System endpoints (codecs), capable of multi-party conferencing via the MCU; the codec shall have minimum 2 video inputs (1 x HDMI and 1 x HDMI as per OEM's camera), minimum 2 x HDMI video outputs, output resolution supported shall be minimum upto 4K, 30 fps (Tx and Rx) from 2048 kbps. Audio Inputs - 3 x IP Microphone, 1 X HDMI, 1 X 3.5mm stereo line in; Audio Outputs - 1 x HDMI, 1 x 3.5 mm stereo line out. The device shall be supplied with required licences. All components of the VC system like

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Codec, Camera, Touch panel and Microphones should be from the same OEM. The system shall be inclusive of - 1 x Codec, minimum 1 x Full HD 1920 x 1080 resolution supporting camera providing HDMI or DVi output having min. 12x optical zoom with connecting cable, 1 x Touch panel for control, Microphone array with audio connecting cable and any other cables as may be required as per OEM to make system completely functional. The codec must be based on ITU standards & hardware based and must be compatible with software based solution. It should support latest video standards H.264/H.265.

System should be scalable of enhancing video conferencing experience with advanced Speaker & face-recognition technology such that it automatically scans the room and seamlessly commands the main camera to appropriately frame the users/speaker during a call without any manual intervention.

- The MCU and Video Conferencing endpoints, camera and microphones and associated software shall be from the same OEM/vendor

- The endpoints shall support H.323, and SIP standards for communications. It should be capable to handle Soft VC calls as well.

- The endpoints shall support 4k60fps, 1080p60fps, 1080p30fps and 720p30 resolutions.

- It shall be included with a High Definition autofocus camera with automatic exposure and automatic white balance supporting up to the 1920X 1080 format, a minimum horizontal field of view of 65°, at least a 12x optical zoom and a minimum range for PAN of +/-100° and for TILT of +20°-30°.

- Camera parameters must be configurable on the VC system user interface, and in particular white balance, back light compensation, exposure compensation, focus and sharpness.

- It shall support the ITU-T standards H.263, H.264, H.264 High Profile, H.265 SVC for video and the ITU-T standards G.711, G.722, G.722.1 Annex C for narrowband, wideband and super wideband audio.

- It shall provide full band (20 kHz) audio capability and support both the ITU standard (G.719) and ISO/MPEG low delay standard.

- It shall allow to connecting multiple microphones having echo cancellation feature for each microphone.

- It must be capable of capturing high definition content from a laptop/PC/DVI source up to 1920x1080 at 30fps.

- The user should be able to define the ratio between the bandwidth used for live video and presentation.

- It must include multipoint conferencing capabilities supporting up to at least 6 parties (1+5) in continuous presence and support for dual video while in a multipoint session.

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- It must support embedded AES confidentiality for both room video channel and content video channel simultaneously.

- It must provide security tools for authentication and integrity (for SIP, HTTP Digest MD5 is required; for H.323, H.235 MD5 and HH.235 Annex D procedure I/IA are required).

- It must provide simultaneous support for IPv4 and IPv6, and tools for QoS.

- Minimum 1 x RJ-45 LAN network port for private network connection must be available.

- It must provide support for LDAP/H.350 directory services with an embedded LDAP server for local users and LDAP client for accessing remote LDAP/H.350 servers.

- It must have a WEB interface for management.

- It must provide the network administrator management tools to control and administer conferences.

- It must have an API command set.

- It must support H.460.18/.19 Firewall Traversal.

- Audio I/O interface of the VC Room System must support both Digital and Analog.

- Administrator tools such as for Remote Management of the GUI, TCP Dump shall be possible.

- Codec shall have minimum 2 video inputs (1 x HDMI and 1 x HDMI/DVi as per OEM's camera), minimum 2 x HDMI video outputs, output resolution supported shall be minimum upto 1920 x 1080p at 30fps. Audio Inputs - Digital Microphone pod x 1, RCA Stereo x 1; Audio Outputs - 1 x HDMI embedded, Stereo x 1, RCA x 1.

- It shall include one Full HD 1920 x 1080 resolution supporting camera providing HDMI or DVi output and having min. 10x zoom

- It shall include one microphone pod providing 360 degree omni-directional coverage and shall be supplied with OEM audio cable.

1.16. BOQ ITEM NO. 20A

Hybrid VC system able to call over IP and soft VC with integrated camera and speakers and a touch panel to accommodate call dialling and other features, should have minimum 2 stereo speakers, minimum 5x camera zoom with external mic support. Should have Aux In and Aux Out.

- The VC should support H.264 AVC, H.264 High Profile, H.265

- The Video Conferencing endpoints, camera and microphones and associated

   software shall be from the same OEM/vendor.

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- Video input X 1 HDMI, Video output X 2 HDMI minimum should be touch display compatible,

- Video Resolution must be 4k, 30 fps minimum.

- Content video resolution, input and output must be UHD (3840 x 2160)

- Content sharing must be from Airplay, Miracast, HDMI Input and Digital Whiteboarding.

- Camera must be with 5X digital zoom, 120 degree FOV, with Group framing and speaker tracking.

- Must support 3XMEMS Mics, 1XHDMI, 1x3.5 mm line in. Mic minimum pickup range must be 25 ft.

- Must have stereo speakers and 1X3.5 mm line out.

- VC System must be Zoom Certified, MS Teams certified. Must have USB device mode.

- Must have the support for native 3rd party apps including Zoom, MS Teams, 8X8, GotoRoom, Ring Central and Star Leaf.

1.17.   BOQ ITEM NO. 22

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.

1.18.   BOQ ITEM NO. 23

SITC of Desktop PC with Intel Core i7 or higher with min. 8GB of RAM DDR4, 1TB SATA II hard drive, 10/100/1000 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 21" HDMI LED monitor with mounting accessories and customization for flush mounting in furniture.

It shall be supplied with Licensed Operating System Windows 10 or above, Licensed Microsoft Office latest version, USB wireless Keyboard, USB wireless Mouse, minimum 1 x USB2.0 spare port

1.19.   BOQ ITEM NO. 24

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ULTRA SHORT THROW PROJECTOR

SITC of Ultra Short Throw Projector - Minimum ANSI 5000 Lumens, 16:9 Aspect Ratio, 1080 display Resolution, Minimum Ports - 3 x HDMI, 1 X HDBaseT, 1 X RCA composite, 1 X HDMI Out, 3 X Stereo Mini In, 1 X Mini out, 1 x D-Sub 15 pin VGA, 1 x wired (RJ-45) LAN Port, 2 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 106" diagonal screen(Tab tensioned with short throw projectors).

- Type of projection technology: 3LCD

- 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 106" diagonal projection screen. This may be a standard or optional accessory; however, cost for the same shall be inclusive.

- Brightness: Minimum 5000 ANSI lumens or better

- Resolution: 1080 or better with 16:9 Aspect ratio

- Supported Interfaces: 3 x HDMI, 1 X HDBaseT, 1 X RCA composite, 1 X HDMI Out, 3 X Stereo Mini In, 1 X Mini out, 1 x D-Sub 15 pin VGA, 1 x wired (RJ-45) LAN Port, 2 x USB or 1 x RS232 for control.

1.20.   BOQ ITEM NO. 25

6000 LUMENS PROJECTOR

SITC of Laser type Projector - 1-Chip DLP Technology, minimum 6,000 ANSI Lumens, 16:9 Aspect Ratio, Resolution : Full HD 1920 x 1080, 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 150" diagonal (3320mm W x 1868mm H) size screen from a throw distance of not more than 4000mm from the screen.

- Type of projection technology: 1-chip DLP, Laser based

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

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- Lens specification: It should permit projection on an approximately 150" diagonal screen from a throw distance of not more than 4000mm from the screen. Lens may be a standard or optional accessory; however, cost for the same shall be inclusive

- For providing projection on a High Gain Material Tubular Motorized Projection screen of size approximately 150" diagonal (3320mm W x 1868mm H, 3810mm diagonal approx.) having aspect ratio of 16:9

- Brightness : Minimum 6000 ANSI lumens or better

- Resolution : WUXGA (1920 x 1200) 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.

1.21. **BOQ ITEM NO. 25A**

SITC of Laser type Projector - 1-Chip DLP Technology, minimum 15,000 ANSI Lumens,16:10 Aspect Ratio, Resolution : WUXGA 1920x1200, 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 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. Auto keystone correction: Yes; Quick corner: Yes; Contrast ratio: 2,40,000x1 or better

Inclusive of standard or optional lens as per OEM to project on a 226" diagonal size screen.

- Type of projection technology: 1-chip DLP, 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 226" diagonal screen.

- For providing projection on a High Gain Material Tubular Motorized Projection screen of size approximately 226" diagonal having aspect ratio of 16:9

- Brightness : Minimum 15000 ANSI lumens or better

- Resolution : WUXGA (1920 x 1200) or better with 16:9 Aspect ratio

- Supported Interface : 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 twisted pair, 1 x wired (RJ-45) LAN port or wireless connectivity for configuration; 1 x USB or 1 x RS232 for control.

AV SYSTEMS WORKS – TECHNICAL SPECIFICATION

DEVELOPMENT OF PERMANENT CAMPUS (PHASE-I) FOR NALANDA UNIVERSITY, RAJGIR, BIHAR

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1.22.   BOQ ITEM NO. 33

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

1.23.   BOQ ITEM NO. 34

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

1.24.   BOQ ITEM NO. 35

UHF Wireless Head-worn Microphone

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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

1.25.   BOQ ITEM NO. 36

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

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- S/N ratio: >100dB or better

1.26.   BOQ ITEM NO. 44

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

1.27.   BOQ ITEM NO.45

6 x 4 AUDIO DSP

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

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- 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

1.28. BOQ ITEM NO. 46

30W 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

1.29. BOQ ITEM NO. 47

30W Surface/Wall Mount Speaker

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 : 30W or better, Sensitivity : SPL/W@1 Mtr - 84 dB SPL or

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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 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

1.30.   BOQ ITEM NO. 48

150W Column Loudspeaker

SITC of full-range 150W or better 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

- Power Rating (Max/Peak): minimum 600 W or better

- Maximum Peak SPL @ 1m : 100dB or better

- Sensitivity 1W @ 1m : 85dB or better

- Coverage (conical):   125H x 20V degrees or better

- Driver : should be full range type or three way driver

- Impedance : 8 Ohms or better

1.31.   BOQ ITEM NO. 49

Four Channel Power Amplifier 4 x 250 W

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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.

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

- 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

1.32. BOQ ITEM NO. 50

Dual Channel Power Amplifier 2 x 60 W

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.

- 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

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- Cooling requirement : minimum 1 fan for front to rear airflow

- Protection : should have overload protection

1.33. BOQ ITEM NO. 51, 52, 53

19" Floor Standing AV Racks – 15U, 22U, 36U

- 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" 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.

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- 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 & 22U, 800mmW x 800mmD for 36U.

1.34. BOQ ITEM NO. 54

Fully Digital Conference Control Unit (minimum 30 units)

SITC of Fully digital Main/Central Conference Controller. Unit should be able to control and power 30 units or more, should have LED/LCD display for necessary controls and configuring the system, min. 6 or better open microphone support, daisy chain connectivity through CAT6 shielded cable via RJ-45 or OEM-specific cable via OEM-specific socket. OEM-specific cable shall be inclusive.

- Frequency Response: should be between 100 Hz to 14 KHz or better

- S/N Ratio or dynamic range: minimum 80dB or higher

- Capacity: device should provide control and power for minimum 30 or higher number of chairman and delegate units

- Conference recording: should support recording via USB port or SD card or external device

- Connectivity: system should support ring/daisy chain connectivity

- Configuration ports: RS 232 or RJ 45 connectivity for system configuration

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1.35.   BOQ ITEM NO. 55

Fully Digital Chairman Unit

SITC of Fully Digital Chairman Unit - Table Top/Flush Mounted, inclusive of pluggable/fixed unidirectional microphone minimum approx. 12" (300mm) stem length, press-to-talk key, in-built speaker, should have 2 buttons – one for Mic on/off and one for Priority, and RJ45 socket or OEM specific standard connectivity

- Loud Speaker: integrated loud speaker

- Buttons: 2 buttons – one for Mic ON/OFF and one for priority

- Microphone: Pluggable / Fixed unidirectional 12'' Microphone

- Frequency response: should be between 80Hz to 15 KHz

- Transducer Type: Condenser / Dynamic

- Polar pattern: Cardioid / Super Cardioid

- S/N ratio: >60dB or better

1.36.   BOQ ITEM NO. 56

Fully Digital Delegate Unit

SITC of Fully Digital Delegate Unit - Table Top/Flush Mounted, inclusive of pluggable/fixed unidirectional microphone minimum approx. 12" (300mm) stem length, press-to-talk key, in-built speaker, should have 1 microphone button, and RJ45 socket or OEM specific standard connectivity.

- Loud Speaker: integrated loud speaker

- Buttons: 1 button – for microphone

- Microphone: Pluggable / Fixed unidirectional 12'' Microphone

- Frequency response: should be between 80Hz to 15 KHz

- Transducer Type: Condenser / Dynamic

- Polar pattern: Cardioid / Super Cardioid

- S/N ratio: >60dB or better

1.37.   BOQ ITEM NO. 41, 42, 43 & 57 THRU 66

AV SYSTEMS WORKS – TECHNICAL SPECIFICATION

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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

1.38.   BOQ ITEM NO. 69

12 PORT POE LAYER 2 MANAGEABLE NETWORKING SWITCH

SITC of Layer2 manageable networking switch, minimum 12 # 10/100/1000Tx ports, all ports capable of providing PoE+ as per 802.3at, switch having a PoE power budget of minimum 350 Watts, minimum 2 dedicated SFP ports.

Switch Architecture

- The switch should have 12 X 10/100/1000 Base-Tx ports; all ports shall be 802.3at-compliant PoE+ capable, with the switch capable of providing minimum 120 Watts of PoE power budget.

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

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- 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 2 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 have forwarding rate of minimum 14Mpps.

- 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.

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- 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.

1.39.   **BOQ ITEM NO. 70**

WIRELESS ACCESS POINT

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SITC of Layer2 manageable networking switch, minimum 12 # 10/100/1000Tx ports, all ports capable of providing PoE+ as per 802.3at, switch having a PoE power budget of minimum 350 Watts, minimum 2 dedicated SFP ports.

- 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

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

1.40. BOQ ITEM NO. 71

32 CHANNEL AUDIO MIXER

SITC of min. 32 Channel high performance Audio Mixer unit with 16 Mic/Line + 8 Mic/Stereo Line Channels, 4 x AUX, USB-Audio Interface, with integrated digital FX processors and Dual Graphic-EQ's, low noise and low distortion discrete microphone preamps built-in, Group-switch-able +48V phantom power, AES in and out, Delay on inputs and outputs,

- No. of Channels: Should have Min 32 channel

- Inputs : 16 Mic / Line + 8 Mic / Stereo Line Channels, 4 x AUX

- Frequency response : Should have 20 Hz to 20 kHz

- THD + Noise : Should have <0.1%, @ 1 KHz

- USB-Audio Interface with integrated digital FX processors and Dual Graphic-EQ's.

- Shall have built in low noise and low distortion discrete microphone preamps.

1.41. BOQ ITEM NO. 72

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

1.42. BOQ ITEM NO. 73

1x12" OR BETTER PASSIVE LOUDSPEAKER

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.

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- 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

1.43. BOQ ITEM NO. 74

1x12" OR BETTER PASSIVE SUBWOOFER

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

1.44. BOQ ITEM NO. 75
2 x 600 W Class D Power Amplifier

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

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- 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

1.45.   BOQ ITEM NO. 76

Smart Lesson Capture & Faculty Development/Reflection System for 40 seater classroom
a) Lesson Observation, Feedback with 360-degree Camera
b) Lesson Audio Recording Microphone.
c) Smart & Intelligent Lesson Capture Recording System.
d) Smart & Intelligent Lesson Capture System Solution Software.
e) Teacher/Instructor Learning & Development Digital Online Training.
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.

Others Smart Lesson Capture & Faculty Development/Reflection System for 300/100/60/50 seater classroom hall or mini auditorium type lecture hall.

a) Lesson Observation, Feedback with 360-degree Camera
b) Lesson Audio Recording Microphone.
c) Smart & Intelligent Lesson Capture Recording System.
d) Smart & Intelligent Lesson Capture System Solution Software.
e) Teacher/Instructor Learning & Development Digital Online Training.
SITC of Class D Power Amplifier, , selectable 8 ohms or suitable during the design approval operation, Power @ 70/100V : 450W or better, supporting short circuit, thermal, and under-voltage protection, 1U/2U form factor.

(A) Lesson Observation, Feedback with 360-degree Camera				
Sr. No.	Parameter	Detailed Specification		
1	Field of View	180+-degree Surface 2D, complete classroom captured from single ceiling mounted camera recording the entire classroom scene with no blind spots.		

Package 5C
AV SYSTEMS WORKS – TECHNICAL SPECIFICATION

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2	V Cams	Optional de warped virtual views as separate video stream direct from camera.		
3	Technology	Digital Technology		
4	Video resolution	Minimum 3200 x 3000		
5	Frame rate	Minimum 10 fps		
6	Video Compression	H.264		
7	Mount	Multiple ceiling mounting options including: Surface mount, discreet flush concealed mount and hanging pendant mount.		
8	Motion Recording	Provide recording triggers based on motion in the scene. Including polygonal motion regions.		
9	Privacy Regions	Facilitate admin specified privacy regions which are not recorded or streamed.		
10	Power	<10 W supported		
11	Image Features	1. Automatic white balance (AWB): 2,500K to 8,000K		
		2. Wide Dynamic Range (WDR): Electronic WDR 60dB		
		3. Brightness		
		4. Sharpness		
		5. Contrast		
		6. Saturation		
		7. Exposure compensation		
12	Robustness	Fixed, precision factory-focused, thermally stable optical system.		
13	Vandal Resistance	Optional vandal resistant dome		
14	Multiple Purposes of the Cameras	It shall be possible for the camera to generate minimum two streams which can be separately used for general surveillance software and Lesson Capture system software		
15	Warranty	Comprehensive warranty for 3 years		
16	Certifications	IEEE802.3af, CE, AS/NZS CISPR 22:2009+A1:2010, CISPR 24:2010 (Class A), FCC, ICES-003, KCC, CU, RCM, SASO UL 60950-1(ed.2) & CAN/CSA C22.2 No. 60950-1-07, RoHS, REACh		

(B) Lesson Audio Recording Microphone				
Sr. No.	Parameter	Detailed Specification		
1	Type	Studio-grade boundary microphone		
2	Transmission mode	Cable		
3	Polar Pattern	Semi Cardioid		
4	Audio Freq mode	30-20000 Hz		

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5	SPL	Support up to 140 dB		
6	Power Input	48 VDC, phantom power		
7	Sensitivity	22mV/Pa		
8	Cable Length	6 m		
9	Warranty	Comprehensive warranty for three years		
10	Mounting	Wall or desk mounting.		

C) Smart & Intelligent Lesson Capture Recording System.				
Sr.No.	Parameter	Detailed Specification		
1	Smart IOT	Status reporting of equipment to cloud including connected devices and their status, internal temperature, network status.		
		Remote control and system management including passwords, system updates, camera power control.		
		Single unit plug and play solution.		
2	Networking	DHCP Client or Manual configuration for the system connection to the School network.		
		Auto network configuration of camera network settings including DHCP Router.		
3	Security	Advanced internal physical firewall protection to prevent unauthorized access to camera and recordings.		
		Limit network access to video to specific source endpoints.		
4	Asset tracking	Automatic Reporting of MAC address of connected devices.		
5	Camera Connection	Power over Ethernet supply to camera, power and network to camera provided on single cable. IEEE standard 802.3af		
6	Power	DC 12-48 V power.		
7	Audio Pre-Amplifier	+48 V Phantom power for condensing boundary microphone		
		Microphone gain control		
		Microphone Input XLR		
8	Audio encoding	PCM audio, minimum sample rate 22050/s, AAC codec, minimum 16kbps		
9	Recording Video	Capture and record video from the camera 24/7		
10	Recording Audio	Capture and record audio 24/7 from the microphone		
11	Storage	Provide storage for a minimum 4 weeks continuous recording of school day. 2TB HDD per camera		

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12	Encryption	Encryption of all recorded video and audio to PyCrypto, AES-256 (32-byte key)		
13	Secure communication	All user interactions, login and video communication are sent over https with SSL and encryption.		
14	Physical Security	Facilitate physical security of recorded content.		
15	Certifications	CE, FCC/CFR 47, ICES-003, IEC 60950-1(ed.2), IEC 60950-1(ed.2); am1, IEC 60950-1(ed.2); am2, CAN/CSA C22.2 No. 60950-1-07, RoHS, Reach		
16	Warranty	Comprehensive warranty for three years		
17	System software features	Remote management and software updates		
		Continuous uninterrupted recording of video and audio		
		Automatic encryption of recorded video and audio		
		Seamless communication with cloud infrastructure		
		Secure Encrypted Transfer of recorded video to cloud storage		
		Local Live stream of video and audio		
		Local archive video access		
		Accessible from any point on the same school network.		
		Software provided by same solution as cloud service.		
18	Cloud infrastructure	System will seamlessly communicate with Smart & Intelligent Lesson Capture Cloud		
		Seamless video viewing whether video is in cloud or local, same user interface, experience, login and features.		
		Provision for 2 hours of video stored in the cloud per classroom at any time		
		Provision for 2 hours of viewing from cloud per classroom per month		
		Optional additional cloud storage and viewing available with additional charges		

d) Smart & Intelligent Lesson Capture System Solution Software.				
Sr. No.	Parameter	Detailed Specification		
1	Application Usability	Web browser delivered SAAS user software		
		No requirement for installed software on user's PC		
2	Management	Remote automated management and software updates		

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		Secure user management and authentication		
3	Cloud Capabilities	Support Local and Cloud Live camera streaming		
		Support Local and Cloud recorded video access		
		User-selective moving of video clips to cloud storage and sharing		
		Support optional provision of additional cloud storage to facilitate long-term or larger-scale lesson storage and sharing. At additional charge.		
4	Access Management	Users can access multiple organization from a single login		
5	Teacher Calendar Management	Users/Teachers provided with a calendar view, highlighting lessons they have or will have access to, clips they have created or been shared. They can use this calendar interface to access video from a specific time and day.		
6	User Based Camera Management	Smart scrubber for video interrogation including zooming		
		Role based permissions structure		
		Restricted Camera Access based on users' predefined timeslots with 1-minute granularity		
		Allocate single or recurring camera access timeslots retrospectively or in advance		
		User can request and have approved via the system timeslots to access specific cameras		
		Access recorded video directly from user friendly calendar showing video access slots		
		Comprehensive classroom recording schedule management		
		Secure user-based camera management		
		Automatic camera password management		
7	Activity Tracking & Management	Email notifications of assigned camera access		
		System alert emails		
		Full user activity auditing and tracking		
		Granular auditing of user activity on videos including, zooming and video position, play, pause and seek events		
8	Clip Creation & Management	Create and save clips of video		
9		Store and organize clips in customizable folders and folder tree		
		Advanced sharing options of clips and folders to internal and external users, via the local gateway or via the cloud (by permission only)		

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		Seamless optional synchronization of clips and folders to the cloud by available permissions only		
		Creating and sharing of clips all facilitated within the system without external export of content, to maintain security.		
		Ability to remove a user's access to clips retrospectively.		
		When creating a clip the user can zoom and change their view from the camera and this moving view is shared with the viewer of a clip to facilitate following a teacher or student round the room. The viewer can still look around the full scene if they choose.		
		Share comments in clips and collaborate with other users		
10	Camera Viewing	View camera from multiple views simultaneously, such as zoomed in on two separate students		
		Store predefined views and groups of views for recall and sharing		
		View multiple cameras and classrooms simultaneously		
		Dynamic user interface supporting traditional and touch displays and full screen viewing modes		
11	Record and produce graphical outputs of moments	While reviewing live or recorded lessons, manually create and record moments against the timeline of the lesson.		
		Provide search for moments and display moments against a section of recorded video, link from moment to the video for easy review of the event.		
		When creating moments, choose from specified list of key moments specified by the teacher development methodology as described in the Training and Development section. Add specific text as needed.		
		Or create basic moments with user generated comments		
		Produce smart dynamic graphical output of those manually created moments to aid in the reflection and assessment of the lesson and the teacher's progress. Output to be as required by the methodology as described in the Training and Development section.		

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12	Enhancing teacher's smart development & professional growth	Strengthening teachers 'capabilities for implementing Smart Education. These centres around lesson observation, self-reflection and peer review of the dynamic learning environment. This should be implemented in three below mentioned ways		
		Step 1: Machine generated smart reports on basic activity levels of the lesson. These reports shall be audio and motion histograms showing volume of audio and intensity of video motion on the timeline only.		
		Step 2: Self-reflection, review and recording of the lesson environment using the creation of key moments in line with the Training Methodology. Creating and reviewing this metadata via the graphical timeline outputs along with the outputs from step 1 allows for self and coach review of the lesson and teacher improvement.		
		Step 3: It shall be possible to share, videos and graphical metadata with internal or external coaches / mentors for teacher training and development.		

E) Faculty /Instructor Learning & Development Digital Online Training.

Sr. No.	Parameter	Detailed Specification		
1	Online Accessibility	Training content should be provided online and accessed and administered via secure administrator and user IDs and passwords		
2	Multi-platform access	Training provided with multi-platform accessibility to all courses and content		
3	System Setup Guidance	Online training to provide comprehensive setup, configuration and user guidance manual for the lesson capture system administrator		
4	System Usage Guidance	Online training to provide comprehensive instruction and guidance for teacher users on how to use the lesson capture system to record, review, share and interrogate the captured classroom video		
5	Learning Management	Online training courses provided via a learning management system facilitating user invitation or allocation, saved progress and staged progression.		

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		The system shall present reports in such a way that senior leaders in the schools could track the progress of their teachers doing the courses and training. For example a Principal at a school or HOD at a college could be set up as a "team leader" and then supervise their teachers/ instructor/professors progress through the course.		
6	Teacher Development, Self-reflection training.	Online training courses for teacher users on how to review, reflect and notice and record critically important moments from the video of the classroom. Advice for teachers and coaches/mentors on how to analyse and reflect on the data produced.		
7	Academic Credibility	Teacher development, training and progress monitoring course and methodology, based on evidence from recent academic research and recent educational published literature.		
8	Peer Credibility	Methodology being used will have established examples by other institutes of repute globally.		
9	Integration	Teacher development training, to be fully bespoke and relevant to the Smart & Intelligent Lesson Capture System including best usage of the features of the system to achieve improvement.		
10	External mentorship and coaching	External mentors trained in the methodology shall be available for hire for such services at separate & additional cost. It is beyond the scope of this tender.		
11	Additional training and development	Additional training courses and coaching shall be available at separate & additional cost to develop further usage and skills within the methodology for more advanced teachers, heads of department or internal teacher trainers.		

Please note that the if the specification of few items are not mentioned herein then the BOQ, SOQ and product specification duly approved by the University will be supplied by the SI without any consent from the SI.