Dr B R AMBEDKAR NATIONAL INSTITUTE OF TECHNOLOGY
G T Road By Pass, Jalandhar-144011, Punjab (India)
EPABX-0181-2690301 & 453 website: www.nitj.ac.in email: registrar@nitj.ac.in

Ref. No. NITJ/PUR/ICE/128/2020/e-Tender No.81/2020

Assistant Registrar
Dr. B. R Ambedkar NIT Jalandhar
Email: arpurchase@nitj.ac.in

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THIS DOCUMENT IS FOR REFERENCE ONLY. ONLY E-TENDERS WILL BE ACCEPTED

e-TENDER NOTICE – NITJ/PUR/ICE/128/2020/e-Tender No.81/2020

National Institute of Technology, Jalandhar invites e-tender for purchase of Basic Electro Pneumatic Training Kit with Industrial Automation Modules as per detail available at Annexure-I along with Tender Fee & EMD required for Robotics Lab for the Department of Instrumentation and Control Engineering of the Institute as per details given below:

I	Downloading & Submission of Online e-tender/bids	Start Date: 10.02.2021 at 11:00 AM
II	Last date of submission of online bids	End Date: 03.03.2021 upto 11:00 AM
III	Physical submission of Tender Fee and EMD	End Date: 04.03.2021 upto 11:00 AM
IV	**Opening of Technical e-Bid (online)**	**04.03.2021 at 11:00 AM**

Detailed Terms and Conditions are available in e-tender document. The bid document can be downloaded from the CPP Portal.

Complete tender document is available for reference purposes on Institute website www.nitj.ac.in and CPP Portal. Only e-tenders will be accepted.

Registrar

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Annexure-I

Ref. No. NITJ/PUR/ICE/UNDER HEFA/128/2020/e-Tender No.81/2020

Detail of Equipment, Tender Fee & EMD are as under:

Sr. no.	Item/Equipment	Qty.	Tender Fee	EMD
1.	**Basic Electro Pneumatic Training Kit with Industrial Automation Modules**	01	Rs. 500/-	Rs. 28,000/-

Note: The quantity of required equipment/item may vary as per requirement.

***Exemption of Tender fee & EMD will only be given to MSME/NSIC registered bidders.**

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Important Note

1. All corrigenda, addenda, amendments and clarifications regarding this tender document will be uploaded on the website www.nitj.ac.in and CPP Portal and not in the newspaper; Bidders shall keep themselves updated with all such developments.

2. In case, the last date of receipt/opening of bids falls on holiday, the bids shall be receipt/opened on the next working day at same time.

3. In case, the last date of submission of EMD & Tender fee falls on holiday, the EMD & Tender fee shall be submitted on the next working day at same time.

4. Tenderer who have downloaded the tender document form from the institute website, shall submit a declaration along with tender document that I/We have downloaded the Tender Form from the institute website www.nitj.ac.in and I/we have not tempered /modified the tender form in any manner. In case, if the same is found to be tempered/modified in any manner, I/we understand that my/our tender will be summarily rejected and I/we are liable to be banned from doing business with institute.

5. **Tender fee of Rs.500/- (Non- refundable) in the form of DD in favour of Director, D R B R Ambedkar NIT, Jalandhar.**

6. **EMD (refundable) in the form of DD in favour of Security- A/c, DR B R Ambedkar NIT, Jalandhar.**

7. Both EMD and Tender fee are be submitted as per dates mentioned in schedule, failing which e-bids will not considered.

- **All the bidders are required to submit the Tender Fee and EMD as per requirement of tender document failing which bids received straightway rejected and bid will be treated invalid.**

- **Note: If the bidder inadvertently or otherwise upload the quoted rates in the technical bid, the bid will be straightway rejected and treated invalid.**

- **If the bidder is exempted for payment of Tender Fee and EMD as NSIC/MSME registered bidders, then bidder is required to submit NSIC/MSME exemption certificate for same. The Certificate must be valid as on last date of submission of bid.**

Tenderer must submit a scanned copy (duly signed and stamped) regarding terms & conditions as per our tender documents along-with make/model, specifications, bill of quantity as per required equipment in the technical bid for examine the bid as per our institute tender documents. It is noted that no rate should be depicted in the letter head.

Instructions to Tenderer

1. No tender will be accepted in physical form. The bidders shall have to submit their bids online in Electronic Format under Digital Signatures. For participation in the e-tendering process, the bidders need to register themselves on CPP Portal.

2. Bids are to be submitted online and opened online as per time given failing which no tender will be considered..

3. Bids will be opened online as per time given schedule.

4. **Before submission of online bids, bidders must ensure that scanned copies of all the necessary/relevant documents have been uploaded with the bid which should be duly signed and stamped. The duly signed and stamped copies of Terms & Conditions of the tender, reply of the Questionnaire of Plant & Machinery and other documents of the Tender & Annexures must be uploaded, failing which their bids may be rejected.**

5. NIT JALANDHAR, will not be responsible for any delay in online submission of bids due to any reason whatsoever.

6. **Bidders should also upload the scanned copies of Tender fees/EMD/Exemption Certificate as specified in the tender documents along with online technical documents. EMD in the form of a Demand Draft in favour of the Security – A/c, Dr B R Ambedkar NIT, payable at Jalandhar (refundable separate) and Tender Fee in the form of a Demand Draft in favour of the Director, Dr B R Ambedkar NIT, payable at Jalandhar (Non- refundable separate) should also be submitted in physical form to the following address as per scheduled time given for physical submission of EMD and Tender fee. The Envelope should be super-scribed as EMD and Tender Fee for Tender for Supply of Basic Electro Pneumatic Training Kit with Industrial Automation Modules and sent to following address:-**

   Kind Attention- Assistant Registrar (Purchase Section)
   Director,
   Dr B R Ambedkar National Institute of Technology,
   G T Road Amritsar By Pass, Jalandhar-144001, Punjab (India).

7. The details of EMD specified in the tender document should be same as submitted online (scanned copies). Otherwise tender will be rejected summarily.

8. The conditional bids shall not be considered and will be out rightly rejected.

Read and Accepted

(Signature & Stamp of Tenderer)

9. The Financial Bid through e-tendering process shall be opened of only those bidders, who will qualify in the technical bid and approved by the Purchase Committee/Technical Experts. The date, time & place of opening of the financial bid(s) will be intimated in due course of time.

10. At any time prior to the deadline for submission of bid, the institute may, for any reason, whether at its own initiative or in response to a clarification requested by a prospective tenderer(s), modify the tender document by issuance of an amendment.

11. The amendment will be uploaded on Institute website and CPP Portal only. In order to provide reasonable time to prospective tenderer(s), for preparing their bid as per amendment, the institute may, at its discretion extend the deadline for the submission of tender.

12. **The supplier must upload the original manuals / catalogue and Make/Model of the Equipment /Item. Otherwise bid is liable to be rejected.**

13. The Institute is not liable to pay any interest on EMD. Earnest money deposit shall be forfeited, if the tenderer, withdraws its bid during the period of tender validity. The Earnest money deposit of the tenderer, whose tender has been accepted, will be returned on the submission of **performance security @ 3% of the total value of the offer. The performance security will be kept till the warranty period + 02 months more of the Equipment /Item. The warranty period will start from the date of satisfactory installation of the Equipment /Item duly given by the concerned department**. Earnest money deposit of the successful tenderer shall be forfeited, if it refuses or neglects to execute the contract or fails to furnish the required performance security within the time frame as specified by the institute. The EMD(s) of other Bidder(s) whose offer are found according to required specifications/ lowest will be released after finalization of Technical Bids/ Lowest Bid/Purchase.

14. The Format of Performance Bank Guarantee bond or Performance Bank Guarantee issued by the bank as per the format given in **Annexure "B" & "C".**

15. Delivery time is the essence of the contract and must be met with.

16. Nearest specifications/better specifications can be considered. In case of deviation, complete justification should be furnished with proper documents.

17. The Director may accept a tender in part or whole of the quantity offered, reject any tender without assigning any reasons and may not accept the lowest bidder. Further in case of any doubt/dispute, the decision of the Director of the Institute shall be final.

18. The offer shall be kept valid for minimum 120 days.

Read and Accepted.

(Signature & Stamp of Tenderer)

19. a) Either the Indian agent/ dealer on behalf of the Principal/OEM or Principal/OEM itself can bid but both cannot bid simultaneously for the same item/product in the same tender.

    b) If an agent/ dealer submits bid on behalf of the Principal/OEM, the same agent /dealer shall not submit a bid on behalf of another Principal/OEM in the same tender for the same item/product.

    c) All offers other than those from the Principal/OEM should be supported by an authority letter from the manufacturer authorizing the dealer /supplier to tender on their behalf as per **Annexure-D**. In case of manufacturer, a certificate or a copy thereof to the effect that the bidder is a manufacturer of the Equipment /Item must be accompanied with the technical bid.

20. The supplier will be responsible till the entire stores contracted for, arrive in good condition at destination.

21. The tenderer should not have been debarred and/ or blacklisted by any Central Government/ or any State Government Department(s) . This must be supported by an affidavit as per format given in **Annexure-"E"**.

22. If any information furnished by the bidder is, at any stage found to be incorrect/false/fabricated, the Institute shall have the absolute right to forfeit the EMD, warranty/performance guarantees or/and security deposits, in addition to cancellation of contract, and in accordance with law, such other actions may be taken like black-listing of the bidder etc.

Read and Accepted.

(Signature & Stamp of Tenderer)

TENDER EVALUATION

Institute will evaluate all the proposals to determine whether these are complete in all respects as specified in the tender document. Evaluation of the proposals shall be done in two stages as:

(a) Stage – I (Technical Evaluation):

(i) Institute shall evaluate the technical bid(s) to determine the following like the bid qualifies the essential eligibility criteria or not , the tenderer has submitted the EMD & Tender fee or not, any computational errors have been made or not, all the documents have been properly filled or otherwise, all the documents have been submitted/ uploaded with technical bid or not, the specifications, Make/Model, Catalogue of quoted Equipment /Item are as per requirement tender specifications or not, Authorization of Dealer / Distributor/ Exclusive Agent certificate from manufacturer is in order or not, Sales & service policy of equipment / item during warranty period and after warranty period will also be seen, location of their authorized service centre will also be seen for evaluation etc.

After evaluation of technical bid(s), a list of the qualifying tenderer (s)/ bidder s) shall be made. Short-listed tenderer(s) will be informed of the date, time and place of opening of financial bid(s) and they may attend or depute their authorized representative/s to attend the schedule of opening of financial bid(s) on the scheduled date and time, if they wish to do so. The representative(s) should have a letter of authority to attend the price bid(s) opening event.

Read and Accepted

(Signature & Stamp of Tenderer)

PART – II (e-FINANCIAL BID):

a) Bidders should offer the rates as per the format of BOQ as available on CPP Portal**. Detailed bill of material/quantity is also to be provided along with the price breakup of each item as per requirement of the tendered specification of the equipment in the online price bid at CPP Portal.**

❖ **Note: The quoted amount as filled in the Annexure(s) of online financial bid and detailed bill of material/quantity provided with price break up of each item in the online financial bid should be tallied and both must be same, otherwise bid will be treated invalid.**

b) Conversion to Single Currency: To facilitate evaluation and comparison, the Institute will convert all the bid prices expressed in the amounts in various currencies to the Indian Rupees as per the TT selling rates of RBI on the date of opening of technical bids.

c) Custom, GST or any other taxes, Education Cess and other charges must be mentioned in the price bid. The financial evaluation/comparison will be made after including all the above mentioned charges/taxes.

Read and Accepted.

(Signature & Stamp of Tenderer)

ARBITRATION:

In case of any dispute or difference arising out in connection with the tender conditions/job order/Contract, the Institute and the Seller/Service Provider will address the dispute/difference for a mutual resolution and failing which, the matter shall be referred for arbitration to a sole Arbitrator to be appointed by the Institute.

The Arbitration shall be held in accordance with the provisions of the Arbitration and Conciliation Act, 1996 and the venue of arbitration shall be at Jalandhar only. The decision of the Arbitrator shall be final and binding on both the parties.

JURISDICTION:

The courts at Jalandhar alone will have the jurisdiction to trial any matter, dispute or reference between parties arising out of this tender / contract. It is specifically agreed that no court outside and other than Jalandhar Court shall have jurisdiction in the matter.

Read and Accepted.

(Signature & Stamp of Tenderer)

(TERMS AND CONDITIONS (FOR THE SUPPLY OF GOODS, EQUIPMENT /ITEM)

1. Rate should be quoted F.O.R NIT Jalandhar.

2. a) For Foreign Import goods/ Equipment, the rates will be evaluated on DAP basis alongwith the item/equipment to be supplied in Indian rupees (If any). Therefore, rates should be quoted on DAP basis with separately mentioning of CIF or FOB charges. The complete description viz. make and model of the Equipment / item and name of the manufacturer must be clearly indicated. The equipment should be insured upto NIT, Jalandhar. Institute will provide all the documents regarding custom clearance.

b) e-Bids found without quoted upto DAP NIT value shall be treated as invalid.

3. Where the Equipment / Machinery/ Instrument are composed of several sub units/components, the rate should be quoted for each subunit/component separately. NIT Jalandhar reserves the right to increase or decrease the number of sub units/components and number of Equipment / Machinery/ Instrument according to its requirements.

4. The institute being government educational institute is having Excise and Custom duty exemption in terms of government notification No. 51/96-customs Dt. 23-7-1996 and No. 10/97-central excise Dt. 1-3- 1997 as amended from time to time, therefore taxes be quoted accordingly and this must be depicted in Price Bid clearly.

5. a) The tenderer(s) who are quoting rates in foreign currency should quote Custom Duty for import (Foreign) goods against Custom Duty Exemption Certificate. The tenders claiming custom duty as extra should specifically give the present rate of Custom Duty as payable against each Equipment /Item. The custom duty so claimed will be reimburse on custom duty receipt basis.

b) The tenderer(s) who are quoting rates in Indian Rupees, the rates should be quoted inclusive of custom Duty against Custom Duty Exemption Certificate (if any). No custom duty will be paid separately. Only custom duty certificate will be provided.

6. GST or any other chargeable duty where applicable must be specifically mentioned, failing which no tax or duty will be allowed at subsequent stage.

7. All items shall be indicated both in words as well as in figures. If there is difference between amount quoted in words and figures, amount quoted in words shall prevail.

Read and Accepted. **(Signature & Stamp of Tenderer)**

8. Payment:

(a) 100% payment will be made against physical delivery, inspection, installation, training of the Equipment/Machinery/Instrument etc in the institute, receipt of satisfactory working report of the Equipment / Machinery/Instrument etc and receipt of Performance Bank Guarantee @ 3%.

b) **For Import Equipment /Item:** 90% of the DAP value of the equipment will be released, through irrevocable Letter of Credit (LC)/ Wire Transfer/ foreign draft/ draft at sight document. Balance 10% of the DAP value will be released after inspection, installation, training and performance bank guarantee of the Equipment / Machinery/Instrument etc in the institute. The payment charged by bidder on account of custom clearance, loading/unloading, transportation, insurance etc. as per price bid and delivery up to NIT, Jalandhar will be reimbursed against actual receipt basis in Indian rupees.

In case of payment through Letter of Credit, all the Bank charges within India will be borne by NIT Jalandhar and all bank charges outside India will be borne by the supplier.

9. Warranty: Rates should be quoted with comprehensive warranty. Besides this, policy regarding after sale service on the expiry of warranty period of Equipment / Machinery/Instrument etc may be explained. The bidders should attach duly signed and stamped certificate of **warranty** as per **Annexure-F** with the technical bid.

10. Training: In house training (where applicable) after the installation and commissioning of Equipment / Machinery/Instrument etc shall be provided by the supplier.

11. Delivery: Delivery date will be mentioned in the supply order. The time and date of delivery or dispatch stipulated in a supply order shall be deemed to be the essence of the supply order and if the supplier fails to deliver or dispatch any consignment within the period prescribed for such delivery, the delayed consignment will be accepted subject to penalty as laid down in the supply order, which will be recovered from the pending payments.

1. No recovery of penalty will be made, if the delayed supplies are acceptable by extending the delivery period by the Director with our any LD charges.

2. Director will allow extension on the request of the supplier by recording in writing that in exceptional circumstances the supply was beyond the control of the supplier and there was no loss to the institute.

3. Penalty on account of delay, Director NIT, Jalandhar reserves the right to impose 0.5% (Half) per cent penalty per week on account of delay in supply, if delivery received after expiry of the original delivery period. The total penalty will not exceed 10% of the value of the delayed goods.

Read and Accepted. **(Signature & Stamp of Tenderer)**

12. Installation: Supplier has to install the Equipment / Machinery/ Instrument within two to three weeks from the receipt of the Equipment / Machinery/Instrument etc in NIT Jalandhar.

13. Spares and Accessories, wherever required should be quoted separately and clearly, even if these are not asked for.

14. Site Preparation: The supplier shall inform NIT Jalandhar about the site preparation, if any, needed for the installation, immediately after receipt of the supply order. Supplier must provide complete details regarding space and all infrastructural requirements needed for the Equipment / Machinery/Instrument etc which NIT Jalandhar should arrange before the arrival of Equipment / Machinery/Instrument etc to ensure its early installation and smooth operation thereafter. The supplier may offer his advice and render assistance to NIT Jalandhar in the preparation of the site and other pre installation requirements.

15. The total scope of work includes the supply, installation, satisfactory commissioning and testing of the Equipment / Machinery/Instrument etc by the supplier, training at NIT Jalandhar, method development and validation for parameters as mentioned in specifications at **Annexure-A**. The supplier will complete installation & Commissioning of Machine within two to three weeks from the date of receipt of Equipment / Machinery/Instrument etc of NITJ.

16. Details about the service center for the quoted Equipment / Machinery/Instrument etc. in India may be mentioned.

Read and Accepted.

(Signature & Stamp of Tenderer)

SPECIAL CONDITIONS FOR SUBMITTING BID IN FOREIGN CURRENCY BY THE INDIAN AGENTS/DEALERS:

1. The Tenderer should submit the following documents/information while quoting:
   a) Foreign Principal's Performa invoice/quote indicating the commission payable to the Indian Agent and nature of after sales service to be rendered by the Indian Agent.
   b) Copy of Agency agreement with the Foreign Principal and the Indian Agent, precise relationship between them and their mutual interest in the business.
   c) Agency Commission will be paid in only Indian Currency.
   d) Compliance of the tax laws by the Indian Agent.
2. The following information/documents are to be submitted wherever applicable.
   - Product Literature.
   - The earliest delivery period and country of origin of the Stores.
   - Banker's name, address, telephone/fax Nos. &e-Mail ID of the Contractor.
   - The approximate net and gross weight and dimensions of packages/cases.
   - Recommended spares for satisfactory operation for a minimum period of one year.
   - Details of any technical service, if required for erection, assembly, commissioning and demonstration.
3. The FOB/FCA and C & F prices quoted should be inclusive of all taxes, levies, duties arising in the tenderer's country.
4. Samples, if called for, should be sent free of cost.
5. The offer should be accompanied with with a certification that the quoted item/items has/have not been restricted or canalized under ITC (HS) classification of Import & Export items.
6. The authority of person signing the tender, if called for, shall be produced.
7. Instructions/ Operation Manual containing all assembly details including wiring diagrams should be sent wherever necessary in duplicate. All documents/ correspondence should be in English language only.
8. It is expressly agreed that the acceptance of the Stores Contracted for, is subject to final approval in writing by the Purchaser.
9. Part shipment is not allowed unless specifically allowed by the Institute.
10. Inspection/ Test Certificate (if required) should be provided.

Read and Accepted.

(Signature & Stamp of Tenderer)

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Acceptance

We_____ read and accept the instructions to the tenderer, terms & conditions and all other documents as mentioned in the tender and shall Comply with them strictly.

Name of Bidder _____

Signature

Address _____

Seal of firm:

_____

_____

Date:

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Questionnaires A & B

QUESTIONNAIRE FOR PLANT & MACHINARY

Note: Please submit the reply in detail and also enclose the necessary documents with proof where required as per Questionnaire. These documents must be submitted in the technical bid document.

Please state that you have submitted your quotations as per procedure mentioned below:-

- Bids consisting of technical details bringing out clearly in a separate sheet ,the deviation in the specifications if any from that of tender enquiry specifications along with commercial terms and tender form.

1. Please attach list dully signed by you, for such spare parts and tools which are absolutely essential for proper maintenance and operation of machine for a period of two years giving full particulars of spare and tool with a price of each spare parts and tools separately.
2. Please confirm that you have adequate servicing and spare parts facilities in India in respect of Equipment /Item tendered by you or that you should arrange to provide such facilities simultaneously.
3. Please indicate that you guaranteed that before going out of production of spare parts, you will give adequate advance notice to the purchaser so that the institute may order his requirements of spares in one lot ,if he so desire.
4. Please indicate that you guaranteed that if you go out of production of spare parts, then you will make available prints, drawings of the spare parts and specifications of the material at no cost if and when required in connection with Equipment /Item to enable the purchaser to fabricate or procure spare parts from other sources.
5. Please confirm that you undertake to enter into a rate contact with the purchaser to supply spare parts on an agreed basis for an agreed period.
6. Status:-
   a) Indicate whether you are ISU or SSI
   b) Are you registered with Government e-Marketing (GeM) for the item quoted? If so indicate whether there is any monetary limit or registration.
   c) If you are a small scale unit registered with NSIC under single point registration scheme whether there is monetary limit.
7. a) If you are registered either with NSIC or with Government e-Marketing (GeM), please State whether you are registered with Directorate of industries of the state government concerned.

   b) If so, confirm whether you have attached a copy of the certificate, issued by Director of industries.
8. Please indicate:-
   Name & Full Address of your Banker
9. Please indicate whether you agree to submit advance samples if called upon to do so within the specified period of 21 days.

10. Business name and constitution of firm:-
    i)The Indian company Act.1956
    ii)Indian partnership Act.1932
    iii)Any act, if not, who are the owner/partners (please give full name and address)

11. Whether the tendering firm is / are:-
    i) Manufacturers authorized agents
    ii) Holders stock of the stores tendered for
    iii) **NBI manufacturer's agents please enclose with tender the copy of manufacturer's authorization.**

12. Please state whether the inspection clause is acceptable to you

13. Here state specifically:-
    i) Whether the price quoted by you is to the best of your knowledge and belief is not more than the price usually charged by you on stores of the same natures, class of description to any private purchase either foreign or as well as government purchaser. If not state the reason thereof if any also indicates the margin of Difference.

    ii) In respect of indigenous items for which there is a controlled price fixed by law, the price quoted shall not be higher than that the controlled price and rates available on DGS&D/ Government e-Marketing (GeM) contract. The reason thereof should be stated.

14. State whether business dealing with you has been banned by Ministry /Department of supply or any other Govt. Department.

15. Please confirm that you have read all the instruction carefully and have complied with accordingly.

(Signature of Tenderer)

(_____)
1. Full Name & Address of the person signing

(_____)
2. Whether signing as proprietor /partners

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PROFORMA FOR PERFORMANCE STATEMENT
(For the Period of last 3 years)

e-Tender Notice – NITJ/PUR/ICE/UNDER HEFA/128/2020/e-Tender No.81/2020

Sr.No.	Order (full placed address of purchaser)	Order No. & Dated	Description And Qty. of Stores Ordered	Value of Order	Date of Completion of delivery	Has the Equipment/Item been satisfactory commissioned

Annexure "A"

TENDER

TECHNICAL SPECIFICATIONS

Basic Electropneumatic Training Kit with Industrial Automation

Technical Specifications:

1. The Automation system shall be modular with all required accessories and components for R&D and academic experiments on Industry 4.0 and IIoT.
2. Must support IIoT (Industrial Internet of Things) and Ideal for academics and research
3. The Automation System should be including PLC Technology, Pneumatic Technology, Hydraulic Technology, Sensor Technology and Virtual reality technology.
4. The Automation System should be five working application station.
5. Each station should be including PLC with colored HD 7" HMI.
6. Apart from five station at least one should be **Hydraulic** based and remaining can be with pneumatic based applications.
7. All station should be compatible with virtual automation SCADA software with 3D facility and ladder programming software should be having facility for offline and online programming for siemens, Allen Bradely, Mitsubishi, Schneider, ABB PLC etc.
8. All stations are compatible with Industry 4.0 and technical support for further development should be required from scope of supplier.
9. All stations are compatible with virtual reality and single user software license and technical support for further development should be required from scope of supplier.
10. All stations should be standalone in working and will be use in different combination within minimum 2-3 different applications.
11. All stations should be provided with standard minimum 40 x 40 mm Aluminum profile-based station.
12. It should be portable and easy to transportation with high quality castor wheels.
13. All the products should be provided with suitable one touch fittings.
14. All the components used shall be of Industrial make and support from OEM for software's should be required.
15. Bidder should be providing the learning resources with step-by-step interactive learning platform –Pneumatics, electro pneumatics, programmable logic controllers, Hydraulic, Electro-Hydraulic, Industry 4.0, IIoT (Industrial Internet of Things), cloud technology and VR technology.
16. Experiment and Technical manual to be supplied – 1 set hard copy and 1 set soft copy with the equipment's

List of Experiment:

1. To build a mechatronics system for industrial scenarios using Industry 4.0, Pneumatic and Hydraulic and PLC Technology (Tab and computer interface both).
2. To study the concept of industry 4.0 and IIoT with latest communication protocols
3. To understand the concepts of technology Mechanics, Pneumatics, Vacuum, Electrical drives. Sensors, PLC controls, Communication interfaces.
4. To Learn about Mechanical set up of a Machine for industrial automation.
5. To learn about Pneumatic linear and Rotary drives for automation.
6. To know about the Pneumatic & Electrical connections for automation.
7. Selection of sensors for various applications.
8. Material handling techniques like conveyor, linear or rotary pick and place units for automation.
9. PLC programming using Ladder Logic.
10. Fault finding techniques for industrial automation unit.
11. To control conveyor belt using PLC

12. To find out the direct kinematics of the robot.
13. To plan a trajectory for specific task of the manipulator using teaching unit

Technical System: The system should be combination of the following stations:

Sr.No.	Application Station	Qty in Nos.
1.	Feeder Station	01
2.	Inspection Station (Hydraulic)	01
3.	Buffer Station (with conveyor or Modular Transportation system)	01
4.	Process Station (drilling or any other process)	01
5.	Sorting and assembling Station	01
6.	Virtual Automation Software-Single User.	01
7.	Virtual Reality Software-Single User.	01
8.	Industry 4.0 software platform	01

1.Feeder Station

The Feeder Station should be possible to separate the components from the Stack Magazine and distribute the components one by one via rotary pick and place module for further processing. The Station should be consisting of the following major parts

- Dispensing module
- Rotary Pick and Place module
- Horizontal Profile Table work bench with castor wheels
- PLC Board
- Control Console
- I/O Interface Module
- Valve manifold

The Dispensing module should separate the jobs stacked in magazine tube with the help of pneumatic cylinder and provisions should be made for detecting the availability of jobs with optical sensors. Rotary Pick and Place module should have a rotary actuator with an arm and suction cup to pick up work pieces and relocate them to positions from '0 degree to 180 degrees' on horizontal plane, so as to feed the subsequent stations. The end position of all pneumatic actuators should be detected by using Magnetic sensors.

The feeder station should consist of aluminum anodized profile table, filter regulator and lubricator unit with pressure gauge, solenoid valve, one touch fittings mounted with suitable mountings for easy assembly and disassembly.

Networking and signaling the subsequent station for further processing should be done by establishing I/O communication between the PLC's of subsequent stations and IoT as per industry 4.0. The PLC used for the station should be capable of handling digital inputs and outputs, and it should have Ethernet interface to communicate with PC for programming

Scope of supply:

S. No	Item with description for Feeder Station	Qty
1.	**Horizontal Aluminum profile table**: a. Minimum (L x W x H)- 540 x 640 x 790 mm b. Aluminum profile with minimum Table top profile – 40 x 160 mm Supporting profile- 40 x 40 mm c. Grid spacing (From slot to slot) – 40 mm d. Profile groove width minimum – 8.3 mm e. Leveling casters for quick setting and smooth movement f. Profile plate connectors: Minimum Length 55 mm, thickness 5mm Mounting method M6 Socket head screw with M6 hammer head nut	1
2.	**I/O Interface module**: a. 25 Pin D-Sub connector interface board for interfacing valves and actuators b. 25 Pin D-Sub cable for transferring the I/O to the terminals which in turn are to be connected to PLC	1
3.	**Valve Manifold minimum requirement with minimum of:** a) L x W x H: 60 X 26.5 X 65 mm b) Grid spacing – 19 mm c) Mountable valve port size 1/8" d) Provided with Conical silencers for reducing the dB level of exhausted air e) 5/2 Double solenoid pilot operated valve: Material- Extruded aluminum with anodized Finish, Size – 1/8", Design – Spool type, Pressure range – 2 to 10 bar, Flow rate – 450 l / min, Manual override-Resetting, Fitted with 1/8" flow control valve for varying the flow	1
4.	**Filter Regulator Combination with Lubricator** (FRL Unit) with pressure gauge and start up valve: a) Port size -1/4 inch b) Flow rate – 500 l/min c) Maximum supply pressure – 10 bar d) Operating pressure- 6 bar e) Filtering element grade – 40 µm f) Minimum operating flow – 12 l/min g) Filter Bowl capacity – 9 ml h) Lubricator Bowl capacity – 20 ml i) Connection for tube 8 dia input and 8 dia output j) Mounting – Socket head cap screw with M6 hammer head nut	1
5.	**Stack Magazine module**: a) Comprising of Miniature cylinder of minimum diameter of 25 and stroke 80 mm Height: 516 mm, Width: 125 mm and Length: 390 mm b) Magnetic sensor for position sensing c) Light barrier Module:Type: Infra -red, Sensing range: 2m, Supply Voltage and Current: 10 to 30V DC (10% max. ripple) @ 20 mA max current, Switch output:	1

	PNP, normally open/normally, Output Protection: Protected against false pulse on closed contact power- up, short-circuit protected	
6.	**Rotary Pick & Place Module**: a) Cylinder rotation angle (rotary cylinder fitted with shock absorbers),180 degrees (freely selectable) b) Compact guided cylinder minimum Dia 40 mm, Stroke – 50 mm c) Height minimum: 325.5 mm, Width: 127 mm, Length: 223 mm d) Magnetic sensor for position sensing	1
7.	**Vacuum Ejector Module**: a) Integrated energy saving function b) Brightly-lit display screen or LED bar display c) Automatic blow off function d) Vacuum Ejector module shall capable of handling 100gm	1
8.	**Control console:** a) Cycle start push button –Green with illuminated b) Auto /Manual selector switch -Black c) Home position push button –Red with illuminated d) Emergency button -Red	1
9.	**Cable ducts and accessories:** a) Wire duct size minimum 45x25 b) With Fastening screws	1
10.	**PLC control panel with S7 1200 PLC or equivalent:** a) Power supply: Input voltage :230/115 V AC (47 – 63 Hz), Output voltage: 24 V DC, short-circuit-proof Output current: Maximum 3A b) Miniature circuit breaker DC voltage with max.5A current rating c) Digital inputs-14,Digital outputs 10, Analog inputs 2Ethernet interface 1 x TCP/IP, 10 Mbit/s d) Terminal blocks e) 25pin D-sub I/O data cable length 1.5 m, wire used 0.25 mm^2 f) Sifficient Cable ducts g) Profinet/modbus or any suitable communcation cable for PLC to computer and actuators h) Power Connection cable:3pin plug with length of 1.3m i) Lisensed software with emulator	1
11.	**Technical documents for Feeder Station**: Should contain complete technical details of the station according to DIN ISO 1219 standard. It should include Pneumatic circuit, Electrical circuit, IO list, Functional description etc.,	1
12.	**Pneumatic power supply source:** Suitable pneumatic power supply unit (compressor) with all safety components	1

2.Insepction Station (hydraulic)

The Inspection station should be possible to measure the height of the components received from its downstream station and transfer the correct and incorrect components to appropriate slides.

The Inspection station should be consisting of the following major parts

- Measuring module
- Horizontal Profile Table work bench with castor wheels

- PLC Board
- Control Console
- I/O interface module
- Valve manifold
- Slide module

Measuring module should check the jobs for height of about minimum 25 mm (diameter as suitable to move over conveyor belt and modular power roller transportation system) using analog sensors and provisions should be made to detect work piece availability with the help of optical or capacitive sensors. An arrangement is to be provided to transfer the right work piece by a slide to the next station and send faulty rejected work piece to the rejection bay.

The inspection station should consist of aluminum anodized profile table, filter regulator and lubricator unit with pressure gauge, solenoid valve, one touch fittings mounted with suitable mountings for easy assembly and disassembly

Networking and signaling the subsequent station for further processing should be done by establishing I/O communication between the PLC's of subsequent stations. The PLC used in this station should be capable of handling various digital inputs/ outputs and analog inputs, and it should have Ethernet interface to communicate with PC for programming

Scope of supply:

S. No	Item with description for Inspection Station	Qty
1.	**Horizontal Aluminum profile table with minimum of:** a. (L x W x H)- 540 x 640 x 790 mm b. Aluminum profile: Table top profile minimum -40 x 160 mm, Supporting profile- 40 x 40 mm c. Grid spacing (From slot to slot) – 40 mm d. Profile groove width – 8.3 mm e. Leveling casters for quick setting and smooth movement f. Profile plate connectors: Length 55 mm, thickness 5mm Mounting method M6 Socket head screw with M6 hammer head nut	1
2.	**I/O Interface module:** a. 25 Pin D-Sub connector interface board for interfacing valves and actuators b. 25 Pin D-Sub cable for transferring the I/O to the terminals which in turn are to be connected to PLC	1
3.	**Valve Manifold with minimum:** a) L x W x H: 60 X 26.5 X 65 mm b) Grid spacing nearly – 19 mm c) Mountable valve port size 1/8" d) 5/2 Double solenoid pilot operated valve: Material- Extruded aluminum with anodized Finish, Size – 1/8 ", Design – Spool type, Hydraulic Pressure range – 2 – 10 bar or any suitable range, Manual override- Resetting, Fitted with 1/8" flow control valve for varying the flow	1
4.	**Filter Regulator Combination with oil pressure gauge and start up valve:** a) Port size -1/4 inch or as per the specifications of interfacing components	1

	b) Operating pressure- 6 bar or as suitable for hydraulic cylinder c) Connection for tube nearly 8 dia input and 8 dia output or as per other elements	
5.	**Measuring Module:** a) Hydraulic Linear Drive or equivalent motion b) LVDT with signal conditioner: Maximum permissible applied voltage – 42V Output: 4 – 20 mA, Overall length – 94.4 mm+- 5mm c) Diffuse Sensor: Type: Infra-red, Sensing range: 15mm+-5mm, Supply Voltage and Current: 10 to 30V DC (10% max. ripple) @ 20 mA max current. Switch output: PNP, normally open/normally closed contact Output Protection: Protected against false pulse on power-up, short-circuit protected	1
6.	**Approve and rejection Slide Module**	1
7.	**Control console**: a) Cycle start push button (high quality) –Green with illuminated b) Auto /Manual selector switch (high quality) -Black c) Home position push button –Red with illuminated d) Emergency button (High quality) -Red	1
8.	**Cable duct and accessories:** a) Wire duct size 45x25 with Fastening screws etc.	1
9.	**PLC control panel** with S7 1200 PLC or equivalent: a) Power supply: Input voltage :230/115 V AC (47 – 63 Hz), Output voltage: 24 V DC, short-circuit-proof Output current: Maximum 3A b) Miniature circuit breaker DC voltage with max.5A current rating c) Digital inputs-14,Digital outputs 10, Analog inputs 2Ethernet interface 1 x TCP/IP, 10 Mbit/s d) Analogue module: Analogue input(4-20mA) e) Terminal blocks f) 25pin D-sub I/O data cable length 1.5 m, wire used 0.25 mm^2 g) Cable ducts h) Power Connection cable:3pin plug with length of 1.3m	1
10.	Technical documents for Inspection Station: Should contain complete technical details of the station according. It should include Hydraulic circuit, Electrical circuit, IO list, Functional description etc.	1
11.	Hydraulic power unit (hydraulic compressor with reservoir) with sufficient fluid as per the requirements to carry out the operation	1

3. Buffer Station (Electro Pneumatic)

Buffer Station should ensure steady flow of components to the process station by allowing one component at a time for processing. It should be able to store up to 5 work pieces at a time and if the count has exceeded 5, it should communicate with the upstream stations to hold the supply of the job until there is a demand from the downstream station.

Buffer Station consists of the following

- Conveyor module or modular transportation system (Power roller conveyor type)
- Horizontal Profile Table work bench with castor wheels
- PLC Board
- Control Console

- I/O interface module
- Valve manifold

Buffer station should be capable of buffering up to 5 jobs. Buffering process should be controlled by a separator using upstream and downstream photo electric sensors and Bar code or QR code detector. **Retro reflective sensor** and **Bar code detector/QR code scanner** is to be used to detect the inserted job and keep tag on the numbers of jobs buffered precisely while the separator module passes the job to the next station, if the transfer point is free. The buffer station should wait for the signal from the downstream station for transferring the job. The end position of all pneumatic actuators is detected by using Magnetic sensors.

The buffer station consists of aluminum anodized profile plate, filter regulator and lubricator unit with pressure gauge, on/off valve quick push connections and couplings mounted with suitable mountings for easy assembly and disassembly.

Conveyor module should be driven by DC motor along with the driver unit which has provisions to change the speed, the direction of rotation and other functions. A retro reflective sensor should be provided at the beginning of the conveyor to detect the presence of job. Pneumatically actuated separator module should be provided for performing the buffer action. Through beam sensor to be provided for subtracting the count after the work piece has reached the separator module. Diffuse sensor should be used to detect the presence of object between the separator module.

Networking and signaling the subsequent station for further processing should be done by establishing I/O communication between the PLC's of subsequent stations. The PLC used in this station should be capable of handling various digital inputs/ outputs, and it should have Ethernet interface to communicate with PC for programming.

Or

Conveyor system can be modular transportation system with minimum three module using roller power conveyor system fitted with sensor to sense the article moving over the roller conveyor system. It is required to run the rollers only where the job is moving over the rollers. All three modules must be detachable and must have user friendly connections to make them tubular form. Modular transportation system must be transparent rectangular tube so that student can see the flow of items.

Scope of supply:

S. No	Item with description	Qty
1.	Horizontal Aluminium profile table minimum of following or with modules: a. (L x W x H)- 540 x 640 x 790 mm b. Aluminium profile Table top profile – 40 x 160 mm Supporting profile- 40 x 40 mm c. Grid spacing (From slot to slot) – 40 mm d. Profile groove width – 8.3 mm e. Leveling casters for quick setting and smooth movement	1

	f. Profile plate connectors: Length 55 mm, thickness 5mm Mounting method M6 Socket head screw with M6 hammer head nut	
2.	I/O Interface module: a. 25 Pin D-Sub connector interface board for interfacing valves and actuators b. 25 Pin D-Sub cable for transferring the I/O to the terminals which in turn are to be connected to PLC	1
3.	Valve Manifold: a) L x W x H: 60 X 26.5 X 65 mm b) Grid spacing –19 mm c) Mountable valve port size 1/8" d) Provided with Conical silencers for reducing the dB level of exhausted air e) 5/2 Double solenoid pilot operated valve: Material- Extruded aluminum with anodized Finish Size – 1/8 " Design – Spool type Pressure range – 2 – 10 bar Flow rate – 450 l / min Manual override- Resetting Fitted with 1/8" flow control valve for varying the flow	1
4.	Filter Regulator Combination with Lubricator (FRL Unit) with pressure gauge and start up valve: a) Port size -1/4 inch b) Flow rate – 500 l/min c) Maximum supply pressure – 10 bar d) Operating pressure- 6 bar e) Filtering element grade – 40 µm f) Minimum operating flow – 12 l/min g) Filter Bowl capacity – 9 ml h) Lubricator Bowl capacity – 20 ml i) Connection for tube 8 dia input and 8 dia output j) Mounting – Socket head cap screw with M6 hammer head nut	1
5.	**Conveyor Module** or **Modular transportation module**: (Flat Belt or power roller type modular as mentioned above) a) Flat belt conveyor or modular power roller drive, belt conveyor must be with overall length of minimum 500mm b) If modular roller conveyor system one module must be of minimum 350mm length maximum three modules c) Conveyor/power rollers to be driven by 24V DC motor of reputed make d) Conveyor/power rollers are to be provided with electronic drive unit for regulating the speed, reversing the direction and other function e) Separator Module: Comprising of 2 pneumatic cylinders of dia 25 mm and stroke 25mm f) Retro reflective -Photo electric sensor (Upstream): I. Type: Infra-red II. Sensing range: 2m III. Supply Voltage and Current: 10 to 30V DC (10% max. ripple) IV. @20mA max current V. Switch output: PNP, normally open/normally closed contact VI. Output Protection: Protected against false pulse on power-up,short circuit protected b) Thru beam -Photo electric sensor (Downstream):	1

	I. Type: Infra-red II. Sensing range: 2m III. Supply Voltage and Current: 10 to 30V DC (10% max. ripple) @ 20 mA max current IV. Switch output: PNP, normally open/normally closed contact V. Output Protection: Protected against false pulse on power-up, short-circuit protected c) Diffuse Sensor - Photo electric: I. Type: Infra-red II. Sensing range: 15mm III. Supply Voltage and Current: 10 to 30V DC (10% max. ripple) @ 20 mA max current IV. Switch output: PNP, normally open/normally closed contact V. Output Protection: Protected against false pulse on power-up, short-circuit protected d) **Bar code or QR code detector** scanner sensor: few jobs must be with bar code or QR code for different experiments on sorting process	
6.	Control console: a) Cycle start push button –Green with illuminated b) Auto /Manual selector switch -Black c) Home position push button –Red with illuminated d) Emergency button -Red	1
7.	Cable duct and accessories: a) Wire duct size 45x25 b) Fastening screws	1
8.	PLC control panel with S7 1200 PLC or equivalent: a) Power supply: Input voltage :230/115 V AC (47 – 63 Hz), Output voltage: 24 V DC, short-circuit-proof Output current: Maximum 3A b) Miniature circuit breaker DC voltage with max.5A current rating c) Digital inputs-14,Digital outputs 10, Analog inputs 2Ethernet interface 1 x TCP/IP, 10 Mbit/s d) Terminal blocks e) 25pin D-sub I/O data cable length 1.5 m, wire used 0.25 mm^2 f) Cable ducts g) Power Connection cable:3pin plug with length of 1.3m	1
12.	Technical documents for Buffer Station: Should contain complete technical details of the station according to DIN ISO 1219 standard. It should include Pneumatic circuit, Electrical circuit, IO list, Functional description, must compatible with Industry 4.0 and IoT etc.,	1

4.Process Station

The Process Station should be possible to demonstrate drilling operation or any other suitable operation on a pneumatically driven rotary indexing table or any other actuator (electrical/hydraulic) and transfer the work piece via Pick and place module to downstream Station. The Process Station should be consisting of the following

- Rotary Indexing table module or any other equipment to handle the job
- Drilling module or any other operation such as capping
- Linear Pick and Place module
- Horizontal Profile Table work bench with castor wheels

- PLC Board, Control Console, I/O interface module
- Valve manifold

The processing station should be capable of demonstrating drilling operation using a pneumatically driven drilling machine etc. for jobs placed on pneumatically operated rotary indexing table. A pneumatic linear drive module should move the drill unit up and down. Provisions should be made to sense the presence of the incoming work piece in order to proceed with further operation. The station should be provided with linear pick and place module to transfer the job to the next station.

The station should consist of aluminum anodized profile plate, filter regulator and lubricator unit with pressure gauge, on/off valve quick push connections and couplings mounted with suitable mountings for easy assembly and disassembly.

The rotary indexing table should be driven by a pneumatic cylinder to index the jobs/ or any other process operation at an angle of 60 degrees/each time. Aluminum anodized plate can be mounted on top of the rotary indexing table with a provision to sense the presence of the incoming work piece in order to proceed with further operation. Drilling module should consist of a drilling machine and the up and down movement of the drilling machine should be carried out using pneumatic linear drive unit. The transfer of work piece to the subsequent station should be done by a linear pick and place unit with vacuum cups as the end effector. The end position of all pneumatic actuators is detected by using Magnetic sensors.

Networking and signaling the subsequent station for further processing should be done by establishing I/O communication between the PLC's of subsequent stations. The PLC used in this station should be capable of handling various digital inputs/ outputs, and it should have Ethernet interface to communicate with PC for programming

Scope of supply:

S. No	Item with description	Qty
1.	Horizontal Aluminium profile table with minimum: a. (L x W x H)- 540 x 640 x 790 mm b. Aluminium profile Table top profile – 40 x 160 mm Supporting profile- 40 x 40 mm c. Grid spacing(From slot to slot) – 40 mm d. Profile groove width – 8.3 mm e. Leveling casters for quick setting and smooth movement f. Profile plate connectors: Length 55 mm, thickness 5mm Mounting method M6 Socket head screw with M6 hammer head nut	1
2.	I/O Interface module: a. 25 Pin D-Sub connector interface board for interfacing valves and actuators b. 25 Pin D-Sub cable for transferring the I/O to the terminals which in turn are to be connected to PLC	1
3.	Valve Manifold:	1

	a) L x W x H : 60 X 26.5 X 65 mm b) Grid spacing – 19 mm c) Mountable valve port size 1/8" d) Provided with Conical silencers for reducing the dB level of exhausted air e) 5/2 Double solenoid pilot operated valve: Material- Extruded aluminium with anodized Finish Size – 1/8 " Design – Spool type Pressure range – 2 – 10 bar Flow rate – 450 l / min Manual override- Resetting Fitted with 1/8" flow control valve for varying the flow	
4.	Filter Regulator Combination with Lubricator (FRL Unit) with pressure gauge and start up valve: a) Port size -1/4 inch b) Flow rate – 500 l/min c) Maximum supply pressure – 10 bar d) Operating pressure- 6 bar e) Filtering element grade – 40 µm f) Minimum operating flow – 12 l/min g) Filter Bowl capacity – 9 ml h) Lubricator Bowl capacity – 20 ml i) Connection for tube 8 dia input and 8 dia output j) Mounting – Socket head cap screw with M6 hammer head nut	1
6.	Rotary indexing table module or any other system: a) Pneumatically driven rotary indexing table capable of handling load upto 50 kg b) Indexing table to be driven by cylinder of Ø 40 x 75 mm c) Indexing angle 60 degrees d) Indexing plate diameter-320 mm e) Diffuse Sensor: Type: Infra red Sensing range: 15mm Supply Voltage and Current: 10 to 30V DC (10% max. ripple) @ 20 mA max current Switch output: PNP, normally open/normally closed contact Output Protection: Protected against false pulse on power-up, short-circuit protected	1
7.	Drilling Module or other operation such as capping: a) Drilling machine to be mounted on pneumatic linear drive of stroke 100mm b) Pneumatic drilling machine: No-load Speed: 3000 rpm, Weight: 1.4 Kg	1`
8.	Pick and Place module a) Rod less cylinder – dia 25 mm x 250 mm stroke b) Aluminium profile pillar – 80 x 80 mm c) Rod less cylinder mounting profile- 40 x 40 mm d) Twin rod cylinder- 15 mm stroke length e) Vacuum gripper with suction pad	1
9.	Control console: a) Cycle start push button –Green with illuminated b) Auto /Manual selector switch -Black c) Home position push button –Red with illuminated d) Emergency button -Red	1

10.	Vacuum Ejector Module: a) Integrated energy saving function b) Brightly-lit display screen or LED bar display c) Automatic blow off function d) Vacuum Ejector module shall capable of handling 100gm	1
11.	Cable duct and accessories: a) Wire duct size 45x25 b) Fastening screws	1
12.	PLC control panel with S7 1200 PLC: a) Power supply: Input voltage :230/115 V AC (47 – 63 Hz), Output voltage: 24 V DC, short-circuit-proof Output current: Maximum 3A b) Miniature circuit breaker DC voltage with max.5A current rating c) Digital inputs-14, Digital outputs 10, Analog inputs 2Ethernet interface 1 x TCP/IP, 10 Mbit/s d) Terminal blocks e) 25pin D-sub I/O data cable length 1.5 m, wire used 0.25 mm2 f) Cable ducts g) Power Connection cable:3pin plug with length of 1.3m	1
13.	Technical documents for Process Station: Should contain complete technical details of the station according to DIN ISO 1219 standard. It should include Pneumatic circuit, Electrical circuit, IO list, Functional description etc.,	1

5.Sorting and Assembling

Sorting Station should be possible to sort the incoming work piece based on colour and material characteristics to appropriate slides. And Assembling module should be assembled the cap as per the colour combination on the selected items. The Sorting and assembling Station consists of the following

- Sorting Conveyor module
- Horizontal Profile Table work bench with castor wheels
- PLC Board
- Control Console
- I/O interface module
- Valve manifold
- Slide module for sorting and assembling

The sorting and assembling station should have 3 slides to sort the incoming jobs based on its material and color. The conveyor module should be fitted with sensors to sense the presence of jobs at the start of the conveyor. Inductive sensors and colour sensors to be used to detect whether the material is metallic or non-metallic & its colour respectively, and divert them to the appropriate slides. A pneumatically actuated sorting arrangement is to be provided to extend for pushing the work pieces onto the appropriate slides.

The station should consist of anodized profile table, filter regulator and lubricator unit with pressure gauge, on/off valve quick push connections and couplings mounted with suitable mountings for easy assembly and disassembly.

The conveyor module should have DC motor driven conveyor belt which shall carry the job to the appropriate location on the station while the inductive and color sensor detect the material and color of the jobs carried along the conveyor. The pneumatically operated sorting guides to be provided to sort the work pieces into various slides as per colors and material. The presence of the work piece in the station is to be detected using diffuse sensor. The end position of all pneumatic actuators should be detected by using Magnetic sensors.

Networking and signaling the subsequent station for further processing should be done by establishing I/O communication between the PLC's of subsequent stations. The PLC used in this station should be capable of handling various digital inputs/ outputs, and it should have Ethernet interface to communicate with PC for programming

Scope of supply:

S. No	Item with description	Qty
1.	Horizontal Aluminium profile table: a. (L x W x H)- 540 x 640 x 790 mm b. Aluminium profile Table top profile – 40 x 160 mm Supporting profile- 40 x 40 mm c. Grid spacing (From slot to slot) – 40 mm d. Profile groove width – 8.3 mm e. Leveling casters for quick setting and smooth movement f. Profile plate connectors: Length 55 mm, thickness 5mm Mounting method M6 Socket head screw with M6 hammer head nut	1
2.	I/O Interface module: a. 25 Pin D-Sub connector interface board for interfacing valves and actuators b. 25 Pin D-Sub cable for transferring the I/O to the terminals which in turn are to be connected to PLC	1
3.	Valve Manifold: a) L x W x H: 60 X 26.5 X 65 mm b) Grid spacing – 19 mm c) Mountable valve port size 1/8" d) Provided with Conical silencers for reducing the dB level of exhausted air e) 5/2 Double solenoid pilot operated valve: Material- Extruded aluminium with anodized Finish Size – 1/8 " Design – Spool type Pressure range – 2 – 10 bar Flow rate – 450 l / min Manual override- Resetting Fitted with 1/8" flow control valve for varying the flow	1

4.	Filter Regulator Combination with Lubricator (FRL Unit) with pressure gauge and start up valve: a) Port size -1/4 inch b) Flow rate – 500 l/min c) Maximum supply pressure – 10 bar d) Operating pressure- 6 bar e) Filtering element grade – 40 µm f) Minimum operating flow – 12 l/min g) Filter Bowl capacity – 9 ml h) Lubricator Bowl capacity – 20 ml i) Connection for tube 8 dia input and 8 dia output j) Mounting – Socket head cap screw with M6 hammer head nut	1
5.	Sorting Conveyor Module: a) Flat belt conveyor with overall length of 500mm a. Conveyor to be driven by 24V DC motor of reputed make b. Conveyor to be provided with electronic drive unit for regulating the speed, reversing the direction and other functions b) Comprising of 2 pneumatic cylinders of dia 25 mm and stroke 40 mm Sorting slides for collecting the work piece on appropriate slides c) Color Sensor: a. Sensing range: 15mm b. Supply Voltage and Current: 10 to 30V DC (10% max. ripple) c. Switch output: PNP, normally open/normally closed contact d. Output Protection: Protected against false pulse on power-up, short-circuit protected e. Output rating : 100 mA d) Proximity sensor: a. Type - Cylindrical inductive type b. Supply voltage -12 – 24V DC c. Sensing range – 8 mm e) Diffuse Sensor: a) Type: Infra-red b) Sensing range: 15mm c) Supply Voltage and Current: 10 to 30V DC (10% max. ripple) @ 20 mA max current d) Switch output: PNP, normally open/normally closed contact e) Output Protection: Protected against false pulse on power-up, short-circuit protected f) Assembling module: - a) 45 degree clockwise and anticlockwise rotary slider b) up-down linear slider with gripper for pick the object. G) supplier may used RFID/Bar code or QR code for sorting station also in place of colour detection sensor or in combination	1
6.	Control console: a) Cycle start push button –Green with illuminated b) Auto /Manual selector switch -Black c) Home position push button –Red with illuminated d) Emergency button -Red	1
7.	Cable duct and accessories: a) Wire duct size 45x25 b) Fastening screws	1
8.	PLC control panel with S7 1200 PLC: a) Power supply: Input voltage :230/115 V AC (47 – 63 Hz), Output voltage: 24 V DC, short-circuit-proof Output current: Maximum 3A	1

	b) Miniature circuit breaker DC voltage with max.5A current rating c) Digital inputs-14, Digital outputs 10, Analog inputs 2Ethernet interface 1 x TCP/IP, 10 Mbit/s d) Terminal blocks e) 25pin D-sub I/O data cable length 1.5 m, wire used 0.25 mm2 f) Cable ducts g) Power Connection cable:3pin plug with length of 1.3m	
9.	Technical documents for Process Station: Should contain complete technical details of the station according to DIN ISO 1219 standard. It should include Pneumatic circuit, Electrical circuit, IO list, Functional description etc.,	1

6. Virtual Automation Software-Single User.

The Software platform should be useful to simulated following parameter step by step,

- PLC programming,
- SCADA,
- Realistic 3D process simulation with physical engine,
- Electric, pneumatic, hydraulic and digital electronic simulation.

This platform should be coming with different following platform which are useful for research and development.

Virtual PLC Simulation Platform

Simulation systems provide effective support with the development of programs and the following actual application. In the automation environment, a simulated test environment including PLC and process reduces startup times and thus costs, for example.

Early discovery of programming errors and optimization of program sections enable the optimized and error free use of the programs in the actual system. If a program is modified, it can be tested prior to loading it onto the plant control system.

It should be coming with simulation tool for Siemens controller families for smaller simulation task with the new develop controller also.

it should be must more complex simulations with the new controllers.eg. Employing virtual controllers.

It should be useful to simulate a controller for functional testing of user blocks and programs.

Online access and test functions of the programming tools can be carried out in exactly the same manner as with a real controller.

This allows the entire program test to be carried out on-site in the development office.

The facility to simulate the communication via MPI, PROFIBUS DP and TCP/IP is new and ensures a high degree of flexibility in the simulation.

It should be capable of working with multi-instances from Version 5.4 SP3 and also possible to start several tasks and test several controllers simultaneously.

It should be to download simulated task into the available hardware station.

Design and functions

- It is suitable to executes the user program just like a real controller (special functions such as F technology only conditionally). During program execution, different process values can be monitored and changed via a simple user interface (e.g. switching inputs/outputs on or off).
- Link-up with an external process simulation
- It should be suitable to interface is used for linking up to external process simulation systems. Dynamic access to process values is possible via this interface. The PROSIM Interface is using the COM Object and is programmable for example with the Microsoft Visual Studio C++ V6.0 and the Microsoft Visual C++ .NET.

Electrical Simulation Platform

Electric (IEC and JIC):-7 segment display ,Coder ,Fuse ,Heating element ,Sound signaling hooter ,Thermal relay with safety contact ,Voltmeter ,Block ,2 positions switch ,3 positions switch ,Contact NC ,Contact NO, Contact with off delay NC ,Contact with off delayNO ,Contact with on delay NC ,Contact with on delay NO ,Contact with on-off delay NC ,Contact with on-off delay NO ,Disconnecting switch with fuse ,Disconnecting switch with switch ,Disconnecting switch ,Magnetothermal disconnecting switch circuit breaker ,Position switch NC ,Position switch NO ,Power contact NO ,Proximity switch NC ,Proximity switch NO ,Push button NC ,Push button NO ,Switch NC ,Switch NO ,Thermal disconnecting switch circuit breaker ,Jump ,Label ,Ac variable speed transmission ,Dc variable speed transmission ,Motor DC current ,Single phase motor, ,Three phase motor on single phase source 1 ,Three phase motor on single phase source 2 ,Three phase motor starting star triangle ,Three phase motor with two speed ,Three phase motor ,Coil latch (reset) ,Coil latch (set) ,Coil with double pilot ,Coil with off delay ,Coil with on and off delay ,Coil with on delay ,Coil ,Light ,Solenoid ,Common (0 volt) ,DC power supply ,Ground ,Power supply 24 volts ,Power supply L1, ,Power supply L2 ,Power supply L3 ,Power supply Neutral ,Transformer ,Magnetic sensor ,Proximity sensor.

Digital electronic Simulation Platform

Power sources, 3 to 8 coder, 4 bits comparator, 7 segment decoder, 8 to 3 coder, BCD decoder, 4 bit asynchronous counter, Down counter, Up counter, Digital voltmeter, Logical probe, Flip-flop D, Flip-flop,Jk, Flip-flop Jkt, Flip-flop SR, Flip-flop Srt, Flip-flop T, Logical gates And, Logical gates Nand, Logical gates No, Logical gates Nor, Logical gates Or, Logical gates Yes, Clock, Sequencer, Common(0 volt), Positive power.

Pneumatic Simulation Platform

Air dryer ,Automatic drain coalescing filter ,Coalescing filter 1 ,Coalescing filter 2 ,Cooler ,Differential pressure gauge ,Filter and separator ,Filter ,Gas-loaded accumulator with separator ,Gas-loaded accumulator without separator ,General accumulator ,Indicator 2 ,Indicator ,Lubricator ,Manual drain coalescing filter ,Manual drain filter ,Pressure gauge ,Pressure reducer ,Silencer ,Vacuum generator ,Valve ,Motor 1 direction ,Motor 2 directions ,Rotary actuator ,Vacuum cup ,Bellow actuator ,Brake ,Double acting cylinder with sensors ,Double acting cylinder ,Single acting cylinder spring exit with sensors ,Single acting cylinder spring exit ,Single acting cylinder spring return with sensors ,Single acting cylinder spring return ,Cylinders\Small ,Cylinders\Brake\Double acting cylinder

,Cylinders\Brake\Single acting, cylinder spring exit ,Cylinders\Brake\Single acting cylinder spring return ,Cylinders\Long\Double acting cylinder ,Cylinders\Long\Single acting cylinder spring exit ,Cylinders\Long\Single acting cylinder spring return ,Cylinders\Small\Double acting cylinder ,Cylinders\Small\Single acting cylinder spring exit ,Cylinders\Small\Single acting cylinder spring return ,Directional valves 2/2 ,Directional valves 3/2 ,Directional valves 3/3 ,Directional valves 4/2 ,Directional valves 4/3 ,Directional valves 5/2 ,Directional valves 5/3 ,Check valve ,Pilot to close check valve ,Pilot to open check valve ,Quick exhaust valve ,Throttle one-way ,Throttle ,Variable throttle ,Compressor ,Exhaust ,Plug ,Pressure source ,Compressor\Compressor with three phase motor ,Compressor\Compressor ,Jump ,Label ,AND ,Counter ,INH ,NAND ,NOR ,NOT (2 inputs) ,NOT ,OR ,YES (2 inputs) ,YES ,Conditioning unit with lubricator ,Conditioning unit ,Piloted pressure regulator ,Piloted pressure relief valve ,Pressure regulator ,Pressure relief valve ,Sequence valve ,Variable pressure regulator ,Variable pressure relief valve ,Variable sequence valve ,push button NO ,push button with detent NC ,push button with detent NO ,push button NC, ,Not threshold sensor ,Pressure sensor ,Sequencers\Entry module ,Sequencers\Exit module ,Sequencers\Memory with reset activation ,Sequencers\Memory with set priority ,Sequencers\Step module ,Timer with negative output ,Timer with positive output.

Hydraulic Simulation Platform

Accumulator ,Air cooler ,Air filter ,Cooler with thermal switch ,Cooler-heater with thermal switch ,Cooler-heater ,Cooler ,Differential pressure gauge ,Filter ,Fluid cooler with thermal switch ,Fluid cooler ,Gas loaded, accumulator without separator ,Heater ,Indicator ,Lubricator ,Pressure gauge ,Pressure indicator ,Spring-loaded accumulator ,Vaive ,Weight-loaded accumulator ,Cylinders ,Motor 1 direction ,Motor 2 directions ,Rotary cylinder ,Cylinders\Brake ,Cylinders\Double acting cylinder ,Cylinders\Long ,Cylinders\Single acting cylinder with spring exit ,Cylinders\Small ,Cylinders\Spring acting cylinder with spring return ,Cylinders\Brake\Double acting cylinder ,Cylinders\Brake\Single acting cylinder spring exit ,Cylinders\Brake\Single acting cylinder spring return ,Cylinders\Long\Double acting cylinder, Cylinders\Long\Single acting cylinder spring exit ,Cylinders\Long\Single acting cylinder spring return ,Cylinders\Small\Double acting cylinder ,Cylinders\Small\Single acting cylinder spring exit ,Cylinders\Small\Single acting cylinder spring return ,Directional valves 2/2 ,Directional valves 3/2 ,Directional valves 3/3 ,Directional valves 4/2 ,Directional valves 4/3 ,Directional valves 5/2 ,Directional valves 5/3 ,Check valve ,Parachute valve ,Pilot operated check valve ,Pilot to close check valve ,Spring loaded check valve ,Throttle valve ,Variable throttle valve ,Plug ,Pressure source ,Reservoir ,Jump ,Label ,Counterbalance valve ,Piloted counterbalance valve ,Piloted pressure reducing valve ,Piloted pressure relief valve ,Pressure reducing valve ,Pressure relief valve ,Sequence valve ,Variable counterbalance valve ,Variable pressure reducing valve ,Variable pressure relief valve ,Variable sequence valve ,Pressure sensor.

PLC Support Platform Software platform should be support for following languages and plc platform for research and development purpose

1.**Programming languages:**

Ladder, Logic, Flow chart, Literal, Function blocks, Grafcet/SFC, CEI 1131-3.

2.**Compatible PLCs or targets:**

- SCHNEIDER (PB, SMC, TSX17-10, 17-20, 47, 07, 37, 57, ZELIO, ZELIO2, TWIDO, M340).
- SIEMENS (S5, S7).
- ABB (CS31, AC31), KLOCKNER-MOELLER (PS3, PS4, PS414.
- GE-FANUC (90 Micro, 9030), CEGELEC (C50, C100, 8005,8035).
- OMRON (C, CV, CS), MITSUBISHI (FX, Q).
- FESTO.
- PANASONIC.

LEGO RCX, LANGUAGE C, PC (I/O drivers available for I/O driving - use a PC as a PLC), others.

7.Virtual Reality Software-Single User.

Virtual reality should be AR and VR technology development.

For creating powerful 3D simulations of automated systems has never been easier. Users will experience amazing immersive experiences enjoying the best high-quality rendering technology supporting virtual reality headsets.

For Developing powerful simulations in the cloud places your users in a collaborative environment which enhances their experience beyond anything available before. Simulations can be accessed from a range of devices including smart-phones, tablets and laptops anywhere in the world.

Software should be coming with 60 defined objects for content development for ready to use for students for experiment developments example should be as follows: -

Colour boxes source, concave part A, concave part B, concave part C, HMI Tablet, HMI tablet support, Light column, Loading conveyor, Gaz tank (Layout), Grid, Handrail, Helper, Primitive Part-A, Primitive Part-B, Pusher, Rack, Pick and place, Pillar(Layout),Platform(Layout),Polymorphous art,Store,Tank,Turn Table, Vive controller #1,sorter,Source of boxes with overpading, stairs(Layout),stopper, coloured boxes source, Concave part-A, Concave part-b, Convex part-A, Boxes Source, Chute, CNC, colour Sensor, Gaz Tank(Layout),Grid, Handrail, Helper, Elevator, Factory layout-1, Factory layout-2,fast sorter, pick and place-2,pillay layout-2,platform layout, Polymorphus Art,palette, Pallettes layout, Pallettes source,palletizer,Sorter-2,Source of Boxes with over packing, Stairs layout,Stopper, Sensor, Sesnor, Sink, smart source, Boxes source, Chute, CNC, Colour sensor,Alarm,Arm,Array sensor,Box,Elevator,Factory Layout, Factory layout, fast sorter,Conveyer-4M, Conveyer-6M, Conveyer-8M, Conveyer-90 degree,Pallete,Palletes layout, pallet source, Palletizer, Normalizer, Normalizer, Overpack, boxes source, Overpacking, Sesnor, sensor, Sink,Smart source, Reflector, Reflector, Robot, Robotic Arm,Alarm, Arm,Array Sensor, Box,Vive controller #2,Vive headset, Weighing conveyor, Overpacking.

Drive the simulations with a real PLC*, an automation workshop** or a virtual controller included in Virtual Universe Pro.

Hardware support: -Siemens S7 IP, MPI, PPI, Siemens S5, Schneider Electric TSX, SoMachine, Twido, Beckhoff, Mitsubishi, Rockwell Ethernet IP, CodeSys PLCs compatibles, Automgen targets (Eg. Arduino), Modbus TCP, SLMP, OPC.

Software Driver support: -Siemens PlcSim, Schneider Unity, Schneider SoMachine, Mhj WinSps, CodeSys, Omron Cx-Simulator, Rockwell Soft Logix, Automgen (all compatible targets), Matlab Simulink, Labview, Proteus, all software or programming tools dll, ip, universal memory access.

About fifteen ready-to-use examples illustrate the use of the library objects.

- For each object, an optimized interface composed of inputs, outputs and parameters makes it easy to control the object from an automation program.
- The configuration of each object is accessible and editable, this allows you to redefine the
- characteristics of the objects of the library and to understand how to create your own objects. You can
- also mix library objects with your own creations created from your usual CAD* software.
- Control panels are used to drive the objects manually and to observe the various associated states. They
- have the dual purpose of being able to test the functioning of the objects before realizing the program that will
- use them and also to simulate failures.
- All the library objects are compatible with the use of a virtual reality headset. The controllers associated with the VR headset allow a full immersion and interaction.

Technical Specifications

- **Development Operating System**: -Windows XP, Windows Vista, Windows 7, Windows 8, Windows 10.
- **PC Configuration:** -Nvidia GTX 980 equivalent or higher, Intel Core I7 10th generation or higher 8 Gb ram, 1TB HDD.
- **VR:** -Oculus Rift headset, HTC Vive headset and controllers, Mixed realty headsets and controllers. All Steam VR compatible systems.
- **AR:** -Microsoft HoloLens, Android devices.
- **Physic engines:** -Newton Dynamics, NVidia Physix and Chrono Engine.
- **Rendering:** -Realtime, HQ, PBR, Unity 3d.
- **Web Player:** -WebGl IE, Chrome, Firefox, Safari.
- **Collaborative cloud simulation**: -Server on Windows, Web clients on PCs, Web clients on mobile devices, Web clients on Macs, Clients on Windows + VR Headsets.
- **Integrated Simulation Tools**: -Pneumatic, Hydraulic, Electric, Digital Electronic and Schematic Blocks (Simulink).
- **Direct PLCs Connections:** -Siemens S7 IP, MPI, PPI, Siemens S5, Schneider TSX, So Machine compatible PLCs,
- Unity compatibles PLCs, Twido, Beckhoff, Mitsubishi, Rockwell Ethernet IP, CodeSys PLCs compatible
- Automgen compatible target (Eg. Arduino),I/O connection with Advantech cards.
- **PLC protocols:** -Modbus TCP, SLMP, OPC.
- **PLC simulators interface:** -Siemens PlcSim, Schneider Unity, Schneider So Machine, Mhj WinSps, CodeSys.
- Omron Cx-Simulator, Rockwell Soft Logix, Mitsubishi Gx-Simulator.
- **Software connections:** -Automgen (all compatible targets), MATLAB Simulink, Labview, Proetus Robotstudio,
- Mitsubishi RT-Toolbox2, mBlock, all software's or programming tools dll, ip, universal memory access.
- **Integrated programming tools:** -Ladder, Grafcet, Function blocks, Script (Basic), C language.
- **CAD Import Formats:** -DS Solidworks, DS Catia, Autodesk Inventor, Siemens Solid Edge.
- **Import from 3D files:** -3DXML, OBJ, 3DS, FBX, X, VRML, STL, DXF, SKP.
- **License:** -standalone soft code or floating license or web license.

8.Industry 4.0 software platform

IOT platform should be a secure, highly scalable and intelligent platform enabling enterprises to build or boost their competitive advantage by giving their core enterprise systems access to contextual and coordinated field data in real-time.

- Support for the entire IoT Ecosystem, with bi-directional information flow across the value chain
- No-code, fully configured, end-to-end management of interactions between physical assets and enterprise systems
- Triangulated information management to support intelligent & contextual decision-making
- Make all sensory devices in your ecosystem your eyes and ears with a few clicks,
- Model your operational business information flow through these devices,
- Make prescriptive decisions based on contextual information collected from these tracked devices in real time, and
- Initiate control actions on Machines.
- Platform should be useful to facilitate bidirectional information exchange between the physical and digital worlds in a contextual, triangulated and easily configurable way.
- IOT platform should be useful for consulting services can help you defile and enterprises-wide IOT program of work, leading to the vision of a truly connected business.
- IOT should be useful for professional services so as to become trusted implementation partner as we understand the challenges of joining the dots in the complex enterprises landscape without losing the sight of the strategic objectives.
- It should be having three year subscriptions facility.

9. COMPUETR SOFTWARE AND ACCESSORIES

Laptop should be provided with minimum specifications: Intel i7 Processor, 500GB Hard Disk, 8 GB RAM and latest license operating system. Window 7 or better

10. Assembly Templates

Should contain assembly templates required for the assembly of respective station and for the different combination functions. It should be made up of plain anodized Aluminium sheet with with handle

11. Technical Document

Main technical document shall contain the details for the assembly of all the five stations in different combination functions. It shall include positional sketch and installation procedure etc.

12. Work Piece set

Should Contain 18 approved work pieces of diameter 40 mm and height 25 mm and 6 rejected work pieces of diameter 40 mm and height 23.5 in every material made of Aluminium, Delrin and Hylum respectively

14. **HMI (Touch screen HD HMI):** minimum one unit of colored touch screen minimum 7" with high internal memory.

15. **Supplier will also provide 20 sitting stool/chairs (for engineering students) along with the equipment**

Including:

- FOR NIT Jalandhar
- Warranty minimum 2 years
- Regular service maintenance contract for three years
- Installation along with foundation
- PC or laptop for programming along with all accessories
- With all other accessories like cables and connectors
- Tool kit for maintenance and all types of necessary cables and connectors
- Training at NIT Jalandhar

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Annexure: "B"

FORMAT FOR PERFORMANCE BOND/GUARANTEE

(Undertaking from the supplier on a Non Judicial Stamp Paper of requisite duly attested by Notary)

In consideration for "The Registrar, National Institute of Technology Jalandhar *(hereinafter called NIT Jalandhar)*having agreed to release the payment of net value as per terms and conditions of a concluded Order No._____ dated _____ ***(hereinafter called 'the order')*** for supply of_____ *(here in after* ***called 'the Equipment /****Item)*to us Messrs _____ *(hereinafter* ***called 'the supplier')*** on submission of a Performance Bond to the satisfaction of NIT Jalandhar for the due performance of the said order

We, Messers _____ hereby submit the FDR/TDR No _____

issued by _____ (Name of Bank) for _____ pledged in favour of Registrar, NIT Jalandhar as performance guarantee amount and hereby irrevocably, unconditionally and absolutely undertake against any loss or damage caused or suffered by NIT Jalandhar by reason of any failure of the supplier to perform or omission or negligence to perform any part of its obligations to the satisfaction of NIT Jalandhar in terms of the order.

We, the supplier, do hereby authorize Registrar, NIT Jalandhar to forfeit this Performance Guarantee amount / undertake to pay the amount due and payable under this guarantee without any demur merely on a demand from the NIT Jalandhar stating that the amount claimed is due by way of loss or damage caused to or would be caused to or suffered by the NIT Jalandhar by reason of any breach by us of any of the terms and conditions contained in the said order or by reason of our failure or omission or negligence to perform the said order or any part thereof. We, the Supplier, undertake to pay to NIT Jalandhar any amount so demanded by NIT Jalandhar, notwithstanding:

a) Any dispute or difference between NIT Jalandhar and supplier or any other person or between the supplier or any person or any suit or proceeding pending before any court or tribunal or arbitrator relating thereto; or

b) The invalidity, irregularity or unenforceability of the order; or

c) Any other circumstances which might otherwise constitute discharge of this guarantee, including any act of omission or commission on the part of NIT Jalandhar to enforce the obligations by the supplier or any other person for any reason whatsoever.

We, the Supplier, further agree that the performance Bond/ Guarantee herein contained shall be continued one and remain in full force and effect during the period that would be taken for the performance of the said order and that it shall continue to be enforceable till all the dues of the NIT Jalandhar under or by virtue of the said order have been fully paid and its claims satisfied or discharged or till the office of the Registrar, NIT Jalandhar certifies that terms and conditions of the said order have been fully and promptly carried out by us and accordingly discharges this Performance Bond/ Guarantee.

We, the Supplier, further agree with NIT Jalandhar, that NIT Jalandhar shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said order or to extend time of performance by the said supplier from time to time or to postpone for any time or from time to time and of the powers exercisable by the NIT Jalandhar against the said supplier and forbear or enforce any of the terms and conditions relating to the order and we shall not be relieved from our liability by reason of any such variation or extension being granted to us or for any forbearance, act or omission on the part of NIT Jalandhar or any indulgence by NIT Jalandhar to us or by any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have effect of so relieving us.

This Performance Bond/Guarantee will not be discharged due to the change in the constitution of the supplier. We, the Supplier, undertake not to revoke this Performance Bond / Guarantee except with the prior consent of NIT Jalandhar in writing.

The disputes relating to this Bank Performance Bond / Guarantee shall be resolved as per the terms and conditions of the order.

Dr B R AMBEDKAR NATIONAL INSTITUTE OF TECHNOLOGY
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EPABX-0181-2690301 & 453 website: www.nitj.ac.in email: registrar@nitj.ac.in

Annexure "C"

FORMAT FOR PERFORMANCE BOND (BANK GUARANTEE)

In consideration for the Registrar, National Institute of Technology Jalandhar, *(hereinafter called NIT Jalandhar)* having agreed to release the payment of net value as per terms and conditions of a concluded Order No. _____ dated _____ ***(hereinafter called 'the order')*** for supply of_____*(hereinafter called* ***'the Equipment /****Item)* to Messrs_____***(hereinafter called 'the supplier')*** on submission of a Bank Guarantee to the satisfaction of NIT Jalandhar for the due performance of the said order.

We, _____ ***(hereinafter called 'the Bank')*** at the request of the supplier do, as a primary obliger and not merely as surety, hereby irrevocably, unconditionally and absolutely undertake against any loss or damage caused or suffered by NIT Jalandhar by reason of any failure of the supplier to perform or omission or negligence to perform any part of its obligations to the satisfaction of NIT Jalandhar in terms of the order.

We, the Bank do hereby undertake to pay the amount due and payable under this guarantee without any demur merely on a demand from NIT Jalandhar stating that the amount claimed is due by way of loss or damage caused to or would be caused to or suffered by NIT Jalandhar by reason of any breach by the said supplier of any of the terms and conditions contained in a said order or any part thereof. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the bank under this guarantee, which shall not be considered as satisfied by any intermediate payment or satisfaction of any part of or obligation hereunder. However, our liability under this guarantee shall be restricted to an amount not exceeding _____.

We, the Bank, undertake to pay to NIT Jalandhar any amount so demanded by NIT Jalandhar, notwithstanding a). Any dispute and difference between NIT Jalandhar and supplier or any other person or between the supplier or any person or any suit or proceeding pending before any court or tribunal or arbitrator relating thereto or

a). The invalidity, irregularity or unenforceability of the order or

b). Any other circumstances which might otherwise constitute discharge of this guarantee, including any act of omission or commission on the part of NIT Jalandhar to enforce the obligations by the supplier or any other person for any reason whatsoever.

We, the Bank, further agree that the guarantee herein contained shall continue and remain in full force and effect during the period that would be taken for the performance of the said order and that it shall continue to be enforceable till all the dues of NIT Jalandhar under or by virtue of the said order have been fully paid and its claims satisfied or discharged or till the office of the Registrar, NIT Jalandhar confirms that the terms and conditions of the said order have been fully and promptly carried out by the said supplier and accordingly discharge this guarantee.

We, the Bank, hereby agree and undertake that any claim which the bank may have against the supplier shall be subject to and subordinate to the prior payment and performance in full of all the obligations of the bank hereunder and the bank will not, without prior written consent of NIT Jalandhar , exercise any legal rights or remedies of any kind in respect of any such payment or performance so long as the obligations of the bank hereunder remain owning and outstanding, regardless of the insolvency, liquidation or bankruptcy of the supplier or otherwise. We, the Bank, will not counter claim or set off against its liabilities to NIT Jalandhar hereunder any sum outstanding to the credit of NIT Jalandhar with it.

We, the Bank, further agree with NIT Jalandhar , that NIT Jalandhar shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said order or to extend time of performance by the said supplier from time to time or to postpone for any time or from time to time and of the powers exercisable by the NIT Jalandhar against the said supplier and forbear or enforce any of the terms and conditions relating to the order and we shall not be relieved from our liability by reason of any such variation or extension being granted to the said supplier or for any forbearance, act or omission on the part of NIT Jalandhar or any indulgence by NIT Jalandhar to the said supplier or by any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have effect of so relieving us.

This guarantee will not be discharged due to the change in constitution of the Bank or the supplier.

We, the Bank, lastly undertake not to revoke this Guarantee during its currency except with the prior consent of NIT Jalandhar in writing.

The disputes relating to this Bank Guarantee shall be resolved as per the terms and conditions of the order.

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Annexure "D"

FORMAT FOR MANUFACTURER'S AUTHORIZATION FORM

To,
The Registrar
Dr B. R Ambedkar National Institute of Technology
Jalandhar

Sub. : e-Tender for "_____".

Dear Sir,

We,_____, who are established and reputed manufacturers of _____,having factory/office at_____, hereby authorize M/s _____ [*name* & address of agents/distributors] to bid, negotiate and conclude the order with you for the above goods manufactured by us.

We shall remain responsible for the tender/Agreement negotiated by M/s

_____, jointly and severely. No company or firm or individual other than M/s _____ are authorized to bid, negotiate and conclude the order in regard to this business against this specific tender as for all business in the entire territory of India.

We hereby extend our full guarantee and warranty as per the terms and conditions of tender for the goods offered for supply against this invitation for bid by the above supplier.

1. _____

2. _____

***specify in detail manufacturer's respon**sibilities* the services to be rendered by M/s_____ are as under:

i) _____

ii) _____

[Specify the services to be rendered by the agent/distributor] In case duties of the agent/distributor are changed or agent/ distributor is changed it shall be obligatory on us to automatically transfer all the duties and obligations to the new Indian Agent failing which we will ipso-facto become liable for all acts of commission or omission on the part of new Indian Agent/ distributor.

Yours faithfully,
[Name & Signature] For and on behalf of M/s. _____ [N*ame of manufacturer*]

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Annexure "E"

DECLARATION REGARDING BLACKLISTING / DEBARRING FOR TAKING PART IN TENDER

Self Attested

I / We _____ (Tenderer) hereby declare that the firm / agency namely M/s._____ has not been blacklisted or debarred in the past by Union / State Government or organization from taking part in Government tenders in India.

Or

I / We _____ (Tenderer) hereby declare that the Firm / agency namely M/s. _____ was blacklisted or debarred by Union / State Government or any Organization from taking part in Government tenders for a period of

_____ years w.e.f._____ to _____. The period is over on _____ and now the firm/company is entitled to take part in Government tenders.

In case the above information found false I / we are fully aware that the tender/ contract will be rejected / cancelled by Director, NIT Jalandhar, and EMD / SD shall be forfeited.

DEPONENT

Attested:

(Stamp of Company with authorized sign)

Name_____

Address _____

Dr B R AMBEDKAR NATIONAL INSTITUTE OF TECHNOLOGY
G T Road By Pass, Jalandhar-144011, Punjab (India)
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Annexure: "F"

CERTIFICATE OF WARRANTY

i) .I/We certify that the warranty shall be for a period of _____ years for _____and starting from the date of satisfactory installation, commissioning and handing over of the Equipment /Item and of the works conducted therewith covered under the supply order in working order. During the **warranty period, I/we shall provide free "after sale service" and the replacement of any part(s) of the** Equipment /Item or rectification of defects of work of the Equipment /Item will be free of cost. The replacement of the parts shall be arranged by us, at our own cost and responsibility. We undertake that the above warranty shall begin only from the date of satisfactory and faultless functioning of the Equipment /Item for 60 days at NIT Jalandhar premises. The benefit of change in dates of the warranty period shall be in the interest of the use/your organization.

ii). During the warranty period, we shall provide at least_____ **preventive maintenance visits**.

iii).Uptime Guarantee: During the warranty period, we will be responsible to maintain the Equipment /Item in good working conditions for a period 350 days (i.e. 95% uptime) in a block of 365 days.

a). All complaints will be attended by us within 2 working days of receipt of the complaint in our office.

b). In case there is delay of more than 2 days in attending to a complaint from our side then you can count the number of days in excess of the permissible response time in the downtime. The above said response time of 2 days for attending to a complaint by us will not be counted in the downtime.

c). **Penalty**: We shall pay a penalty equivalent to **0.5 % of the FOB/CIF** value of the Equipment /Item for every week or part thereof delay in rectifying the defect.

Note: The right to accept the reason (s) for delay and consider reduction or wave off the penalty for the same shall be at the sole discretion of Director, NIT Jalandhar

iv). We certify that the Equipment /Item being/ quoted is the latest model and that spares for the Equipment /Item will be available for a period of at least _____ years and we also guarantee that we will keep the organization informed of any update of the Equipment /Item over a period of ___ years.

v). We guarantee that in case we fail to carry out the maintenance within the stipulated period, NIT Jalandhar reserves the right to get the maintenance work carried out at our risk, cost and responsibility after informing us. All the expenses including excess payment for repairs/maintenance shall be adjusted against the Performance Bank Guarantee. In case the expenses exceed the amount of Performance Bank Guarantee, the same shall be recoverable from us with/without interest in accordance with the circumstances.

vi).We shall try to repair the Equipment /Item at NIT Jalandhar premises itself. However, the Equipment /Item will be taken to our site on our own expenses in case it is not possible to repair the same at NIT Jalandhar. We shall take the entire responsibility for the safe custody and transportation of the Equipment /Item taken out for repairs till the Equipment /Item is rehabilitated to the NIT Jalandhar after repair Any loss of Equipment /Item or its accessories under its charge on account of theft, fire or any other reasons shall be at our sole risk and responsibility which will be compensated to NIT Jalandhar for such losses at the FOB/CIF value for the damaged/lost Equipment /Item part, including accessories.

vii. We undertake to perform calibration after every major repair/breakdown/taking the Equipment /Item for repair out of NIT Jalandhar premises.

viii. In case of extended warrantee, we undertake to carry out annual calibration of the Equipment /Item.

ix. We guarantee that we will supply spare parts if and when required on agreed basis for an agreed price. The agreed basis could be an agreed discount on the published catalogue price.

x. We guarantee to the effect that before going out of production of spare parts, we will give adequate advance notice to you so that you may undertake to procure the balance of the life time requirements of spare parts.

xi. We guarantee the entire unit against defects of manufacture, workmanship and poor quality of components.

Signature & Seal of the Manufacturer/Tenderer