



Training Institute

GOVERNMENT OF NATIONAL CAPITAL TERRITORY OF DELHI
GOVERNMENT INDUSTRIAL TRAINING INSTITUTE
S BLOCK INDUSTRIAL AREA, MANGOLPURI,
NEW DELHI-110083

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Azadi Ka
Amrit Mahotsav

No. F.4(9)/ITIMGP/Pur/Upgradation IOT Eletronics /2026-27/234

Dated : 10/07/26.

OFFICE ORDER

In pursuance of the proposal for the upgradation of the **Internet of Things (IoT), Technician Power Electronics Systems (TPES) and Electronics Laboratories** at Government ITI Mangolpuri, a Technical/Survey Committee is hereby constituted to assess the existing infrastructure and prepare a comprehensive proposal with a list of Tools & Equipoments for the upgradation of laboratories in line with the latest industry requirements and Industry 4.0 technologies. The committee shall comprise the following members:

- a) Sh Rajiv Saini, GI, ITI Mangolpuri (Chairperson)
- b) Sh. Suresh Kalra OGI
- c) Sh Ravi Prasad (C.I. IOT)
- d) Ms Meenakshi (CI DMC)
- e) Sh. Jagvinder Rana (C.C.I. TPES)
- f) Smt Meenakshi (C.C.I. Electronics)

Terms of Reference

The Committee shall:

1. Conduct a detailed survey of the existing laboratories and assess the present infrastructure. Identify the latest machinery, equipment, software, tools, instruments, training kits and allied items required for upgradation of the IoT, TPES and Electronics laboratories.
2. Prepare detailed technical specifications in accordance with the latest industry standards and training requirements.
3. Assess the space requirements, electrical load, networking, furniture and other infrastructure required for installation and operation of the proposed equipment.
4. Prepare the proposed laboratory layout and installation plan.
5. Estimate the tentative cost of machinery, equipment and allied infrastructure required for the proposed laboratories.
6. Submit a comprehensive report along with recommendations for further necessary action.
7. The Committee shall submit its report to the undersigned within **7 days** from the date of issue of this Office Order.


(Teekam Chand Saini)
Vice Principal/H.O.O

No. F.4(9)/ITIMGP/Pur/Upgradation IOT Eletronics /2026-27/

Dated :

Copy forwarded for information & necessary action to:
Concerned committee members


(Teekam Chand Saini)
Vice Principal/H.O.O

Recommendation Of Technical / Survey Committee

As per the schedule, a meeting of the Technical/Survey Committee was held on 13.07.2026 at 10:00 A.M. in Room No. 208 to finalize the requirements for the upgradation of the Internet of Things (IoT), TPES, and Electronics Laboratories.

After detailed deliberations, the Committee unanimously recommended the procurement of the following items for the upgradation of the above-mentioned laboratories. The Committee also recommended that a Common Employability Laboratory be established in Room No. 203 to facilitate integrated practical training and optimum utilization of available infrastructure.

The details of the recommended items are as follows:

S. No.	Name of the Item	Qty	Unit
1	Industrial Internet of Things Bench	1	Set
2	Automation Programming - HMI, PLC and Sensors	1	Set
3	Industrial communication and SCADA	1	Set
4	Virtual Reality Workstation	1	Nos
5	Composite Three-D Printing Machine	1	Nos
6	Resin Based Three-D Printing Machine	1	Nos
7	Three-D Scanning Machine	1	Nos
8	OT Cybersecurity	1	Set
9	Industrial Installation, Controls, Drives and Automation	1	Set

The Committee further certifies that the above-mentioned items are essential for the effective implementation of the upgraded training facilities and recommends that the procurement process be initiated as per the prevailing Government procurement guidelines. The details technical specifications are attached along with it.

Committee Members


 (Sh. Suresh Kalra)
 OGI


 Ravi Prasad
 (C.I. IOT)


 Meenakshi
 (C.I. DMC)


 Sh Jagvinder Rana
 (C.C.I. Electronics)


 Smt Meenakshi
 (C.C.I. Electronics)


 Sh. Rajeev Saini,
 GI(Chairperson)

Sr. No.	Item Description
1	Industrial Internet of Things Bench Tender Specifications This module is comprised of two discrete technologies. ○ The Industrial Internet of Things (IIOT) & Extended Reality ○ IIOT is at the heart of modern industry. Measuring and analysing product and process characteristics makes it possible to anticipate and predict failures & to make responsible decisions. ○ Extended Reality allows maintenance and operations technicians to work more efficiently on their tasks and to intervene under conditions to help promote safety. ○ This equipment should be able to design and implement IIOT applications, should also have Installation and connection of measurement (wireless & wired) sensors, Real-time visualisation of machine and process states and must give easy access to actionable information in the cloud & must allow to manage operations and assets in the cloud—from anywhere, at any time, alongside the extended reality software should allow Development and presentation of statistical analysis control maps and also this equipment should make it possible to design and implement all the accessible applications using the configurable Extended Reality software, the IIOT & Extended reality solutions should be implemented with actual application panel having all provisions to connect different sensors and also must have operational actuators The package should be designed to achieve the following learning objectives: ○ Transform industrial equipment by integrating connected objects ○ Develop or modify a product and process monitoring application using the measured data ○ Build control maps and analyze the data ○ Performing maintenance, adjustment, and logging procedures in a guided manner, ○ Real-time visualization of machine states: operation, efficiency, production, ○ Visualization of machine components and virtual security zone ○ Access to documentation, ○ Follow-up of the operations carried out and sharing between the various stakeholders ○ Rendering useful documentation accessible from dynamic links and QR codes ○ Alerting to hazards through image recognition and measurement feedback

- o Real-time access to the operational and monitoring data of the equipment
- o Guiding stakeholders in maintenance and operations

Detailed Product Description:

The starter pack includes: It should be a enclosure with following components

- o RCBO, 10A, 30mA - 1 Qty
- o Wireless to Modbus/TCP, 24~240 V AC/DC, transmission frequency 2405~2480 MHz - 1 Qty
- o Modular box PC, Windows 10 IoT Enterprise 64 bit multi-language, 250 GB M.2 SSD TLC, 4 GB RAM DDR3 internal - 1 Qty
- o DC Power supply, 100~240VAC to 24VDC, 5A, 120W - 1
- o Compact industrial WiFi access point and client, data rates up to 300 Mbps - WiFi 802.11n - MIMO 2T2R - 2.4/5 GHz - 1 Qty
- o Unmanaged Switch, 10/100BASE-TX - 5 port(s) copper cable, 12~24VDC, 2.2W - 1 Qty
- o Enclosure with handle - 1 Qty

The application pack includes: It should be a enclosure with following components

- o Mesh plate for components installation with Enclosure, 800x600mm - 1 Qty
- o Power incomer terminal block - 1 Qty
- o Transformer, 230 to 400 V to 24 V, 63VA - 1 Qty
- o DC power supply, 24VDC, 1.2A - 1 Qty
- o Control Circuit breakers 1P+N, 0.5A, Icu 50 kA@240V - 1 Qty
- o Control Circuit breakers, 1P+N, 1A, Id=14 A - 1 Qty
- o Control Circuit breakers, 1P+N, 2A, Icu=15 kA@240 V - 1 Qty
- o Control Circuit breakers, 1P+N, 3A, Id = 40A - 1 Qty
- o Isolating switch, 3P, 25 A - 1 Qty
- o Fuse Switch disconnecter, 32A, 690VAC - 1 Qty
- o Contactor, 9A, 1NO, 1NC, 24VAC COIL, 400V - 1 Qty
- o Changeover contactor, 9A, 5.5KW, 24VAC COIL, 400V - 1 Qty
- o Thermal magnetic circuit breaker, 3P, 2.5A to 4A - 1 Qty
- o Compact Motor Starter with Modbus port, 3P, 12A/690V, coil 24VDC - 1 Qty
- o Brick PLC with 4 fast inputs, 16 regular inputs & 16 relay outputs, input voltage of 24V DC, a output voltage of 24V DC/220V AC, output current of 2A, mini B USB 2.0, serial link 1 and RS485, serial link 2 and RS232/RS485, ethernet Modbus TCP/IP, and serial link 2 and RS485 - 1 Qty
- o Power meter, 200 to 480VAC, Modbus RTU, RS485 - 1 Qty
- o Current transformer, 40/5, inner dia 21mm - 3 Qty
- o Control boxes with buttons and indicators - 2 Qty
- o Emergency stop push button, 40mm dia - 2 Qty
- o Push button, NO, Black - 3 Qty
- o Push button, NO, Green - 1 Qty
- o Selector switch - 2 Qty
- o Pilot lamp, 24V AC/DC - 4 Qty

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- Limit switches, 1NO+1NC – 5 Qty
 - 3-phase Asynchronous Motors 400V/690, 180W – 2 Qty
- The motor to be supplied with terminal box having the windings wired on the terminal box with 4mm banana connectors

The sensor pack includes:

- Two push buttons with wireless control – 1 Qty
 - Wireless contact temperature and humidity probes – 1Qty
 - Wireless room temperature sensors – 4 Qty
 - Single-phase power tags – 2 Qty
 - Tetrapolar power tags – 1 Qty
 - Wireless limit switch – 1 Qty
 - Straight M12, 4-pin female connector – 1 Qty
 - Straight M12, 5-pin male connector – 1 Qty
- Applicable Software:
 - SCADA Expert development software (single user 1 year term license) – 1 Qty
 - SCADA Expert builder license (single user 1 year term license) – 1 Qty
 - Open-source software Node-RED – 1 Qty
 - PLC Programming Software (single user permanent license) – 1 Qty
 - Variable speed drive configuration software (single user permanent license) – 1 Qty
 - Electrical Characteristics:
 - Voltage: 230/400 V
 - Frequency: 50/60 Hz $\pm$ 5%
 - Mechanical Parameters:
 - Starter pack**
 - Minimum Dimensions: 540W x 230D x 400H mm
 - Table Top
 - Application pack**
 - Minimum Dimensions: 540W x 230D x 400H mm
 - Table Top
 - Motor**
 - Minimum Dimension: 200H x 130W x 230D mm
 - Table Top

The equipment should be supported with relevant technical and practical manuals.

- SCADA Programming Software 512K Tags (single user one-year term license - instructor) – 1
- SCADA Programming Software 512K Tags (6 users one year term license - student)- 1

1.1 Accessories

- Computers with Two monitors – 1 Qty
- Processor: Intel Core i5 or above
Operating System: Microsoft Windows 10

1 Set

	Office Suite: Microsoft Office 365 Memory (RAM): 8-16 GB of RAM Storage: 240 GB solid state drive, or larger. Monitor: Desktop: 14" – 19" widescreen flat-panel display (dual monitors) - Table with Storage and Power supply – 1 Qty - VR headset – 1 Qty	
2	Automation Programming - HMI, PLC and Sensors The didactics supplied below must achieve the mentioned learning objectives: ➤ Training bench for HMI and PLC ➤ PLC Programming simulation ➤ Static Application Panel ➤ Sensor case ➤ Accessories for Automation programming	
2.1	Training bench for HMI and PLC Tender Specifications The console must consist of a industrial grade, modular type PLC/equivalent with expandable I/O's mounted and wired on front surface plate. The surface plate must be mounted on a metal enclosure with the IO's and the power supply. The I/Os from the PLC must be wired out to the front surface using 4mm banana sockets. This IO's mounted on the surface can be connected to an external operational equipment in form of push buttons, limit switches and the indicators using suitable stackable patch cords. An HMI display unit enables operator dialogue. This PLC-HMI bench should be designed to achieve the following learning objectives: ○ Program and configure a modular PLC ○ Study the display unit ○ Program and configure the HMI terminal ○ Control and operate the terminal ○ Manage breakdowns(troubleshooting) via feedback from the terminal Detailed Product Description: ○ Back plane, 8 slots – 1 Qty ○ Central Processing Unit for PLC, max 1024 discrete + 256 analog I/O, Modbus and/or Ethernet – 1 Qty ○ DC Power supply for PLC, 24VDC, 16.8W – 1 Qty ○ Module digital input, 16I, 24VDC, positive discrete input – 1 Qty ○ Module digital outputs, 16Q relays, 24VDC/24V to 240VAC – 1 Qty ○ Analog IO module - 4 inputs supporting Current 0~20 mA/Current 4~20 mA, Voltage +/- 10V, Voltage 0~10V, Voltage 0~5V, Voltage 1~5V /2 Analog outputs supporting Current: 0~20 mA, Current: 4~20 mA, Voltage: +/- 10V – 1 Qty ○ 7" HMI Ethernet colour touch screen terminal – 1 Qty ○ Unmanaged switch, 8 copper ports – 1 Qty	1 Nos

	○ DC Power Supply, 24VDC, 3A – 1 Qty ○ Miniature circuit breaker, 2P, 6A, Curve C, 415V – 1 Qty ○ RCCB, 2P, 25A, 30mA, AC-type – 1 Qty ○ Contactor, 3P, 9A, 4KW, 1NO+1NC, 220VAC COIL – 1 Qty ○ Set of programming cables for the PLC and display unit – 1 Qty ○ Set of cables with round male connectors and flying leads, 4mm – 1 Set • Electrical Characteristics: ○ Voltage: 230V, 1P+N+E ○ Frequency: 50/60 Hz $\pm$ 5% • Applicable Simulation: ○ HMI Programming Simulation (single user permanent license) • The equipment should be supported with relevant technical and practical manuals.	
2.2	PLC Programming simulation (100 user permanent license)	1 Nos
2.3	Static Applications panel The application panels should be designed to wire out various digital/ analogue inputs and outputs from the PLC. The output of the PLC program can be visualized through the LEDs on the application panels. ○ Traffic light module – 1 Qty ○ Vehicle parking module – 1 Qty ○ Elevator Lift module – 1 Qty ○ Washing machine control module – 1 Qty ○ Bottle filler control module – 1 Qty ○ Packaging module – 1 Qty ○ Level & Pump control module – 1 Qty ○ Fan control module – 1 Qty ○ Star- Delta control module – 1 Qty ○ Safety door control module – 1 Qty ○ Conveyor belt control module – 1 Qty ○ Stepper motor module – 1 Qty ○ DC motor control module – 1 Qty • Electrical Characteristics: ○ Voltage: 24V, DC	1 Nos
2.4	Sensor Case Tender Specifications	1 Nos

The didactic package should be designed to study various industrial sensors. The various types of detectors and targets should be representative of the equipment found in an industrial environment. The power supply box should be equipped with indicator lights to show the states of the detectors. The package should be designed to achieve the following learning objectives:

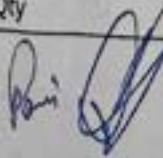
- Finding out about the various sensor technologies used in industrial detection:
 - Photoelectric detectors (barrier, reflex, fibre optics, background obliteration, etc.)
 - Inductive and capacitive detectors for detection of various materials,
 - Detection of rectilinear or angular movement via position switches.
- Implementing detectors
- Making adjustments
- Setting up a detection chain

Detailed Product Description:

- A grooved Aluminium plate with sliding profiles possible to hold & slide the aluminium vices in X & Y axis – 1 Qty
- Fast-opening vices with fine screw tightening system – 2 Qty
- Cam with 15°, 30°, 45°, and 90° angles – 1 Qty
- Limit switch, metal end plunger with elastomer boot 1NO + 1 NC PG11 – 1 Qty
- Limit switch plastic thermoplastic roller lever 1 NO + 1NC PG-11 cable – 1 Qty
- Limit switch thermoplastic roller lever plunger horizontal action in 1 direction 1 NO+1NC PG-11 cable entry – 1 Qty
- Inductive sensor M12 sensing distances 8mm 1 NO – 1 Qty
- Inductive sensor M18 sensing distances 8mm PNP – 1 Qty
- Inductive sensor M30 sensing distances 8mm – 1 Qty
- Capacitive Proximity sensor M18 sensing distances 5 mm – 1 Qty
- Photo electric sensor sensing distance 30m through beam need a transmitter – 1 Qty
- Photo electric sensor sensing distance 30m through beam need a emitter – 1 Qty
- Photo electric sensor nominal sensing distances 1m defuse – 1 Qty
- Photo electric fibre amplifier – 1 Qty
- Plastic fibre optic for sensor 3m long – 1 Qty
- Fibre optic amplifier – 1 Qty
- Various types of Reflector (Glass, Aluminium, mirror, brass, copper, acrylic) – 1 Qty
- Power supply box – 1 Qty
 - With regulator 0-24 V variable direct current power supply
 - NPN sensors powering outlets

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	○ PNP sensors powering outlet ○ DC motor power outlet with potentiometer control ○ Digital counter output panel with bits input • Electrical Characteristics: ○ Voltage: 230V, 1P+N+E ○ Frequency: 50/60 Hz ± 5% • The equipment should be supported with relevant technical and practical manuals.	
2.5	Accessories for Automation Programming - Infra Details ○ Hardware for PLC Programming – 1 Qty - Processor: Intel Core i5 or above - Operating System: Microsoft Windows 10 - Office Suite: Microsoft Office 365 - Memory (RAM): 8-16 GB of RAM - Storage: 240 GB solid state drive, or larger. - Monitor: Desktop: 14" – 19" widescreen flat-panel display (dual monitors) ○ Tables with Storage and Power supply – 1 Qty	1 Set
3	Industrial communication and SCADA Tender Specifications SCADA (Supervisory Control and Data Acquisition) is a simulation application for monitoring and controlling industrial processes, which gathers data in real time from remote locations and displays at single platform to monitor and control process. The SCADA bench should be designed based on a factory scenario represented by 2 different standalone stations where each SCADA station is a typical factory/industrial installation and should be developed with the following learning objectives: ○ PLC communication protocols ○ PLC and HMI programming ○ Communication: CAN Open, Ethernet, TCP/IP ○ Simulation to design supervision system ○ Alarms and report management ○ Variety of graphics and animations ○ Extensive data and event logging ○ Real-time trending ○ Wizards for screen development ○ Extensive tags and database management ○ Script based excel report generation ○ Advance component library ○ Open data base connectivity Detailed Product Description: Station-1: Master Process ○ Back plane, 8 slots – 1 Qty ○ Back plane, 6 slots – 1 Qty	1 Nos



- Power Supply for PLC, 24VDC, 16.8 W - 2 Qty
- Central Processing Unit for PLC, max 1024 discrete + 256 analog I/O - 1 Qty
- Remote IO Adaptor module - 1 Qty
- Ethernet module - flash memory card - 1 x RJ45 10/100 - 1 Qty
- Ethernet module, 4 x RJ45 10/100 - 1 Qty
- Digital input module, 16I, positive discrete input 24VDC - 1 Qty
- Digital output module, 16 relays, 24VDC/24V to 240VAC - 1 Qty
- Analog IO module - 4 inputs supporting Current 0~20 mA/Current 4~20 mA, Voltage +/- 10V, Voltage 0~10V, Voltage 0~5V, Voltage 1~5V /2
- Analog outputs supporting Current: 0~20 mA, Current: 4~20 mA, Voltage: +/- 10V - 1 Qty
- Standard Network Interface Module, Ethernet/IP 10...100 Mbit/s - 1 Qty
- HMI 7" screen, 2 serial ports, 1 Ethernet port - 1 Qty
- Tower light, 40 MM, 100-240 V, BUZZER, BLINKING, LED, GREEN, ORANGE - 1 Qty
- Unmanaged hub switch - 1 Qty
- DC Power supply, 24VDC, 5A - 1 Qty
- Contactor, 3P, 12A, 220VAC coil - 1 Qty
- Multi function meter with Power and Energy Class 1.0 RS485 - 1 Nos
- Variable Speed drive, 0.37KW, 200V, 1PH - 1 Qty
- Indicators, dia 22mm, 24VDC - 8 Nos
- Push buttons, dia 22mm - 8 Nos
- Selector Switch - 2 Qty
- Variable Potentiometers - 2 Qty
- Emergency stop Push button - 1 Qty
- Miniature relay, 24VDC, 2CO - 2 Qty
- Miniature Circuit Breaker, 2P, 6A - 3 Qty
- Residual Current Circuit Breaker, 2P, 25A, 30mA - 1 Qty
- Metal enclosure suitable printed - 1 Qty

Station-2: Slave Process

- Power supply for the standard network interface module
- Basic digital input kit, 24VDC, 16I - 1 Qty
- Basic digital output kit, 24VDC, 16I - 1 Qty
- Brick PLC, 40IO, 24VDC - 1 Qty
- Unmanaged hub switch - 1 Qty
- HMI 10.1" screen, 2 serial ports, 1 Ethernet port - 1 Qty
- DC Power supply, 24VDC, 5A - 1 Qty
- Contactor, 3P, 12A, 220VAC coil - 1 Qty
- Indicators, dia 22mm, 24VDC - 10 Qty
- Push buttons, dia 22mm - 10 Qty
- Tower light, 40 MM, 100-240 V, BUZZER, BLINKING, LED, GREEN, ORANGE, - 1 Qty
- Miniature relay, 24VDC, 2CO - 2 Qty
- Emergency stop Push button - 1 Qty
- Miniature Circuit Breaker, 2P, 6A - 2 Qty
- Residual Current Circuit Breaker, 2P, 25A, 30mA - 1 Qty
- Metal enclosure suitable printed - 1 Qty

• Electrical Characteristics:

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	- o Voltage: 230V, 1P+N+E - o Frequency: 50/60 Hz $\pm$ 5% • Applicable Simulation: - o Drive Configuration Simulation (single user permanent license) - o HMI Programming Simulation (single user permanent license) - o SCADA Build and Runtime Simulation with minimum 100 Tags (single user permanent license) • This equipment to be supplied with one fully developed project utilising the complete architecture as used in the equipment.																																					
3.1	Accessories for Industrial communication and SCADA - Infra Details - o Hardware for SCADA – 1 Qty - Processor: Intel Core i5 or above - Operating System: Microsoft Windows 10 - Office Suite: Microsoft Office 365 - Memory (RAM): 8-16 GB of RAM - Storage: 240 GB solid state drive, or larger. - Monitor: Desktop: 14" – 19" widescreen flat-panel display (dual monitors) - o Tables with Storage and Power supply – 1 Qty	1 Set																																				
4	Virtual Reality Workstation <table border="1"> <thead> <tr> <th>S. No.</th><th>Parameter/ Feature</th><th>Specification Required</th></tr> </thead> <tbody> <tr> <td>1.</td><td>Tracking</td><td>With 6 Degree of Freedom, the headset must track the movement of both head and body of user, then translates them into VR with realistic precision without need of any external sensors.</td></tr> <tr> <td>2.</td><td>Storage</td><td>128GB</td></tr> <tr> <td>3.</td><td>Display Panel</td><td>Fast-switch LCD</td></tr> <tr> <td>4.</td><td>Display Resolution</td><td>1830x1830 per eye</td></tr> <tr> <td>5.</td><td>Display Refresh</td><td>120hz</td></tr> <tr> <td>6.</td><td>SoC</td><td>Qualcomm Snapdragon XR2 Gen 2</td></tr> <tr> <td>7.</td><td>Audio</td><td>3D positional audio built directly into the headset, allowing user to hear what's all around it and a 3.5mm audio port.</td></tr> <tr> <td>8.</td><td>RAM</td><td>8GB</td></tr> <tr> <td>9.</td><td>Battery working Life</td><td>Min 2 hours</td></tr> <tr> <td>10.</td><td>Charge Time</td><td>With the provided USB-C power adapter, charging time less than 3 hours</td></tr> <tr> <td>11.</td><td>Controllers</td><td>Left- and right-hand controllers having at least four controls compatible with the headset.</td></tr> </tbody> </table>	S. No.	Parameter/ Feature	Specification Required	1.	Tracking	With 6 Degree of Freedom, the headset must track the movement of both head and body of user, then translates them into VR with realistic precision without need of any external sensors.	2.	Storage	128GB	3.	Display Panel	Fast-switch LCD	4.	Display Resolution	1830x1830 per eye	5.	Display Refresh	120hz	6.	SoC	Qualcomm Snapdragon XR2 Gen 2	7.	Audio	3D positional audio built directly into the headset, allowing user to hear what's all around it and a 3.5mm audio port.	8.	RAM	8GB	9.	Battery working Life	Min 2 hours	10.	Charge Time	With the provided USB-C power adapter, charging time less than 3 hours	11.	Controllers	Left- and right-hand controllers having at least four controls compatible with the headset.	1 Nos
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S.NO.	Parameters	Technical Specifications
1	Application	The 3D Machine should be versatile and capable of producing high strength parts for end-use and functional parts for users including shop floor applications of tooling etc. with high reliability.
2	Printing Technology	Continuous Fiber Fabrication.
3	End component properties	Component strength as per Minimum: ASTM:
		Tensile strength (ASTM D 3039) 590 Mpa or more
		Tensile modulus (ASTM D 3039) 21 Gpa or more
		IZOD Impact (ASTM D 256 -10) 2600 J/m or more
		Flexural strength (D 790) 200 Mpa or more
		Compressive strength (D6641) 140 Mpa or more
		Heat Deflection Temperature 100 °C or more (D648 B)
4	Build volume	300 x 130 x 150 mm or more
5	Z layer resolution	100 microns or better
6	Fiber material	Fiber Glass
7	Printer connectivity	WiFi, Ethernet, USB Flash Drive
8	Print head setup	Machine must have TWO nozzles with one dedicated to a base material and one dedicated to reinforcement material
		A fiber cutting blade must be integrated inside the printhead and controlled automatically by Simulation.
9	Simulation features	1. The 3D printing Simulation must be able to import 3D models from any major CAD Simulation in STL format.






			2. The Simulation must be able to calculate printing time and consumables usage during pre-processing of each print job.																
			3. The Fiber laying must be Isotropic & layers be fully programmable for lay-up angle and while laying concentric fiber, user should have choice on walls to reinforce as: All walls / Outer shell only / Inner holes only.																
			4. The Simulation must be cloud based & versatile to support OS like: Mac OS 10.7 Lion +, Win 7+, Linux2 and should operate under Chrome 3.0+ Browser.																
	10	Machine hardware & feature	1. The print should have Pause & Resume on demand.																
			2. Print bed must use kinematic coupling to provide precision and certainty of location when decoupled and recoupled.																
			3. 3D Machine must feature a unibody aluminum chassis and precision-machined components to deliver lights-out reliability over thousands of print hours.																
	11	Facility Requirement	1. The operational mass must not be more than 16 kg.																
			2. The power supply must be 100-240 VAC, drawing 3Amp.																
			3. The printer must be able to be relocated easily by one person.																
	6	Resin Based Three-D Machine			1 Nos														
<table><tr><th>S No</th><th>Description</th><th>Specification</th></tr><tr><td>1</td><td>Type of Technology</td><td>SLA/MSLA/LFD</td></tr><tr><td>2</td><td>XY Resolution</td><td>50 microns</td></tr><tr><td>3</td><td>Layer Thickness</td><td>25 – 200µm</td></tr><tr><td>4</td><td>Maximum print speed</td><td>100 mm/hr or better</td></tr></table>				S No	Description	Specification	1	Type of Technology	SLA/MSLA/LFD	2	XY Resolution	50 microns	3	Layer Thickness	25 – 200µm	4	Maximum print speed	100 mm/hr or better	
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5	Material compatibility Resins	Grey, white, clear, black, precision, Fast, Tough 2K, Elastic, Flex, High Temp, Rigid
6	Printable build volume	200 × 125 × 210 mm or more
7	Power source	Backlight Unit and Light Processing Unit
8	Camera	Inbuild camera for capturing continuous images as an option
9	Intelligent control systems	Resin level sensor, Resin Temperature sensor, Force sensor, printer levelling sensor, mixer sensor
10	Simulation Included	Free Slicing Simulation,
11	Cloud connection	Premium Integration available with Simulation
12	Resin Loading	Automatic Refill System
13	Resin tanks make	Flexible resin tank
14	Post Processing	Automated Washing & Curing unit to be provided
15	Operating Temp & Current	(18-28° C)
		100-240 VAC, 2.5A max
		50/60HZ, 220W
16	Operating System	Windows 7 (64-bit) and up
		Mac OS X 10.12 and up
17	Supports	Auto Generated
		Light-Touch Removal
18	Internal Temperature	Auto-heats to 35 °C
19	Temperature	Air-heated print chamber
	Control	
20	Operating Environment	18 – 28 °C
21	Touch screen alerts	Touchscreen alerts







			SMS/email via Dashboard	
	22	Peel Mechanism	Sliding Peel Process with wiper or better	
	23	Light Source	Backlight Unit: 60 uniform-wavelength LEDs, a plano-convex lens array, and integrated air cooling 405 nm optical wavelength 16 mW/cm ² optical power intensity delivered to the cure plane 50 μm pixel size	
	24	Input File formats	STL, OBJ	
	25	Slicing Print Setup Features	One-Click Print Adaptive layer thickness for faster printing with fine details. Remote Print Auto-orient for optimal print position.	
			Auto-mesh repair, Auto-generation of supports, Rotate, scale, duplicate, and mirror.	
			Layer slicer for path inspection. Available in multiple languages	
			Manage prints and printers via the cloud	
			Track resin and tank usage over time	
	26	Dashboard Machine Management features	SMS and email alerts	
			Create enterprise group accounts with admins to more easily share printers and control access	
7	Three-D Scanning Machine			1 Nos
	Sr. No	Nomenclature	Specification	
	a)	Description	Should be Handheld device with Infrared VCSEL structured light technology with Color resolution (on object) 50 to 200 DP	







	b)	Scanning Technology	Invisible light/hair/dark environment scanning. It should be a colour 3D Scanner.	
	c)	Mesh Resolution	0.250 mm (0.01 in) or better	
	d)	Scanning Area	340 x 475mm (13.39 x 18.7 in) or large	
	e)	Usage Distance (From Object)	250 to 550 mm (9.8 to 21.7 in)	
	f)	Scan Speeds	80 sec/m2 or better	
	g)	Scanner controls	Touchscreen	
	h)	Projector Light source	IR VCSEL	
	i)	Color Resolution	50 to 200 DPI	
	k)	Positioning Methods	Geometry and/or Target and/or texture	
	l)	Measurement rate	1,250,000 measurements/s or better	
	m)	Connectivity	USB 3.0	
	n)	Output Formats	dae, .fbx, .ma, .obj, .ply, .stl, .txt, .wrl, .x3d, .x3dz, .zpr, .dxf, .iges*, .step etc..	
	o)	Accuracy	0.050 mm (0.0020 in) or better	
	P	Volumetric accuracy:	0.050 mm + 0.100 mm/m (0.0020 in + 0.0012 in/ft)	
	q)	Dimension	≥300 x 125 x 75 mm	
	r)	Certified	CE / FC Certified & RoHS compliant .	
	t)	RE Simulation	The scanner should be integrated with RE Simulation.	
	u)	Depth of Field	≥ 300 mm	
	v)	Recommended object size	Shall be 0.1 - 3.0 m (0.3-10 ft)	
	w)	Measurement Capabilities	Pin - 1.5 mm (0.059 in) Hole - 3.0 mm (0.118 in) Step - 0.1 mm (0.0039 in) Wall- 1.0 mm (0.039 in) Or better	
8	OT Cybersecurity Tender Specifications In industry all equipment is connected and communicated through various and varied protocols, cybersecurity becomes indispensable. The Operational technology (OT) Cybersecurity research equipment should help raise awareness of the risks of hacking and implement techniques to counter attacks by having the set of industrial controllers like PLC, HMI & drive with actuators simulating operational application, this application must have all major industrial communication protocols like Ethernet/IP, Modbus, CANOPEN, etc. The equipment should provide provision of implementing the firewall network into application and should allow configuration & commissioning of the entire system to implicate the OT cyber security.			1 Nos

The package should be designed to achieve the following learning objectives:

- Understand industrial networks and their applications
- Understand the risks associated with equipment networking
- Implement industrial communication buses
- Set up a machine and an industrial firewall to help prevent cybersecurity risks
- Configuration & commissioning of Firewall
- Resetting, registration & initial settings of firewall
- Configuration of policies for same & different network devices
- Allowing internet access via Firewall

Detailed Product Description:

- RCBO, 2P, 10A, 30mA – 1 Qty
 - MCB, 2P, 1A, Curve C – 1 Qty
 - MCB, 2P, 4A, Curve C – 1 Qty
 - MCB, 2P, 2A, Curve D – 1 Qty
 - DC POWER SUPPLY, 100~240V AC, 24V, 2.5A, 60W – 1 Qty
 - DC POWER SUPPLY, 100~240V AC, 12V, 2.5A, 60W – 1 Qty
 - Motor circuit breaker, 3P, 4 A – 1 Qty
 - PLC Back Plane, 8 slots – 1 Qty
 - DC Power supply module for PLC, 24VDC, 16.8W – 1 Qty
 - CPU for PLC, 1024 Digital I/O, Analog 256 I/O, 3 Standard Ethernet Ports – 1 Qty
 - CANOpen Communication module for PLC – 1 Qty
 - Ethernet Control network module for PLC – 1 Qty
 - HMI, 5.7" TFT LCD – 1 Qty
 - Variable speed drive, 0.37kW, 240V, 1Ph – 1 Qty
 - Fire wall - 10 x GE RJ45 ports (including 7 x Internal Ports, 2 x WAN Ports, 1 x DMZ Port) – 1 Qty
 - Manageable switch, L2 Switch - 8 x GE RJ45 ports, 2 x GE SFP, Fanless, 12V/3A power adapter of input voltage 100 - 240VAC and PSE dual powered L2+ management switch – 1 Qty
 - PC USB/RJ45 connection cable – 1 Qty
- Applicable Simulation:
 - HMI programming simulation (single user permanent license) – 1 Qty
 - Fire Wall configuration tool (single user permanent license) – 1 Qty
 - Electrical Characteristics:
 - Voltage: 230 V
 - Frequency: 50/60 Hz $\pm$ 5%
 - The equipment should be supported with relevant technical and practical manuals.

1 Set

8.1

Accessories

	○ Hardware for Cybersecurity simulation – 1 Qty Processor: Intel Core i5 or above Operating System: Microsoft Windows 10 Office Suite: Microsoft Office 365 Memory (RAM): 8-16 GB of RAM Storage: 240 GB solid state drive, or larger. Monitor: Desktop: 14" – 19" widescreen flat-panel display (dual monitors) ○ Tables with Storage and Power supply – 1 Qty	
9	Industrial Installation, Controls, Drives, and Automation The didactics supplied below must achieve the mentioned learning objectives: ➤ Motor Starter Pack ➤ Ultra Motor Starter Pack/Compact Motor Starter Pack ➤ Variable speed control add-on Motor Starter Pack ➤ Three-phase Asynchronous 400 V/690 V Training Motor ➤ Power and Control pack with PLC wiring and sensors	
9.1	Motor Starter Pack Tender Specifications This assembly allows electromechanics to design, assemble, wire, and troubleshoot power control equipment. This didactic package should be designed to study the industrial components and learn to read industrial diagrams. Further more this Didactic package should consider motor starting methods to relate to the industrial concepts. It should be designed to achieve learning objectives: ○ Acquire knowledge of LV switchgear, understand the role and composition of the items implemented in a motor feeder ○ Study, build and test the various motor feeder diagrams. ○ Build power control equipment from industrial components essential in all automated systems. ○ The power distributed through electromechanical products performs four main functions stipulated by regulations: - Separation or disconnection - Control or switching - Short-circuit protection - Overload protection Detailed Product Description: ○ Control Transformer, 230-400/24V, 400VA – 1 Qty ○ Cable trunking, PVC, 50x25mm – 1 Set ○ Connectors, 4 sq.mm – 1 Set ○ Connectors, 6 sq.mm – 1 Set ○ Circuit Breaker, 1P, 16A – 1 Qty ○ Circuit Breaker, 4P, 10A – 1 Qty ○ Differential Block, 4P, 25A, 30mA, 400-415V – 1 Qty	1 Nos

	○ Din Rail, 500mm – 1 Set ○ Perforated mesh, 750x550mm – 1 Qty ○ NFC cylindrical cartridge fuses, 10 mm x 38 mm, fuse type a M, 500VAC, 4 A, without striker – 1 Qty ○ Aux. Contact Block, 2NO+2NC – 1 Qty ○ Time delays auxiliary contact block, 1NO+1NC, 1-30s, for star-delta applications – 1 Qty ○ Time delays auxiliary contact block, 1NO+1NC, 1-30s – 1 Qty ○ Contactor, 9A, 3P, 440V, 24VAC Coil – 3 Qty ○ Reversing Contactor, with mechanical interlock, 9A, 3P, 440V, 24VAC Coil – 1 Qty ○ Thermal Overload Relay, 2.5-4A, 1NO+1NC, direct contactor bottom terminals mounting type – 1 Qty ○ Fuse-disconnector, 3P, 30A, fuse size 10 x 38 mm – 1 Qty ○ Push Button station - green flush/red flush/green flush pushbuttons Ø22 – 1 Qty ○ Empty control station, 8 openings in 2 columns – 1 Qty ○ Push button, plastic, flush, green, Ø22, spring return, unmarked, 1 NO – 1 Qty ○ Push button, plastic, flush, red, Ø22, spring return, unmarked, 1 NO – 1 Qty ○ Selector switch, plastic, black, Ø22, 3 positions, stay put, 2 No – 1 Qty ○ Single contact block with body/fixing collar, plastic, screw clamp terminal, 1 NO + 1 NC – 1 Qty ○ Emergency stop head, switching off, plastic, red mushroom Ø40, trigger and latching turn to release – 1 Qty ○ Pilot light, plastic, green, Ø22, 24V AC/DC – 1 Qty ○ Pilot light, plastic, red, Ø22, 24V AC/DC – 1 Qty ○ Pilot light, plastic, orange, Ø22, 24V AC/DC – 1 Qty ○ Tightening tool for fixing nut – 1 Qty ○ Limit switch - thermoplastic roller lever - 1NC+1NO – 1 Qty ○ Loose bolt and clip nuts – 1 Set • Electrical Characteristics: ○ Voltage: 400V, 3P+N+E ○ Frequency: 50/60 Hz ± 5% The equipment should be supported with relevant technical and practical manuals.	
9.2	Compact Motor Starter Pack Detailed Product Description: ○ Advanced power base, 3P, 12A/690V, 5.5kW, 1NO+1NC – 1 Qty ○ Signaling contacts, 2NO, 5A, 250VAC/DC – 1 Qty ○ Auxiliary contacts, 1NO+1NC, 5A, 24-250VAC/DC – 1 Qty ○ Standard control unit, 1.25-5A, 3P motors, thermal magnetic protection, class 10, coil 24VAC – 1 Qty ○ Reverser block, vertical mounting, 32A/690V, coil 24V AC – 1 Qty ○ Control terminal block - for reversing motor starter – 1 Qty ○ Control circuit pre-wired connector - for reversing motor starter – 1 Qty	1 Nos






	- Electrical Characteristics: - Voltage: 400V, 3P+N+E - Frequency: 50/60 Hz $\pm$ 5% - The equipment should be supported with relevant technical and practical manuals.	
9.3	Variable speed control add-on motor starter pack Detailed Product description: - Motor Circuit Breaker, 3P, 10A, 440V, magnetic, rotary handle – 1 Qty - Motor Protection Circuit Breaker, 3P, 2.5-4A, 440V, thermal & magnetic – 1 Qty - Variable Speed Drive, 1.5kW/2Hp, 400V, 3Ph, Modbus serial – 1 Qty - Soft Starter, 6A, 1.5 to 3kW, 380 to 415V – 1 Qty - Potentiometer, 2.2kΩ – 1 Qty - Din Rail Mounting Base – 1 Qty - Drive communication cable i.e. USB: RJ45 – 1 Qty - Electrical Characteristics: - Voltage: 400V, 3P+N+E - Frequency: 50/60 Hz $\pm$ 5% - Applicable Software: - Variable speed drive configuration software – 1 Qty - License type: Permanent - The equipment should be supported with relevant technical and practical manuals.	1 Nos
9.4	Three-phase Asynchronous 400 V/690 V Training Motor Detailed Product Description: 3-phase Asynchronous Motors 400/690V, 180W – 1 Qty - The motor to be supplied with terminal box having the windings wired on the terminal box with 4mm banana connectors. - Electrical Characteristics: - Voltage: 400/690V, - Frequency: 50/60 Hz $\pm$ 5% - Mechanical Parameters: - Minimum Dimension: 200H x 130W x 230D mm - Table - Top	1 Nos
9.5	Power and Control pack with PLC wiring and sensors Tender Specifications	1 Nos

The wiring plates reproduces the control and power circuits of a EOT crane system. This pack can be used as a media for intermediate certification concerning two professional training units: preparation for execution of an electrical installation and checking the operation of an electrical installation. To achieve the professional training, the package designed should achieve the following learning objectives:

- Unwired version:
 - Install components as per the drawing,
 - wire up the power and control components,
 - wire up the Ethernet components,
 - configure the power meter,
 - load the test program in the PLC,
 - test general operation

• Detailed Product Description:

- Mesh plate for components installation, 800x600mm – 1 Qty
- Power incomer terminal block – 1 Qty
- Transformer, 230-400 V to 24 V, 63VA – 1 Qty
- DC power supply, 24VDC, 1.2A – 1 Qty
- Control Circuit breakers 1P+N, 0.5A, Icu 50 kA@240V – 1 Qty
- Control Circuit breakers, 1P+N, 1A, Id=14 A – 1 Qty
- Control Circuit breakers, 1P+N, 2A, Icu=15 kA@240 V – 1 Qty
- Control Circuit breakers, 1P+N, 3A, Id = 40A – 1 Qty
- Isolating switch, 3P, 25 A – 1 Qty
- Fuse Switch disconnecter, 32A, 690VAC – 1 Qty
- Contactor, 9A, 1NO, 1NC, 24VAC COIL, 400V – 1 Qty
- Changeover contactor, 9A, 5.5KW, 24VAC COIL, 400V – 1 Qty
- Thermal magnetic circuit breaker, 3P, 2.5A to 4A – 1 Qty
- Compact Motor Starter with Modbus port, 3P, 12A/690V, coil 24VDC – 1 Qty
- Brick PLC with 4 fast inputs, 16 regular inputs & 16 relay outputs, input voltage of 24V DC, a output voltage of 24V DC/220V AC ,output current of 2A, mini B USB 2.0, serial link 1 and RS485, serial link 2 and RS232/RS485, ethernet Modbus TCP/IP, and serial link 2 and RS485 – 1 Qty
- Power meter, 200 to 480VAC, Modbus RTU, RS485 – 1 Qty
- Current transformer, 40/5, inner dia 21mm – 3 Qty
- Control boxes with buttons and indicators
 - Box is used to start up and shut down the system, it contains an emergency stop pushbutton – 1 Qty
 - 9control box enables to control the M1 and M2 motors in both rotation directions – 1 Qty
- Emergency stop push button, 40mm dia – 2 Qty
- Push button, NO, Black – 3 Qty
- Push button, NO, Green – 1 Qty
- Selector switch – 2 Qty
- Pilot lamp, 24V AC/DC – 4 Qty
- Limit switches, 1NO+1NC – 5 Qty

• Electrical Characteristics:

- Voltage: 400V, 3P+N+E
- Frequency: 50/60 Hz ± 5%

u/c

	- Applicable Software: - PLC Programming Software – 1 Qty License type: Permanent - The equipment should be supported with relevant technical and practical manuals.	
9.6	Accessories for Industrial Installation, Controls, Drives and Automation - Lab Infra - Wiring Mesh with table and power supply for Module – 1 Qty - Laptops for PLC configuration – 1 Qty - Processor: Intel Core i5 or above - Operating System: Microsoft Windows 10 - Office Suite: Microsoft Office 365 - Memory (RAM): 8-16 GB of RAM - Storage: 240 GB SSD, or larger.	1 Set



