# DEMOCRATIC SOCIALIST REPUBLIC OF

# SRI LANKA



# UNIVERSITY OF JAFFNA, SRI LANKA

## SUPPLY & INSTALLATION OF ELECTRICAL & ELECTRONIC ENGINEERING EQUIPMENT UNIVERSITY OF JAFFNA

## UJ/F/PO/T/04/2016

# Package 02

# **BIDDING DOCUMENT**

Bid Opening on	13.07.2016
Bid Validity up to	13.10.2016

#### <u>Client</u>

University of Jaffna, P. O. Box 57, Thirunelvely, Jaffna, Sri Lanka.



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# Section I.

## **Instructions to Bidders (ITB)**

ITB shall be read in conjunction with the Section II, Bidding Data Sheet (BDS), which shall take precedence over ITB.

General	
1. Scope of Bid	<ul> <li>1.1 The Purchaser indicated in the Bidding Data Sheet (BDS), issues these Bidding Documents for the supply of Goods and Related Services incidental thereto as specified in Section V, Schedule of Requirements. The name and identification number of this procurement are specified in the BDS. The name, identification, and number of lots (individual contracts), if any, are provided in the BDS.</li> <li>1.2 Throughout these Bidding Documents: <ul> <li>(a) the term "in writing" means communicated in written form by mail (other than electronic mail) or hand delivered with proof of receipt;</li> <li>(b) if the context so requires, "singular" means "plural" and vice versa; and</li> <li>(c) "Day" means calendar day.</li> </ul> </li> </ul>
2. Source of Funds	2.1 Payments under this contract will be financed by the source specified in the BDS.
3. Ethics, Fraud and Corruption	3.1 The attention of the bidders is drawn to the following guidelines of the Procurement Guidelines published by National Procurement Agency:
	<ul> <li>Parties associated with Procurement Actions, namely, suppliers/contractors and officials shall ensure that they maintain strict confidentiality throughout the process;</li> </ul>
	<ul> <li>Officials shall refrain from receiving any personal gain from any Procurement Action. No gifts or inducement shall be accepted. Suppliers/contractors are liable to be disqualified from the bidding process if found offering any gift or inducement which may have an effect of influencing a decision or impairing the objectivity of an official.</li> </ul>
	3.2 The Purchaser requires the bidders, suppliers, contractors, and consultants to observe the highest standard of ethics during the procurement and execution of such contracts. In pursuit of this policy:
	(a) "corrupt practice" means the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence the action of a public official in the procurement process or in contract execution;
	(b) "fraudulent practice" means a misrepresentation or omission of facts in order

	to influence a procurement process or the execution of a contract;
	(c) "collusive practice" means a scheme or arrangement between two or more bidders, with or without the knowledge of the Purchaser to establish bid prices at artificial, noncompetitive levels; and
	(d) "Coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the procurement process or affect the execution of a contract.
	3.3 If the Purchaser found any unethical practices as stipulated under ITB Clause 3.2, the Purchaser will reject a bid, if it is found that a Bidder directly or through an agent, engaged in corrupt, fraudulent, collusive or coercive practices in competing for the Contract in question.
4. Eligible	4.1 All bidders shall possess legal rights to supply the Goods under this contract.
Bidders	4.2 A Bidder shall not have a conflict of interest. All bidders found to have conflict of interest shall be disqualified. Bidders may be considered to have a conflict of interest with one or more parties in this bidding process, if they:
	(a) are or have been associated in the past, with a firm or any of its affiliates which have been engaged by the purchaser to provide consulting services for the preparation of the design, specifications, and other documents to be used for the procurement of the goods to be purchased under these Bidding Documents ; or
	(b) Submit more than one bid in this bidding process. However, this does not limit the participation of subcontractors in more than one bid.
	4.3 A Bidder that is under a declaration of ineligibility by the National Procurement Agency (NPA), at the date of submission of bids or at the date of contract award, shall be disqualified. The list of debarred firms is available at the website of NPA, www.npa.gov.lk.
	4.4 Foreign Bidder may submit a bid only if so stated in the BDS.
5. Eligible Goods and Related Services	5.1 All goods supplied under this contract shall be complied with applicable standards stipulated by the Sri Lanka Standards Institute (SLSI). In the absence of such standards, the Goods supplied shall be complied to other internationally accepted standards.
	Contents of Bidding Documents
6. Sections of Bidding Documents	6.1 The Bidding Documents consist of 2 Volumes, which include all the sections indicated below, and should be read in conjunction with any addendum issued in accordance with ITB Clause 8.
	<ul> <li>Volume 1</li> <li>Section I. Instructions to Bidders (ITB)</li> <li>Section VI. Conditions of Contract (CC)</li> <li>Section VIII. Contract Forms</li> </ul>

	<ul> <li>Volume 2</li> <li>Section II. Bidding Data Sheet (BDS)</li> <li>Section III. Evaluation and Qualification Criteria</li> <li>Section IV. Bidding Forms</li> <li>Section V. Schedule of Requirements</li> <li>Section VII. Contract Data</li> <li>Invitation For Bid</li> </ul> 6.2 The Bidder is expected to examine all instructions, forms, terms, and specifications in the Bidding Documents. Failure to furnish all information or documentation required by the Bidding Documents may result in the rejection of the bid.
7. Clarification of Bidding Documents	7.1 A prospective Bidder requiring any clarification of the Bidding Documents including the restrictiveness of specifications shall contact the Purchaser in writing at the Purchaser's address specified in the BDS. The Purchaser will respond in writing to any request for clarification, provided that such request is received no later than ten (10) days prior to the deadline for submission of bids. The purchaser shall forward copies of its response to all those who have purchased the Bidding Documents, including a description of the inquiry but without identifying its source. Should the Purchaser deem it necessary to amend the Bidding Documents as a result of a clarification, it shall do so following the procedure under ITB Clause 8.
8. Amendment of Bidding Documents	<ul> <li>8.1 At any time prior to the deadline for submission of bids, the Purchaser may amend the Bidding Documents by issuing addendum.</li> <li>8.2 Any addendum issued shall be part of the Bidding Documents and shall be communicated in writing to all who have purchased the Bidding Documents.</li> <li>8.3 To give prospective Bidders reasonable time in which to take an addendum into account in preparing their bids, the purchaser may, at its discretion, extend the deadline for the submission of bids, pursuant to ITB Sub-Clause 23.2</li> </ul>
	Droporation of Rids
9. Cost of Bidding	<b>Preparation of Bids</b> 9.1 The Bidder shall bear all costs associated with the preparation and submission of its bid, and the Purchaser shall not be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.
10. Language of Bid	10.1 The Bid, as well as all correspondence and documents relating to the Bid (including supporting documents and printed literature) exchanged by the Bidder and the Purchaser, shall be written in English language.
11. Documents Comprising the Bid	<ul> <li>11.1 The Bid shall comprise the following:</li> <li>(a) Bid Submission Form and the applicable Price Schedules, in accordance with ITB Clauses 12, 14, and 15;</li> <li>(b) Bid Security or Bid-Securing Declaration, in accordance with ITB Clause 20;</li> </ul>

	(c) documentary evidence in accordance with ITB Clauses 18 and 29, that the Goods and Related Services conform to the Bidding Documents;
	(d) documentary evidence in accordance with ITB Clause 18 establishing the Bidder's qualifications to perform the contract if its bid is accepted; and
	(e) Any other document required in the BDS.
12. Bid	12.1 The Bidder shall submit the Bid Submission Form using the form furnished
Submission Form	in Section IV, Bidding Forms. This form must be completed without any
and Price	alterations to its format, and no substitutes shall be accepted. All blank spaces
Schedules	shall be filled in with the information requested.
13. Alternative Bids	13.1 Alternative bids shall not be considered.
14. Bid Prices and	14.1 The Bidder shall indicate on the Price Schedule the unit prices and total bid prices of the goods it proposes to supply under the Contract.
Discounts	prices of the goods it proposes to suppry under the contract.
2100001100	14.2 Any discount offered against any single item in the price schedule shall be
	included in the unit price of the item. However, a Bidder wishes to offer discount
	as a lot the bidder may do so by indicating such amounts appropriately.
	14.3 If so indicated in ITB Sub-Clause 1.1, bids are being invited for individual
	contracts (lots) or for any combination of contracts. Unless otherwise indicated in
	the BDS, prices quoted shall correspond to 100 % of the items specified for each
	lot and to 100% of the quantities specified for each item of a lot. Bidders wishing
	to offer any price reduction (discount) for the award of more than one Contract
	shall specify the applicable price reduction separately.
	14.4 (i) Prices indicated on the Price Schedule shall include all duties and sales and other taxes already paid or payable by the Supplier:
	(a) on components and raw material used in the manufacture or assembly of goods quoted; or
	(b) on the previously imported goods of foreign origin
	(ii) However, VAT shall not be included in the price but shall be indicated separately;
	(iii) the price for inland transportation, insurance and other related services to deliver the goods to their final destination;
	(iv) the price of other incidental services
	14.5 The Prices quoted by the Bidder shall be fixed during the Bidder's performance of the Contract and not subject to variation on any account. A bid submitted with an adjustable price quotation will be treated as non-responsive and rejected, pursuant to ITB Clause 31.
	14.6All lots, if any, and items must be listed and priced separately in the Price Schedules. If a Price Schedule shows items listed but not priced, their prices shall be assumed to be included in the prices of other items.

15. Currencies of Bid	15.1 Unless otherwise stated in Bidding Data Sheet, the Bidder shall quote in Sri Lankan Rupees and payment shall be payable only in Sri Lanka Rupees.
16. Documents	16.1 To establish their eligibility in accordance with ITB Clause 4, Bidders shall
Establishing the	complete the Bid Submission Form, included in Section IV, Bidding Forms.
Eligibility of the	
Bidder	
17. Documents	17.1 To establish the conformity of the Goods and Related Services to the
Establishing the	Bidding Documents, the Bidder shall furnish as part of its Bid the documentary
Conformity of the	evidence that the Goods conform to the technical specifications and standards
Goods and	specified in Section V, Schedule of Requirements.
	specified in Section V, Schedule of Requirements.
Related	
Services	17.2 The documentary evidence may be in the form of literature, drawings or
	data, and shall consist of a detailed item by item description (given in Section V,
	Technical Specifications) of the essential technical and performance
	characteristics of the Goods and Related Services, demonstrating substantial
	responsiveness of the Goods and Related Services to the technical specification,
	and if applicable, a statement of deviations and exceptions to the provisions of
	the Schedule of Requirements.
	17.3 The Bidder shall also furnish a list giving full particulars, including
	quantities, available sources and current prices of spare parts, special tools, etc.,
	necessary for the proper and continuing functioning of the Goods during the
	period if specified in the BDS following commencement of the use of the goods
	by the Purchaser.
18. Documents	18.1 The documentary evidence of the Bidder's qualifications to perform the
Establishing the	contract if its bid is accepted shall establish to the Purchaser's satisfaction:
0	contract if its ord is accepted shall establish to the rule haser's satisfaction.
Qualifications of	(a) A Didden that does not manufacture an unclose the Cools it offers to see also
the Bidder	(a) A Bidder that does not manufacture or produce the Goods it offers to supply
	shall submit the Manufacturer's Authorization using the form included in Section
	IV, Bidding Forms to demonstrate that it has been duly authorized by the
	manufacturer or producer of the Goods to supply these Goods;
	(b) that, if required in the BDS, in case of a Bidder not doing business within Sri
	Lanka, the Bidder is or will be (if awarded the contract) represented by an Agent
	in Sri Lanka equipped and able to carry out the Supplier's maintenance, repair
	and spare parts stocking obligations prescribed in the Conditions of Contract
	and/or Technical Specifications; and
	(c) That the Bidder meets each of the qualification criterions specified in Section
	III, Evaluation and Qualification Criteria.
19. Period of	19.1 Bids shall remain valid until the date specified in the BDS. A bid valid for a
Validity of Bids	shorter date shall be rejected by the Purchaser as non-responsive.
	19.2 In exceptional circumstances, prior to the expiration of the bid validity date,
	the Purchaser may request bidders to extend the period of validity of their bids.
	The request and the responses shall be made in writing. If a Bid Security is
	requested in accordance with ITB Clause 20, it shall also be extended for a
	corresponding period. A Bidder may refuse he request without forfeiting its Bid
	Security. A Bidder granting the request shall not be required or permitted to
	modify its bid.

20. Bid Security	20.1 The Bidder shall furnish as part of its bid, a Bid Security as specified in the BDS.
	20.2 The Bid Security shall be in the amount specified in the BDS and denominated in Sri Lanka Rupees, and shall:
	(a) at the bidder's option, be in the form of either a bank draft, a letter of credit, or a bank guarantee from a banking institution;
	(b) be issued by a institution acceptable to Purchaser. The acceptable institutes are published in the NPA website, www.npa.gov.lk.
	(c) be substantially in accordance with the form included in Section IV, Bidding Forms;
	(d) be payable promptly upon written demand by the Purchaser in case the conditions listed in ITB Clause 20.5 are invoked;
	(e) be submitted in its original form; copies will not be accepted;
	(f) Remain valid for the period specified in the BDS.
	20.3 Any bid not accompanied by a substantially responsive Bid Security in accordance with ITB Sub-Clause 20.1 and 20.2, may be rejected by the Purchaser as non-responsive.
	20.4 The Bid Security of unsuccessful Bidders shall be returned as promptly as possible upon the successful Bidder's furnishing of the Performance Security pursuant to ITB Clause 43.
	20.5 The Bid Security may be forfeited:
	(a) if a Bidder withdraws its bid during the period of bid validity specified by the Bidder on the Bid Submission Form, except as provided in ITB Sub- Clause 19.2; or
	(b) if a Bidder does not agreeing to correction of arithmetical errors in pursuant to ITB Sub-Clause 30.3
	(c) if the successful Bidder fails to:
	(i) sign the Contract in accordance with ITB Clause 42;
	(ii) Furnish a Performance Security in accordance with ITB Clause 43.
21. Format and Signing of Bid	21.1 The Bidder shall prepare one original of the documents comprising the bid as described in ITB Clause 11 and clearly mark it as "ORIGINAL." In addition, the Bidder shall submit a copy of the bid and clearly mark it as "COPY." In the event of any discrepancy between the original and the copy, the original shall prevail.

	21.2 The original and the Copy of the bid shall be typed or written in indelible ink and shall be signed by a person duly authorized to sign on behalf of the Bidder.
	21.3 Any interlineations, erasures, or overwriting shall be valid only if they are signed or initialed by the person signing the Bid.
	Submission and Opening of Bids
22. Submission, Sealing and	22.1 Bidders may always submit their bids by mail or by hand.
Marking of Bids	(a) Bidders submitting bids by mail or by hand, shall enclose the original and the copy of the Bid in separate sealed envelopes, duly marking the envelopes as "ORIGINAL" and "COPY." These envelopes containing the original and the copy shall then be enclosed in one single envelope.
	22.2 The inner and outer envelopes shall:
	(a) Bear the name and address of the Bidder;
	(b) be addressed to the Purchaser in accordance with ITB Sub-Clause 23.1;
	(c) bear the specific identification of this bidding process as indicated in the BDS; and
	(d) Bear a warning not to open before the time and date for bid opening, in accordance with ITB Sub-Clause 261. If all envelopes are not sealed and marked as required, the Purchaser will assume no responsibility for the misplacement or premature opening of the bid.
23. Deadline for Submission of	23.1 Bids must be received by the Purchaser at the address and no later than the date and time specified in the BDS.
Bids	23.2 The Purchaser may, at its discretion, extend the deadline for the submission of bids by amending the Bidding Documents in accordance with ITB Clause 8, in which case all rights and obligations of the Purchaser and Bidders previously subject to the deadline shall thereafter be subject to the deadline as extended.
24. Late Bids	24.1 The Purchaser shall not consider any bid that arrives after the deadline for submission of bids, in accordance with ITB Clause 23. Any bid received by the Purchaser after the deadline for submission of bids shall be declared late, rejected, and returned unopened to the Bidder.
25. Withdrawal,	25.1 A Bidder may withdraw, or modify its Bid after it has been submitted by
and	sending a written notice in accordance with ITB Clause 22, duly signed by an
Modification of Bids	authorized representative, and shall include a copy of the authorization in accordance with ITB Sub-Clause 21.2, (except that no copies of the withdrawal
	notice are required). The corresponding substitution or modification of the bid
	must accompany the respective written notice. All notices must be:
	(a) submitted in accordance with ITB Clauses 21 and 22 (except that withdrawal notices do not require copies), and in addition, the respective envelopes shall be clearly marked "WITHDRAWAL," or "MODIFICATION;" and

	(b) Received by the Purchaser prior to the deadline prescribed for submission of bids, in accordance with ITB Clause 23.
	25.2 Bids requested to be withdrawn in accordance with ITB Sub-Clause 25.1 shall be returned to the Bidders only upon notification of contract award to the successful bidder in accordance with sub clause 41.1.
	25.3 No bid may be withdrawn, substituted, or modified in the interval between the deadline for submission of bids and the expiration of the period of bid validity specified by the Bidder on the Bid Submission Form or any extension thereof.
26. Bid Opening	26.1 The Purchaser shall conduct the bid opening in public at the address, date and time specified in the BDS.
	26.2 First, envelopes marked "WITHDRAWAL" shall be opened and read out and the envelope with the corresponding bid may be opened at the discretion of the Purchaser. No bid withdrawal shall be permitted unless the corresponding withdrawal notice contains a valid authorization to request the withdrawal and is read out at bid opening. Envelopes marked "MODIFICATION" shall be opened and read out with the corresponding Bid. No Bid modification shall be permitted unless the corresponding modification notice contains a valid authorization to request the modification and is read out at Bid opening. Only envelopes that are opened and read out at Bid opening shall be considered further.
	26.3 All other envelopes shall be opened one at a time, reading out: the name of the Bidder and whether there is a modification; the Bid Prices, including any discounts and alternative offers; the presence of a Bid Security or Bid-Securing Declaration, if required; and any other details as the Purchaser may consider appropriate. Only discounts and alternative offers read out at Bid opening shall be considered for evaluation. No Bid shall be rejected at Bid opening except for late bids, in accordance with ITB Sub Clause 24.1.
	26.4 The Purchaser shall prepare a record of the Bid opening that shall include, as a minimum: the name of the Bidder and whether there is a withdrawal, or modification; the Bid Price, per lot if applicable, including any discounts, and the presence or absence of a Bid Security. The bids that were opened shall be resealed in separate envelopes, promptly after the bid opening. The Bidders' representatives who are present shall be requested to sign the attendance sheet. A copy of the record shall be distributed to all Bidders who submitted bids in time.
	Evaluation and Comparison of Bids
27. Confidentiality	27.1 Information relating to the examination, evaluation, comparison, and post- qualification (if applicable) of bids, and recommendation of contract award, shall not be disclosed to bidders or any other persons not officially concerned with such process until publication of the Contract Award.
	27.2 Any effort by a Bidder to influence the Purchaser in the examination, evaluation, comparison, and post-qualification of the bids or contract award decisions may result in the rejection of its Bid.

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	27.3 Notwithstanding ITB Sub-Clause 27.2, if any Bidder wishes to contact the Purchaser on any matter related to the bidding process, from the time of bid opening to the time of Contract Award, it should do so in writing.
28. Clarification of Bids	28.1 To assist in the examination, evaluation, comparison and post-qualification of the bids, the Purchaser may, at its discretion, request any Bidder for a clarification of its Bid. Any clarification submitted by a Bidder in respect to its Bid and that is not in response to a request by the Purchaser shall not be considered for purpose of evaluation. The Purchaser's request for clarification and the response shall be in writing. No change in the prices or substance of the Bid shall be sought, offered, or permitted, except to confirm the correction of arithmetic errors discovered by the Purchaser in the Evaluation of the bids, in accordance with ITB Clause 30.
29. Responsiveness of Bids	29.1 The Purchaser's determination of a bid's responsiveness is to be based on the contents of the bid itself.
	29.2 A substantially responsive Bid is one that conforms to all the terms, conditions, and specifications of the Bidding Documents without material deviation, reservation, or omission. A material deviation, reservation, or omission is one that:
	(a) affects in any substantial way the scope, quality, or performance of the Goods and Related Services specified in the Contract; or
	(b) limits in any substantial way, inconsistent with the Bidding Documents, the Purchaser's rights or the Bidder's obligations under the Contract; or
	(c) if rectified would unfairly affect the competitive position of other bidders presenting substantially responsive bids. 29.3 If a bid is not substantially responsive to the Bidding Documents, it shall be rejected by the Purchaser and may not subsequently be made responsive by the Bidder by correction of the material deviation, reservation, or omission.
30. Nonconformities, Errors and	30.1 Provided that a Bid is substantially responsive, the Purchaser may waive any non-conformities or omissions in the Bid that do not constitute a material deviation.
Omissions	30.2 Provided that a bid is substantially responsive, the Purchaser may request that the Bidder submit the necessary information or documentation, within a reasonable period of time, to rectify nonmaterial nonconformities or omissions in the bid related to documentation requirements. Such omission shall not be related to any aspect of the price of the Bid. Failure of the Bidder to comply with the request may result in the rejection of its Bid.
	<ul><li>30.3 Provided that the Bid is substantially responsive, the Purchaser shall correct arithmetical errors on the following basis:</li><li>(a) if there is a discrepancy between the unit price and the line item total that is obtained by multiplying the unit price by the quantity, the unit price shall prevail and the line item total shall be corrected, unless in the opinion of the Purchaser there is an obvious misplacement of the decimal point in the unit price, in which case the line item total as quoted shall govern and the unit price shall be corrected;</li></ul>

	<ul><li>(b) if there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected; and</li><li>(c) If there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail subject to (a) and (b) above.</li><li>30.4 If the Bidder that submitted the lowest evaluated Bid does not accept the</li></ul>
	correction of errors, its Bid shall be disqualified and its Bid Security shall be forfeited or its Bid- Securing Declaration shall be executed.
31. Preliminary Examination of Bids	31.1 The Purchaser shall examine the bids to confirm that all documents and technical documentation requested in ITB Clause 11 have been provided, and to determine the completeness of each document submitted.
	31.2 The Purchaser shall confirm that the following documents and information have been provided in the Bid. If any of these documents or information is missing, the Bid shall be rejected.
	(a) Bid Submission Form, in accordance with ITB Sub- Clause 12.1;
	(b) Price Schedules, in accordance with ITB Sub-Clause 12;
	(c) Bid Security, in accordance with ITB Clause 20.
32. Examination	32.1 The Purchaser shall examine the Bid to confirm that all terms and conditions
of Terms and	specified in the CC and the Contract Data have been accepted by the Bidder
Conditions;	without any material deviation or reservation.
Technical	
Evaluation	32.2 The Purchaser shall evaluate the technical aspects of the Bid submitted in accordance with ITB Clause 17, to confirm that all requirements specified in Section V, Schedule of Requirements of the Bidding Documents have been met without any material deviation or reservation.
	32.3 If, after the examination of the terms and conditions and the technical evaluation, the Purchaser determines that the Bid is not substantially responsive in accordance with ITB Clause 29, the Purchaser shall reject the Bid.
<b>33.</b> Conversion to	34.1 If the bidders are allowed to quote in foreign currencies in accordance with
Single Currency	sub clause 15.1, for evaluation and comparison purposes, the Purchaser shall
	convert all bid prices expressed in foreign currencies in to Sri Lankan Rupees using the selling rates prevailed 28 days prior to closing of bids as published by
	the Central Bank of Sri Lanka. If this date falls on a public holiday the earliest
	working day prior to the date shall be applicable.
34. Domestic	34.1 Domestic preference shall be a factor in bid evaluation only if stated in the
Preference	BDS. If domestic preference shall be a bid evaluation factor, the methodology for
	calculating the margin of preference and the criteria for its application shall be as
	specified in Section III, Evaluation and Qualification Criteria.
35. Evaluation of Bids	35.1 The Purchaser shall evaluate each bid that has been determined, up to this stage of the evaluation, to be substantially responsive.
	35.2 To evaluate a Bid, the Purchaser shall only use all the factors, methodologies and criteria defined in this ITB Clause 35.

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	35.3 To evaluate a Bid, the Purchaser shall consider the following:
	(a) the Bid Price as quoted in accordance with clause 14;
	(b) price adjustment for correction of arithmetic errors in accordance with ITB Sub-Clause 30.3;
	(c) price adjustment due to discounts offered in accordance with ITB Sub-Clause 14.2; and 14.3
	(d) adjustments due to the application of the evaluation criteria specified in the BDS from amongst those set out in Section III, Evaluation and Qualification Criteria;
	(e) Adjustments due to the application of a domestic preference, in accordance with ITB Clause 34 if applicable.
	35.4 The Purchaser's evaluation of a bid may require the consideration of other factors, in addition to the factors stated in ITB Sub-Clause 35.3, if specified in BDS. These factors may be related to the characteristics, performance, and terms and conditions of purchase of the Goods and Related Services. The effect of the factors selected, if any, shall be expressed in monetary terms to facilitate comparison of bids
	35.5 If so specified in the BDS, these Bidding Documents shall allow Bidders to quote for one or more lots, and shall allow the Purchaser to award one or multiple lots to more than one Bidder. The methodology of evaluation to determine the lowest-evaluated lot combinations is specified in Section III, Evaluation and Qualification Criteria.
36. Comparison of Bids	36.1 The Purchaser shall compare all substantially responsive bids to determine the lowest-evaluated bid, in accordance with ITB Clause 35.
<b>37.</b> Post qualification of the Bidder.	37.1 The Purchaser shall determine to its satisfaction whether the Bidder that is selected as having submitted the lowest evaluated and substantially responsive bid is qualified to perform the Contract satisfactorily.
	37.2 The determination shall be based upon an examination of the documentary evidence of the Bidder's qualifications submitted by the Bidder, pursuant to ITB Clause 18.
	37.3 An affirmative determination shall be a prerequisite for award of the Contract to the Bidder. A negative determination shall result in disqualification of the bid, in which event the Purchaser shall proceed to the next lowest evaluated bid to make a similar determination of that Bidder's capabilities to perform satisfactorily.
38. Purchaser's Right to Accept Any Bid, and to Reject Any or All Bids	38.1 The Purchaser reserves the right to accept or reject any bid, and to annul the bidding process and reject all bids at any time prior to contract award, without thereby incurring any liability to Bidders.

	Award of Contract
39. Award	39.1 The Purchaser shall award the Contract to the Bidder whose offer has been
Criteria	determined to be the lowest evaluated bid and is substantially responsive to the
	Bidding Documents, provided further that the Bidder is determined to be
	qualified to perform the Contract satisfactorily.
40. Purchaser's	40.1 At the time the Contract is awarded, the Purchaser reserves the right to
<b>Right to Vary</b>	increase or decrease the quantity of Goods and Related Services originally
Quantities at	specified in Section V, Schedule of Requirements, provided this does not exceed
Time of Award	twenty five percent (25%) or one unit whichever is higher and without any
	change in the unit prices or other terms and conditions of the bid and the Bidding
	Documents.
41. Notification of	41.1 Prior to the expiration of the period of bid validity, the Purchaser shall
Award	notify the successful Bidder, in writing, that its Bid has been accepted.
	41.2 Until a formal Contract is prepared and executed, the notification of award
	shall constitute a binding Contract.
	41.2 Upon the successful Bidder's furnishing of the signed Contract Form and
	41.3 Upon the successful Bidder's furnishing of the signed Contract Form and performance security pursuant to ITB Clause 43, the Purchaser will promptly
	notify each unsuccessful Bidder and will discharge its bid security, pursuant to
	ITB Clause 20.4.
42. Signing of	42.1 Within Seven (7) days after notification, the Purchaser shall complete the
Contract	Agreement, and inform the successful Bidder to sign it.
	42.2 Within Seven (7) days of receipt of such information, the successful Bidder
	shall sign the Agreement.
	43.1 Within fourteen (14) days of the receipt of notification of award from the
43. Performance	Purchaser, the successful Bidder, if required, shall furnish the Performance
Security	Security in accordance with the CC, using for that purpose the Performance
	Security Form included in Section VIII Contract forms. The Employer shall
	promptly notify the name of the winning Bidder to each unsuccessful Bidder and
	discharge the Bid Securities of the unsuccessful bidders pursuant to ITB Sub-
	Clause 20.4.
	43.2 Failure of the successful Bidder to submit the abovementioned Performance
	Security or sign the Contract shall constitute sufficient grounds for the annulment
	of the award and forfeiture of the Bid Security or execution of the Bid-Securing
	Declaration. In that event the Purchaser may award the Contract to the next lowest evaluated Bidder whose offer is substantially responsive and is
	lowest evaluated Bidder, whose offer is substantially responsive and is determined by the Purchaser to be qualified to perform the Contract
	determined by the Purchaser to be qualified to perform the Contract satisfactorily.
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## Section VI. Conditions of Contract

1. Definitions	1.1 The following words and expressions shall have the meanings
	hereby assigned to them:
	(a) "Contract" means the Contract Agreement entered into between the Purchaser and the Supplier, together with the Contract
	Documents referred to therein, including all attachments, appendices, and all documents incorporated by reference therein.
	(b) "Contract Documents" means the documents listed in the Contract Agreement, including any amendments thereto.
	(c) "Contract Price" means the price payable to the Supplier as specified in the Contract Agreement, subject to such additions and adjustments thereto or deductions there from, as may be made pursuant to the Contract.
	(d) "Day" means calendar day.
	(e) "Completion" means the fulfillment of the supply of Goods to the destination specified and completion of the Related Services by the Supplier in accordance with the terms and conditions set forth in the Contract.
	(f) "CC" means the Conditions of Contract.
	(g) "Goods" means all of the commodities, raw material, machinery and equipment, and/or other materials that the Supplier is required to supply to the Purchaser under the Contract.
	(h) "Purchaser" means the entity purchasing the Goods and Related Services, as specified in the Contract Data.
	(i) "Related Services" means the services incidental to the supply of the goods, such as insurance, installation, training and initial maintenance and other such obligations of the Supplier under the Contract.
	(j) "Subcontractor" means any natural person, private or government entity, or a combination of the above, to whom any part of the Goods to be supplied or execution of any part of the Related Services is subcontracted by the Supplier. Section VI General Conditions of Contract 51
	(k) "Supplier" means the natural person, private or government entity, or a combination of the above, whose bid to perform the Contract has been accepted by the Purchaser and is named as such in the Contract Agreement.

	(1) "The Project Site," where applicable, means the place named in
	the Contract Data.
2. Contract Documents	2.1 Subject to the order of precedence set forth in the Contract
	Agreement, all documents forming the Contract (and all parts thereof) are intended to be correlative, complementary, and mutually
	explanatory. The Contract Agreement shall be read as a whole.
3. Fraud and Corruption	3.1 The Government of Sri Lanka requires the Purchaser as well as
	bidders, suppliers, contractors, and consultants to observe the highest standard of ethics during the procurement and execution of such contracts. In pursuit of this policy:
	(i) "corrupt practice" means offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence the action of a public official in the procurement process or in contract execution;
	(ii) "fraudulent practice" means a misrepresentation or omission of facts in order to influence a procurement process or the execution of a contract;
	(iii) "collusive practice" means a scheme or arrangement between two or more bidders, with or without the knowledge of the Purchaser to establish bid prices at artificial, noncompetitive levels; and
	(iv) "Coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the procurement process or affect the execution of a contract.
4. Interpretation	4.1 If the context so requires it, singular means plural and vice versa.
	4.2 Entire Agreement
	The Contract constitutes the entire agreement between the Purchaser and the Supplier and supersedes all communications, negotiations and agreements (whether 52 Section VII. General Conditions of Contract written or oral) of the parties with respect thereto made prior to the date of Contract.
	4.3 Amendment
	No amendment or other variation of the Contract shall be valid unless it is in writing, is dated, expressly refers to the Contract, and is signed by a duly authorized representative of each party thereto. 4.4 Severability
	If any provision or condition of the Contract is prohibited or rendered invalid or unenforceable, such prohibition, invalidity or unenforceability shall not affect the validity or enforceability of any other provisions and conditions of the Contract.
5. Language	5.1 The Contract as well as all correspondence and documents relating to the Contract exchanged by the Supplier and the Purchaser,

6. Joint Venture, Consortium or Association	<ul> <li>shall be written in English language. Supporting documents and printed literature that are part of the Contract may be in another language provided they are accompanied by an accurate translation of the relevant passages in the language specified, in which case, for purposes of interpretation of the Contract, this translation shall govern.</li> <li>5.2 The Supplier shall bear all costs of translation to the governing language and all risks of the accuracy of such translation, for documents provided by the Supplier.</li> <li>6.1 If the Supplier is a joint venture, consortium, or association, all of the parties shall be jointly and severally liable to the Purchaser for the fulfillment of the provisions of the Contract and shall designate one party to act as a leader with authority to bind the joint venture, consortium, or association. The composition or the constitution of the</li> </ul>
	joint venture, consortium, or association shall not be altered without the prior consent of the Purchaser.
7. Eligibility	7.1 All goods supplied under this contract shall be complied with applicable standards stipulated by the Sri Lanka Standards Institute. In the absence of such standards, the Goods supplied shall be complied to other internationally accepted standards, such as British Standards.
8. Notices	<ul> <li>8.1 Any notice given by one party to the other pursuant to the Contract shall be in writing to the address specified in the Contract Data. The term "in writing" means communicated in written form with proof of receipt. Section VI General Conditions of Contract 53</li> <li>8.2 A notice shall be effective when delivered or on the notice's effective date, whichever is later.</li> </ul>
9. Governing Law	9.1 The Contract shall be governed by and interpreted in accordance with the laws of the Democratic Socialist Republic of Sri Lanka.
10. Settlement of Disputes	<ul> <li>10.1 The Purchaser and the Supplier shall make every effort to resolve amicably by direct informal negotiation any disagreement or dispute arising between them under or in connection with the Contract.</li> <li>10.2 If, after twenty-eight (28) days, the parties have failed to resolve their dispute or difference by such mutual consultation, then either the Purchaser or the Supplier may give notice to the other party of its intention to commence arbitration, as hereinafter provided, as to the matter in dispute, and no arbitration in respect of this matter may be commenced unless such notice is given. Any dispute or difference in respect of which a notice of intention to commence arbitration in respect of this matter may be commenced unless such notice is given. Any dispute or difference in respect of which a notice of intention to commence arbitration has been given in accordance with this Clause shall be finally settled by arbitration. Arbitration may be commenced prior to or after delivery of the Goods under the Contract. Arbitration Act No:11 of 1995.</li> <li>10.3 Notwithstanding any reference to arbitration herein,</li> </ul>

	(a) the parties shall continue to perform their respective obligations under the Contract unless they otherwise agree; and
	(b) the Purchaser shall pay the Supplier any monies due the Supplier.
11. Scope of Supply	11.1 The Goods and Related Services to be supplied shall be as specified in the Schedule of Requirements.
12. Delivery and	12.1 Subject to CC Sub-Clause 32.1, the Delivery of the Goods and
Documents	Completion of the Related Services shall be in accordance with the Delivery and Completion Schedule specified in the Schedule of Requirements. Where applicable the details of shipping and other documents to be furnished by the Supplier are specified in the Contract Data.
13. Supplier's Responsibilities	13.1 The Supplier shall supply all the Goods and Related Services included in the Scope of Supply in accordance with CC Clause 11, and the Delivery and Completion Schedule, as per CC Clause 12.
14. Contract Price	14.1 Prices charged by the Supplier for the Goods supplied and the Related Services performed under the Contract shall not vary from the prices quoted by the Supplier in its bid.
15. Terms of Payment	15.1 The Contract Price shall be paid as specified in the Contract Data.
	15.2 The Supplier's request for payment shall be made to the Purchaser in writing, accompanied by invoices describing, as appropriate, the Goods delivered and Related Services performed, and by the documents submitted pursuant to CC Clause 12 and upon fulfillment of all other obligations stipulated in the Contract.
	15.3 Payments shall be made promptly by the Purchaser, but in no case later than twenty eight (28) days after submission of an invoice or request for payment by the Supplier, and after the Purchaser has accepted it.
16. Taxes and Duties	16.1 The Supplier shall be entirely responsible for all taxes, duties, license fees, etc., incurred until delivery of the contracted Goods to the Purchaser.
17. Performance Security	17.1 If required as specified in the Contract Data, the Supplier shall, within fourteen (14) days of the notification of contract award, provide a performance security of Ten percent (10%) of the Contract Price for the performance of the Contract.
	17.2 The proceeds of the Performance Security shall be payable to the Purchaser as compensation for any loss resulting from the Supplier's failure to complete its obligations under the Contract.
	17.3 As specified in the Contract Data, the Performance Security, if required, shall be in Sri Lanka Rupees and shall be in the format stipulated by the Purchaser in the Contract Data, or in another format acceptable to the Purchaser.
	17.4 The Performance Security shall be discharged by the Purchaser

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	and returned to the Supplier not later than twenty-eight (28) days
	following the date of Completion of the Supplier's performance
18 Conversion	obligations under the Contract, including any warranty obligations.
18. Copyright	18.1 The copyright in all drawings, documents, and other materials containing data and information furnished to the Purchaser by the
	Supplier herein shall remain vested in the Supplier, or, if they are
	furnished to the Purchaser directly or through the Supplier by any
	third party, including suppliers of materials, the copyright in such
	materials shall remain vested in such third party.
19. Confidential	19.1 The Purchaser and the Supplier shall keep confidential and shall
Information	not, without the written consent of the other party hereto, divulge to
mormation	any third party any documents, data, or other information furnished
	directly or indirectly by the other party hereto in connection with the
	Contract, whether such information has been furnished prior to,
	during or following completion or termination of the Contract.
	Notwithstanding the above, the Supplier may furnish to its
	Subcontractor such documents, data, and other information it
	receives from the Purchaser to the extent required for the
	Subcontractor to perform its work under the Contract, in which event
	the Supplier shall obtain from such Subcontractor an undertaking of
	confidentiality similar to that imposed on the Supplier under CC
	Clause 19.
	19.2 The Purchaser shall not use such documents, data, and other
	information received from the Supplier for any purposes unrelated to
	the contract. Similarly, the Supplier shall not use such documents,
	data, and other information received from the Purchaser for any
	purpose other than the performance of the Contract.
	19.3 The above provisions of CC Clause 19 shall not in any way
	modify any undertaking of confidentiality given by either of the
	parties hereto prior to the date of the Contract in respect of the
	Supply or any part thereof.
	19.4 The provisions of CC Clause 19 shall survive completion or
	termination, for whatever reason, of the Contract.
20. Subcontracting	20.1 The Supplier shall notify the Purchaser in writing of all
	subcontracts awarded under the Contract if not already specified in
	the bid. Such notification, in the original bid or later shall not relieve
	the Supplier from any of its obligations, duties, responsibilities, or
	liability under the Contract.
	20.2 Subcontracts shall comply with the provisions of CC Clauses 3
	and 7.
21. Specifications and	21.1 Technical Specifications and Drawings
Standards	21.1 roomical operitoutions and Drawings
	(a) The Goods and Related Services supplied under this Contract
	shall conform to the technical specifications and standards mentioned
	in Section V, Schedule of Requirements and, when no applicable
	standard is mentioned, the standard shall be equivalent or superior to
	the official standards whose application is appropriate to the Goods'
	country of origin.

	(b) The Supplier shall be entitled to disclaim responsibility for any design, data, drawing, specification or other document, or any modification thereof provided or designed by or on behalf of the Purchaser, by giving a notice of such disclaimer to the Purchaser.
	(c) Wherever references are made in the Contract to codes and standards in accordance with which it shall be executed, the edition or the revised version of such codes and standards shall be those specified in the Schedule of Requirements. During Contract execution, any changes in any such codes and standards shall be applied only after approval by the Purchaser and shall be treated in accordance with CC Clause 32.
22. Packing and	22.1 The Supplier shall pack the Goods as is required to prevent their
Documents	damage or deterioration during transit to their final destination, as indicated in the Contract.
23. Insurance	23.1 Unless otherwise specified in the Contract Data, the Goods
	supplied under the Contract shall be fully insured against loss or damage incidental to manufacture or acquisition, transportation, storage, and delivery.
24. Transportation	24.1 Unless otherwise specified in the Contract Data, responsibility for arranging transportation of the Goods shall be a responsibility of the supplier.
25. Inspections and Tests	25.1 The Supplier shall at its own expense and at no cost to the Purchaser carry out all such tests and/or inspections of the Goods and Related Services as are specified in the Contract Data.
	25.2 The inspections and tests may be conducted on the premises of the Supplier or its Subcontractor, at point of delivery, and/or at the Goods' final destination, or in another place as specified in the Contract Data. Subject to CC Sub-Clause 25.3, if conducted on the premises of the Supplier or its Subcontractor, all reasonable facilities and assistance, including access to drawings and production data, shall be furnished to the inspectors at no charge to the Purchaser.
	25.3 The Purchaser or its designated representative shall be entitled to attend the tests and/or inspections referred to in CC Sub-Clause 25.2, provided that the Purchaser bear all of its own costs and expenses incurred in connection with such attendance including, but not limited to, all traveling and board and lodging expenses.
	25.4 Whenever the Supplier is ready to carry out any such test and inspection, it shall give a reasonable advance notice, including the place and time, to the Purchaser. The Supplier shall obtain from any relevant third party or manufacturer any necessary permission or consent to enable the Purchaser or its designated representative to attend the test and/or inspection.
	25.5 The Purchaser may require the Supplier to carry out any test and/or inspection not required by the Contract but deemed necessary to verify that the characteristics and performance of the Goods

	comply with the technical specifications codes and standards under the Contract, provided that the Supplier's reasonable costs and expenses incurred in the carrying out of such test and/or inspection shall be added to the Contract Price. Further, if such test and/or inspection impede the progress of manufacturing and/or the Supplier's performance of its other obligations under the Contract, due allowance will be made in respect of the Delivery Dates and Completion Dates and the other obligations so affected.
	25.6 The Supplier shall provide the Purchaser with a report of the results of any such test and/or inspection.
	25.7 The Purchaser may reject any Goods or any part thereof that fail to pass any test and/or inspection or do not conform to the specifications. The Supplier shall either rectify or replace such rejected Goods or parts thereof or make alterations necessary to meet the specifications at no cost to the Purchaser, and shall repeat the test and/or inspection, at no cost to the Purchaser, upon giving a notice pursuant to CC Sub-Clause 25.4.
	25.8 The Supplier agrees that neither the execution of a test and/or inspection of the Goods or any part thereof, nor the attendance by the Purchaser or its representative, nor the issue of any report pursuant to CC Sub-Clause 25.6, shall release the Supplier from any warranties or other obligations under the Contract.
26. Liquidated Damages	26.1 Except as provided under CC Clause 31, if the Supplier fails to deliver any or all of the Goods by the Date(s) of delivery or perform the Related Services within the period specified in the Contract, the Purchaser may without prejudice to all its other remedies under the Contract, deduct from the Contract Price, as liquidated damages, a sum equivalent to the percentage specified in the Contract Data of the delivered price of the delayed Goods or unperformed Services for each week or part thereof of delay until actual delivery or performance, up to a 58 Section VII. General Conditions of Contract Data. Once the maximum is reached, the Purchaser may terminate the Contract pursuant to CC Clause 34.
27. Warranty	27.1 The Supplier warrants that all the Goods are new, unused, and of the most recent or current models, and that they incorporate all recent improvements in design and materials, unless provided otherwise in the Contract.
	27.2 Subject to CC Sub-Clause 21.1(b), the Supplier further warrants that the Goods shall be free from defects arising from any act or omission of the Supplier or arising from design, materials, and workmanship, under normal use in the conditions prevailing in the country of final destination.
	27.3 Unless otherwise specified in the Contract Data, the warranty shall remain valid for twelve (12) months after the Goods, or any portion thereof as the case may be, have been delivered to and

	accepted at the final destination indicated in the Contract Data.
	27.4 The Purchaser shall give notice to the Supplier stating the nature of any such defects together with all available evidence thereof, promptly following the discovery thereof. The Purchaser shall afford all reasonable opportunity for the Supplier to inspect such defects.
	27.5 Upon receipt of such notice, the Supplier shall, within the period specified in the Contract Data, expeditiously repair or replace the defective Goods or parts thereof, at no cost to the Purchaser.
	27.6 If having been notified, the Supplier fails to remedy the defect within the period specified in the Contract Data, the Purchaser may proceed to take within a reasonable period such remedial action as may be necessary, at the Supplier's risk and expense and without prejudice to any other rights which the Purchaser may have against the Supplier under the Contract.
28. Patent Indemnity	28.1 The Supplier shall, subject to the Purchaser's compliance with CC Sub-Clause 28.2, indemnify and hold harmless the Purchaser and its employees and officers from and against any and all suits, actions or administrative proceedings, claims, demands, losses, damages, costs, and expenses of any nature, including attorney's fees and expenses, which the Purchaser may suffer as a result of any infringement or alleged infringement of any patent, utility model, registered design, trademark, copyright, or other intellectual property right registered or otherwise existing at the date of the contract by reason of:
	(a) the installation of the Goods by the Supplier or the use of the Goods in the country where the Site is located; and
	(b) The sale in any country of the products produced by the Goods. Such indemnity shall not cover any use of the Goods or any part thereof other than for the purpose indicated by or to be reasonably inferred from the Contract, neither any infringement resulting from the use of the Goods or any part thereof, or any products produced thereby in association or combination with any other equipment, plant, or materials not supplied by the Supplier, pursuant to the Contract.
	28.2 If any proceedings are brought or any claim is made against the Purchaser arising out of the matters referred to in CC Sub-Clause 28.1, the Purchaser shall promptly give the Supplier a notice thereof, and the Supplier may at its own expense and in the Purchaser's name conduct such proceedings or claim and any negotiations for the settlement of any such proceedings or claim.
	28.3 If the Supplier fails to notify the Purchaser within twenty eight (28) days after receipt of such notice that it intends to conduct any such proceedings or claim, then the Purchaser shall be free to conduct

	the same on its own behalf.
	28.4 The Purchaser shall, at the Supplier's request, afford all available assistance to the Supplier in conducting such proceedings or claim, and shall be reimbursed by the Supplier for all reasonable expenses incurred in so doing.
	28.5 The Purchaser shall indemnify and hold harmless the Supplier and its employees, officers, and Subcontractors from and against any and all suits, actions or administrative proceedings, claims, demands, losses, damages, costs, and expenses of any nature, including attorney's fees and expenses, which the Supplier may suffer as a result of any infringement or alleged infringement of any patent, utility model, registered design, trademark, copyright, or other intellectual property right registered or otherwise existing at the date of the Contract arising out of or in connection with any design, data, drawing, specification, or other documents or materials provided or designed by or on behalf of the Purchaser.
29. Limitation of	29.1 Except in cases of criminal negligence or willful misconduct,
Liability	
	(a) the Supplier shall not be liable to the Purchaser, whether in contract, tort, or otherwise, for any indirect or consequential loss or damage, loss of use, loss of production, or loss of profits or interest costs, provided that this exclusion shall not apply to any obligation of the Supplier to pay liquidated damages to the Purchaser and
	(b) the aggregate liability of the Supplier to the Purchaser, whether under the Contract, in tort or otherwise, shall not exceed the total Contract Price, provided that this limitation shall not apply to the cost of repairing or replacing defective equipment, or to any obligation of the supplier to indemnify the purchaser with respect to patent infringement
30. Change in Laws and Regulations	30.1 Unless otherwise specified in the Contract, if after the date of 28 days prior to date of Bid submission, any law, regulation, ordinance, order or bylaw having the force of law is enacted, promulgated, abrogated, or changed in Sri Lanka that subsequently affects the Delivery Date and/or the Contract Price, then such Delivery Date and/or Contract Price shall be correspondingly increased or decreased, to the extent that the Supplier has thereby been affected in the performance of any of its obligations under the Contract. Notwithstanding the foregoing, such additional or reduced cost shall not be separately paid or credited if the same has already been accounted for in the price adjustment provisions where applicable, in accordance with CC Clause 14.

	ity, liquidated damages, or termination or default if and to the
obliga Majeu	that its delay in performance or other failure to perform its tions under the Contract is the result of an event of Force
situati unavo the pa to, a revolu	For purposes of this Clause, "Force Majeure" means an event or on beyond the control of the Supplier that is not foreseeable, is idable, and its origin is not due to negligence or lack of care on rt of the Supplier. Such events may include, but not be limited cts of the Purchaser in its sovereign capacity, wars or titons, fires, floods, epidemics, quarantine restrictions, and t embargoes.
notify thereo Suppl as fa altern	f a Force Majeure situation arises, the Supplier shall promptly the Purchaser in writing of such condition and the cause f. Unless otherwise directed by the Purchaser in writing, the ier shall continue to perform its obligations under the Contract as is reasonably practical, and shall seek all reasonable ative means for performance not prevented by the Force are event.
<b>Contract Amendments</b> in acc	The Purchaser may at any time order the Supplier through notice cordance CC Clause 8, to make changes within the general of the Contract in any one or more of the following:
	awings, designs, or specifications, where Goods to be furnished the Contract are to be specifically manufactured for the aser;
(b) the	e method of shipment or packing;
(c) the	place of delivery; and
such a requir Contr or in shall adjust (28) a	he Related Services to be provided by the Supplier. 32.2 If any change causes an increase or decrease in the cost of, or the time ed for, the Supplier's performance of any provisions under the act, an equitable adjustment shall be made in the Contract Price the Delivery/Completion Schedule, or both, and the Contract accordingly be amended. Any claims by the Supplier for ment under this Clause must be asserted within twenty-eight lays from the date of the Supplier's receipt of the Purchaser's e order.
that m shall the p simila	Prices to be charged by the Supplier for any Related Services hight be needed but which were not included in the Contract be agreed upon in advance by the parties and shall not exceed revailing rates charged to other parties by the Supplier for r services.
	Contract shall be made except by written amendment signed by

33. Extensions of Time	33.1 If at any time during performance of the Contract, the Supplier or its subcontractors should encounter conditions impeding timely delivery of the Goods or completion of Related Services pursuant to CC Clause 12, the Supplier shall promptly notify the Purchaser in writing of the delay, its likely duration, and its cause. As soon as practicable after receipt of the Supplier's notice, the Purchaser shall evaluate the situation and may at its discretion extend the Supplier's time for performance, in which case the extension shall be ratified by the parties by amendment of the Contract.
34. Termination	<ul> <li>33.2 Except in case of Force Majeure, as provided under CC Clause</li> <li>31, a delay by the Supplier in the performance of its Delivery and</li> <li>Completion obligations shall render the Supplier liable to the</li> <li>imposition of liquidated damages pursuant to CC Clause 26, unless</li> <li>an extension of time is agreed upon, pursuant to CC Sub-Clause 33.1.</li> <li>34.1 Termination for Default</li> </ul>
	(a) The Purchaser, without prejudice to any other remedy for breach of Contract, by written notice of default sent to the Supplier, may terminate the Contract in whole or in part:
	(i) if the Supplier fails to deliver any or all of the Goods within the period specified in the Contract, or within any extension thereof granted by the Purchaser pursuant to CC Clause 33;
	(ii) if the Supplier fails to perform any other obligation under the Contract; or
	(iii) If the Supplier, in the judgment of the Purchaser has engaged in fraud and corruption, as defined in CC Clause 3, in competing for or in executing the Contract.
	(b) In the event the Purchaser terminates the Contract in whole or in part, pursuant to CC Clause 34.1(a), the Purchaser may procure, upon such terms and in such manner as it deems appropriate, Goods or Related Services similar to those undelivered or not performed, and the Supplier shall be liable to the Purchaser for any additional costs for such similar Goods or Related Services. However, the Supplier shall continue performance of the Contract to the extent not terminated.
	<ul><li>34.2 Termination for Insolvency.</li><li>(a) The Purchaser may at any time terminate the Contract by giving notice to the Supplier if the Supplier becomes bankrupt or otherwise insolvent. In such event, termination will be without compensation to the Supplier, provided that such termination will not prejudice or affect any right of action or remedy that has accrued or will accrue thereafter to the Purchaser</li></ul>

	<ul><li>34.3 Termination for Convenience.</li><li>(a) The Purchaser, by notice sent to the Supplier, may terminate the Contract, in whole or in part, at any time for its convenience. The notice of termination shall specify that termination is for the</li></ul>
	Purchaser's convenience, the extent to which performance of the Supplier under the Contract is terminated, and the date upon which such termination becomes effective.
	(b) The Goods that are complete and ready for shipment within twenty-eight (28) days after the Supplier's receipt of notice of termination shall be accepted by the Purchaser at the Contract terms and prices. For the remaining Goods, the Purchaser may elect:
	(i) to have any portion completed and delivered at the Contract terms and prices; and/or
	(ii) to cancel the remainder and pay to the Supplier an agreed amount for partially completed Goods and Related Services and for materials and parts previously procured by the Supplier.
35. Assignment	35.1 Neither the Purchaser nor the Supplier shall assign, in whole or in part, their obligations under this Contract, except with prior written consent of the other party.

/ D M. G. L. Maveekumbura Senior Assistant Bursar (Supplies) University of Jaffna Jaffna

## Section VIII.

## **Contract Forms**

#### 1. Contract Agreement

THIS CONTRACT AGREEMENT is made

the [ insert: number ] day of [ insert: month ], [ insert: year ].

#### BETWEEN

(1) [ insert complete name of Purchaser ], a [ insert description of type of legal entity, for example, an agency of the Ministry of ..... or corporation and having its principal place of business at [ insert address of Purchaser ] (hereinafter called "the Purchaser"), and

(2) [ insert name of Supplier ], a corporation incorporated under the laws of [ insert: country of Supplier ] and having its principal place of business at [ insert: address of Supplier ] (hereinafter called "the Supplier").

WHEREAS the Purchaser invited bids for certain Goods and ancillary services, viz., [insert brief description of Goods and Services] and has accepted a Bid by the Supplier for the supply of those Goods and Services in the sum of [insert Contract Price in words and figures, expressed in the Contract currency (ies)] (hereinafter called "the Contract Price").

#### NOW THIS AGREEMENT WITNESSETH AS FOLLOWS:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract referred to.

2. The following documents shall constitute the Contract between the Purchaser and the Supplier, and each shall be read and construed as an integral part of the Contract:

- (a) This Contract Agreement
- (b) Contract Data
- (c) Conditions of Contract

(d) Technical Requirements (including Schedule of Requirements and Technical Specifications)

- (e) The Supplier's Bid and original Price Schedules
- (f) The Purchaser's Notification of Award
- (g) [Add here any other document(s)]

3. This Contract shall prevail over all other Contract documents. In the event of any discrepancy or inconsistency within the Contract documents, then the documents shall prevail in the order listed above.

4. In consideration of the payments to be made by the Purchaser to the Supplier as hereinafter mentioned, the Supplier hereby covenants with the Purchaser to provide the Goods and Services and to remedy defects therein in conformity in all respects with the provisions of the Contract.

5. The Purchaser hereby covenants to pay the Supplier in consideration of the provision of the Goods and Services and the remedying of defects therein, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

IN WITNESS whereof the parties hereto have caused this Agreement to be executed in accordance with the laws of Democratic Socialist Republic of Sri Lanka on the day, month and year indicated above.

For and on behalf of the Purchaser

Signed: [insert signature]

in the capacity of [ insert title or other appropriate designation ]

in the presence of [insert identification of official witness]

For and on behalf of the Supplier

Signed: [insert signature of authorized representative(s) of the Supplier]

in the capacity of [ insert title or other appropriate designation ]

in the presence of [ insert identification of official witness]

M. G. L. Maveer Senior Assistant Bursar (S University of Jaffna Jaffna Мачеекитбига

#### 2. Performance Security

Date: -----

PERFORMANCE GUARANTEE No.: -----

We have been informed that ------ [name of Supplier] (hereinafter called "the Supplier") has entered into Contract No. ------ [reference number of the contract] dated ------ with you, for the ------ Supply of ------ [name of contract and brief description] (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, a performance guarantee is required. At the request of the Supplier, we ------ [name of Agency] hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of ------

[Amount in figures] (------) [amount in words], such sum being payable in the types and proportions of currencies in which the Contract Price is payable, upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation(s) under the Contract, without your needing to prove or to show grounds for your demand or the sum specified therein. This guarantee shall expire, no later than the .... Day of ....., 20.. [Insert date, 28 days beyond the scheduled completion date including the warranty period] and any demand for payment under it must be received by us at this office on or before that date.

[Signature(s)]

M. G. L. MaveeRumbura Senior Assistant Bursar (Supplies University of Jaffna Jaffna

#### **3.** Guarantee for Advance Payment

[The issuing agency, as requested by the successful Bidder, shall fill in this form in accordance with the instructions indicated.]

Date: [insert date (as day, month, and year) of Bid Submission] ICB No. and title: [insert number and title of bidding process] [issuing agency's letterhead] Beneficiary: [insert legal name and address of Purchaser]

ADVANCE PAYMENT GUARANTEE No.: [insert Advance Payment Guarantee no.]

We, [insert legal name and address of issuing agency], have been informed that [insert complete name and address of Supplier] (hereinafter called "the Supplier") has entered into Contract No. [Insert number] dated [insert date of Agreement] with you, for the supply of [insert types of Goods to be delivered] (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, an advance is to be made against an advance payment guarantee.

At the request of the Supplier, we hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of [insert amount(s) in figures and words] upon receipt by us of your first demand in writing declaring that the Supplier is in breach of its obligation under the Contract because the Supplier used the advance payment for purposes other than toward delivery of the Goods.

It is a condition for any claim and payment under this Guarantee to be made that the advance payment referred to above must have been received by the Supplier on its account [insert number and domicile of the account]

This Guarantee shall remain valid and in full effect from the date of the advance payment received by the Supplier under the Contract until [insert date].

[Signature of authorized representative(s) of the issuing agency]

M. G. L. Maveekumbura Senior Assistant Bursar (Supplies) University of Jaffna Jaffna

# Section II.

## **Bidding Data Sheet (BDS)**

The following specific data for the goods to be procured shall complement, supplement, or amend the provisions in the Instructions to Bidders (ITB). Whenever there is a conflict, the provisions herein shall prevail over those in ITB.

[Instructions for completing the Bid Data Sheet are provided, as needed, in the relevant ITB Clauses.]

ITB Clause Reference	A. General
ITB 1.1	The Dynahosen is University of Joffne
11D 1.1	The Purchaser is: University of Jaffna
ITB 1.1	The name and identification number of the Contract are:
	"Supply & Installation of Electrical & Electronic Engineering Equipment, University of Jaffna. – Package 02 - UJ/F/PO/T/04/2016"
ITB 1.2	The bidder should have at least three years experience in the relevant industry in Sri
	Lanka and should submit documents to prove experience in the industry.
ITB 2.1	The source of funding is: GOSL
ITB 4.4	Foreign bidders are allowed to participate in bidding: <b>Not allowed</b>
	B. Contents of Bidding Documents
ITB 7.1	For Clarification of bid purposes only, the Purchaser's address is:
	Attention: Senior Assistant Bursar/Supplies
	Address: 57, University of Jaffna, Thirunelvely, Jaffna
	Telephone: 021-2220962
	Electronic mail address:bursaruj@gmail.com
	C. Preparation of Bids
ITB 11.1 (e)	The Bidder shall submit the following additional documents:
	A complete company profile of the bidders including, but not limited to, the
	following:
	Data commencing business in Sri Lanka
	Names of current Directors
	Annual turnover, assets and liabilities
	• List of client who use the products
	• Number of staff supporting to proceed the operation in Sri Lanka and their competence
	• Past 3 years relevant experience in the relevant industry in Sri Lanka

ITB 15.1	The bidder shall quote the local expenditure in Sri Lankan Rupees.
ITB 18.1 (b)	After sales service is: required
ITB 19.1	The bid shall be validity until: 13.10.2016
ITB 20.1	<ul> <li>(a) Bid shall include a Bid Security (issued by bank or surety) included in Section IV Bidding Forms;</li> </ul>
ITB 20.2	The amount of the Bid Security shall be: <b>As per the advertisement</b> Beneficiary: <b>Vice Chancellor, University of Jaffna.</b> The validity period of the bid security shall be until: <b>11.11.2016</b>
	D. Submission and Opening of Bids
ITB 22.2 (c)	The inner and outer envelopes shall bear the following identification marks: <b>"Supply &amp; Installation of Electrical &amp; Electronic Engineering Equipment,</b> <b>University of Jaffna.</b> – Package 02 - UJ/F/PO/T/04/2016"
ITB 23.1	For bid submission purposes, the Purchaser's address is:
	Attention: Bursar
	Address: University of Jaffna, P.O.Box 57, Thirunelvely, Jaffna.
	The deadline for the submission of bids is:
	Date:13.07.2016 Time: 2.00pm
ITB 26.1	The bid opening shall take place at:
	Address: Board Room, University of Jaffna, P.O.Box 57, Thirunelvely, Jaffna.
	Date: 13.07.2016 Time: 2.00 pm
	E. Evaluation and Comparison of Bids
ITB 34.1	Domestic preference shall not be a bid evaluation factor.
ITB 35.3(d)	The adjustments shall be determined using the following criteria, from amongst those set out in Section III, Evaluation and Qualification Criteria:
	(a) Deviation in Delivery schedule: Option 2 is selected and the adjustment is 0.5% per week or part thereof

	<ul><li>(b) Deviation in payment schedule: Not applicable</li><li>(c) the cost of major replacement components, mandatory spare parts, and service: Not applicable</li></ul>
ITB 35.4	The following factors and methodology will be used for evaluation: Not applicable
ITB 35.5	Bidders shall be allowed to quote for one or more lots. [refer to Section III Evaluation and Qualification Criteria]Purchaser will evaluate the bid item by item basis.

M. G. L. Maveekumbura Senior Assistant Bursar (Supplies) University of Jaffna Jaffna

# Section III.

#### **Evaluation and Qualification Criteria**

## 1. Evaluation Criteria (ITB 35.3 (d))

The Purchaser's evaluation of a bid may take into account, in addition to the Bid Price quoted in accordance with ITB Clause 14, one or more of the following factors as specified in ITB Sub-Clause 35.3(d) and in BDS referring to ITB 35.3(d), using the following criteria and methodologies.

(a) Delivery schedule

#### Option 2

The goods covered under this invitation are required to be delivered within an acceptable range of weeks specified in the Schedule of Requirement. No credit will be given to earlier deliveries, and bids offering delivery beyond this range will be treated as nonresponsive. Within this acceptable range, an adjustment per week, as specified in the Bid Data Sheet, will be added for evaluation purposes only, to the bid price of bids offering deliveries later than the earliest delivery period specified in the Section V, Schedule of Requirements

(a) Deviation in payment schedule. Not applicable

(c) Cost of major replacement components, mandatory spare parts, and service: Not applicable

(d) Specific additional criteria: None

#### 2. Evaluation Criteria (ITB 35.4)

#### 3. Multiple Contracts (ITB 35.5)

The Purchaser shall award multiple contracts to the Bidder that offers the lowest evaluated combination of bids (one contract per bid) and meets the post-qualification criteria (this Section III, Sub-Section ITB 37.2 Post-Qualification Requirements)

The Purchaser shall:

(a) Evaluate only lots or contracts that include items per lot and quantity per item

(b) Take into account: The lowest-evaluated bid for each lot

### 3. Post qualification Requirements (ITB 37.2)

After determining the lowest-evaluated bid in accordance with ITB Sub-Clause 36.1, the Purchaser shall carry out the post qualification of the Bidder in accordance with ITB Clause 37, using only the requirements specified. Requirements not included in the text below shall not be used in the evaluation of the Bidder's qualifications.

#### Qualification Criteria:

- (a) Bid may be submitted by any reputed supplier of **Electrical & Electronic Engineering Equipment** registered business in Sri Lanka or any accredited local agent who takes fullest responsibility for the whole bid. The local agent shall submit evidence of status, obligations, power of attorney and any other documentary evidence that he is duly authorized and eligible to bid on behalf of the manufacturer.
- (b) The bidders should also have previous experience of at least three years in relevant industry in the supply and also technical and financial capability necessary to perform the contract.
- (c) Bids will be rejected as non- responsive if documentary evidence in proof of above has not been provided.
- (d) If an Agent submits bids on behalf of more than one suppler, unless each such bid is accompanied by a separate Bid Form for each bid, and a bid security when required for each bid, and authorization from the respective Manufacturer, and valid vendor certificate, all such bids will be rejected as non- responsive.
- (e) Bidders should possess the Certificate of Business Registration issued by a Governmental Authority/ Registrar of Companies/ Provincial Registrar of Business in the relevant category.
- (f) Bidders offering goods under their own brand names should provide along with their bids a current certification/s of quality; Bid not complying with this requirement may be treated as non responsive.
- (g) Having a service center in Jaffna will be considered as an added qualification.

#### 4. Domestic Preference (ITB 34.1) – Not applicable

# **Section IV**

## **Bidding Forms**

#### Bid Submission Form.

[The Bidder shall fill in this Form in accordance with the instructions indicated no alterations to its format shall be permitted and no substitutions shall be accepted.]

Date:

No:

#### To: University of Jaffna

We, the undersigned, declare that:

- a) We have examined and have no reservations to the Bidding Documents, including Addenda No.:
- b) We offer to supply in conformity with the Bidding Documents and in accordance with the Delivery Schedules specified in the Schedule of Requirements the following Goods and Related Service Supply of **Electrical & Electronic Engineering Equipment** to the University of Jaffna.
- c) The total price of our Bid without VAT, including any discounts offered is:
- d) The total price of our Bid including VAT, and any discounts offered is:
- e) Our bid shall be valid for the period of time specified in ITB sub-Clause 19.1, form the date fixed for the bid submission deadline in accordance with ITB Sub-Clause 23.1, and it shall remain biding upon us and may be accepted at any time before the expiration of that period;
- f) If our bid is accepted, we commit to obtain a performance security in accordance with ITB Clause 43 and CC Clause 17 for the due performance of the Contract;
- g) We have no conflict of interest in accordance with ITB Sub-Clause 4.3;
- h) Our firm, its affiliates or subsidiaries- including any subcontractors or suppliers for any part of the contract-has not been declared blacklisted by the National Procurement Agency;
- i) We understand that bid, together with your written acceptance thereof include in your notification of award, shall constitute a binding contract between us, until a formal contract is prepared and executed.
j) We understand that you are not bound to accept the lowest evaluated bid or any other bid that you may receive.

Signed:

In the capacity of

Name:

Duly authorized to sign the bid for and on behalf of:

Dated on ----- day of -----

M. G. L. Maveekumbura Senior Assistant Bursar (Supplies) University of Jaffna Jaffna

## Price Schedule \*

		(1)	(2)	(3)	(4)	(5)
No	Description of the Item and ITEM CODE	Qty	Unit Rate	VAT	Price with VAT (2+3)	Total (1x4)
2.1	Rasberry Pi Single board Linux platform	10				
2.2	Beagle Bone Single board Linux platform	4				
2.3	Banana Pi Single board Linux platform	5				
2.4	Programable microcontroller development board	15				
2.5	Micro controller programmer with universal programing adapter seat, USB cable and 6 pin cable	5				
2.6	Programmable microcontroller development board with bread board included	15				
2.7	Microcontroller starter kit with necessary software tools (builder, simulator ,emulator) and ISP programmer(USB).	15				
2.8	FPGA trainer board	15				
2.9	Transistor based voltage regulator trainer kit	4				
2.10	Digital combinatory logic training kit	4				
2.11	Digital sequential logic trainer kit	2				
2.12	Digital Electronic trainer kit	4				
2.13	Step Motor Control kit	4				
2.14	Universal motor control board	3				
2.15	Digital Lux meter	1				
2.16	3 Phase Power Pack	1				
2.17	Power Factor Control Unit	1				
2.18	Asynchronous Wind Mill System including HVDC Light Line	1				
2.19	Flex Stand	6				
2.20	Flex set	1				
2.21	Flywheel	1				
2.22	TECNEL. Unit	1				
2.23	Pulse Generator	1				

2.24	Power factor meter	2		
2.25	Frequency meter	2		
2.26	Current Transformer	3		
2.27	PWM DC-Machine Control Module	2		
2.28	Drill Bench	1		
2.29	PCB shears	1		
2.30	Electrical hand driller	1		
2.31	Rheostat	4		
2.32	Rheostat	4		
2.33	Rheostat	4		
2.34	Digital and Analog Communication Trainer kit with jumper wire	1		
2.35	Digital Storage Oscilloscope	10		
2.36	Inductor bank	2		
2.37	Resistor bank	3		
2.38	Capacitor bank	2		
2.39	Glue gun and sticks	10		
2.40	Wireless Microphone set	2		
2.41	Wheatstone Bridge	5		
2.42	NI ELVIS II+ for Labview	2		
2.43	Multisim Education 25 user	1		
2.44	Digital Duplicator machine	1		
2.45	Colour Laser Printer	1		
2.46	Hot air gun	3		
2.47	QUADCOPTER FOR DEVELOPERS	1		
2.48	humanoid robot	1		
2.49	Three phase synchronous generator	2		
2.50	Three phase induction motor	2		
2.51	Single phase motor	2		
2.52	Synchronizing module	3		
2.53	Optical fibre training kit	1		
2.54	UV Laser based PCB machine	1		
2.55	Reflow oven	1		

2.56	Altera FPGA Starter Development Kit	20		
2.57	Signal Generators	10		
2.58	Spectrum Analyzer	5		
2.59	Arbitrary Waveform Generator	2		
2.60	Transmission Line trainer	1		
2.61	AnalogMultimeter	10		
2.62	Genuino Starter Kit (Original)	20		
2.63	Arduino MEGA 2560 / Genuino MEGA 2560 (Original)	20		
2.64	Arduino Due(Original)	20		
2.65	Arduino ZERO/ Genuino ZERO(Original)	10		
2.66	ArduinoYún(Original)	10		
2.67	ArduinoWiFi Shield(Original)	5		
2.68	Arduino Ethernet Shield WITH PoE Module(Original)	5		
2.69	Arduino GSM Shield (integrated antenna)(Original)	5		
2.70	Arduino Motor Shield (Original)	15		
2.71	Motor/Stepper/Servo Shield for Arduino Kit(Original)	20		
2.72	Assembled Data Logging shield for Arduino(Original)	20		
2.73	Android Phone to generic shield converter for Arduino(Original)	20		
2.74	Music Shield(Original)	20		
2.75	USB Stick DSP Development Tool(Original)	20		
2.76	Advanced USB Stick DSP Development Tool(Original)	20		
2.77	DSP Evaluation Module(Original)	15		
2.78	DSP Starter Kit (DSK)(Original)	20		
2.79	Proteous	1		
2.80	4DOF Robot Arm Kit	5		
2.81	6DOF Robot Arm	1		
2.82	dual measurement multimeter digital	10		

\*Use separate price schedule for options

••••••	•••••	
Signature and seal of the Bidder	Date	
Total Price without Taxes (in SLR):		
Total Price without Taxes (in Words):		
Vat Registration No:		
Total Price with VAT:		
Total Price with VAT (in Words):		
Maintenance charges as a percentage after the warranty per	riod:	
Name of the Authorized persons:		
Signature of the Authorized persons:		
Date:		

M. G. L. Maveekumbura Senior Assistant Bursar (Supplies) University of Jaffna Jaffna

#### Bid Guarantee

[This Bank Guarantee form shall be filled in accordance with the instructions indicated in brackets]

------ [insert issuing agency's name, and address of issuing branch or office] ------Beneficiary: ------ [ name and address of Purchaser] Date: ------ [insert (by issuing agency) date] BID GUARANTEE No.: ------ [insert (by issuing agency) number] We have been informed that ------- [insert (by issuing agency) name of the Bidder; if a joint venture, list complete legal names of partners] (hereinafter called "the Bidder") has submitted to you its bid dated ------ [insert (by issuing agency) date](hereinafter called "the Bid") for the supply of [insert name of Supplier] under Invitation for Bids No. ------ [insert IFB number] ("the IFB").

Furthermore, we understand that, according to your conditions, Bids must be supported by a Bid Guarantee.

At the request of the Bidder, we ------- [insert name of issuing agency] hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of ------ [insert amount in figures] ------ [insert amount in words]) upon receipt by us of your first demand in writing accompanied by a written statement stating that the Bidder is in breach of its obligation(s) under the bid conditions, because the Bidder:

(a) Has withdrawn its Bid during the period of bid validity specified; or

(b) Does not accept the correction of errors in accordance with the Instructions to Bidders (hereinafter "the ITB"); or

(c) having been notified of the acceptance of its Bid by the Purchaser during the period of bid validity, (i) fails or refuses to execute the Contract Form, if required, or (ii) fails or refuses to furnish the Performance Security, in accordance with the ITB.

This Guarantee shall expire: (a) if the Bidder is the successful bidder, upon our receipt of copies of the Contract signed by the Bidder and of the Performance Security issued to you by the Bidder; or (b) if the Bidder is not the successful bidder, upon the earlier of (i) our receipt of a copy of your notification to the Bidder that the Bidder was unsuccessful, otherwise it will remain in force up to ----- (insert date) Consequently, any demand for payment under this Guarantee must received at the office or before that be by us on date. \_signature(s) of authorized representative(s) ]

## Manufacturer's Authorization

[The Bidder shall require the Manufacturer to fill in this Form in accordance with the instructions indicated. This letter of authorization should be on the letterhead of the Manufacturer and should be signed by a person with the proper authority to sign documents that are binding on the Manufacturer. The Bidder shall include it in its bid, if so indicated in the BDS.]

Date: [insert date (as day, month and year) of Bid Submission]

No.: [insert number of bidding process]

To: [insert complete name of Purchaser]

#### WHEREAS

We [insert complete name of Manufacturer], who are official manufacturers of [insert type of goods manufactured], having factories at [insert full address of Manufacturer's factories], do hereby authorize [insert complete name of Bidder] to submit a bid the purpose of which is to provide the following Goods, manufactured by us [insert name and or brief description of the Goods], and to subsequently negotiate and sign the Contract.

We hereby extend our full guarantee and warranty in accordance with Clause 27 of the Conditions of Contract, with respect to the Goods offered by the above firm.

Signed: [insert signature(s) of authorized representative(s) of the Manufacturer]

Name: [insert complete name(s) of authorized representative(s) of the Manufacturer]

Title: [insert title]

Duly authorized to sign this Authorization on behalf of: [insert complete name of Bidder]

Dated on	day of	. [	insert da	ate of	sign	ing]
		., <u> </u>			~-0	01

# Section V

# **Schedule of Requirements**

## 1. List of Goods and Delivery Schedule

[The Purchaser shall fill in this table, with the exception of the column "Bidder's offered Delivery date" to be filled by the Bidder]

			Final	Delivery Date		e
No	Description of Goods	Qty	Destination as specified in BDS	Earliest Delivery Date	Latest Delivery Date	Bidder's offered Delivery date
2.1	Rasberry Pi Single board Linux platform	10				
2.2	Beagle Bone Single board Linux platform	4				
2.3	Banana Pi Single board Linux platform	5				
2.4	Programable microcontroller development board	15				
2.5	Micro controller programmer with universal programing adapter seat, USB cable and 6 pin cable	5				
2.6	Programmable microcontroller development board with bread board included	15	Universi	2 V	4 V	
2.7	Microcontroller starter kit with necessary software tools (builder, simulator ,emulator) and ISP programmer(USB).	15	University of Jaffna	2 Weeks	4 Weeks	
2.8	FPGA trainer board	15				
2.9	Transistor based voltage regulator trainer kit	4				
2.10	Digital combinatory logic training kit	4				
2.11	Digital sequential logic trainer kit	2				
2.12	Digital Electronic trainer kit	4				
2.13	Step Motor Control kit	4				
2.14	Universal motor control board	3				

2.15	Digital Lux meter	1				
2.16	3 Phase Power Pack	1	1			
2.17	Power Factor Control Unit	1				
2.18	Asynchronous Wind Mill System including HVDC Light Line	1				
2.19	Flex Stand	6				
2.20	Flex set	1				
2.21	Flywheel	1				
2.22	TECNEL. Unit	1				
2.23	Pulse Generator	1				
2.24	Power factor meter	2				
2.25	Frequency meter	2				
2.26	Current Transformer	3				
2.27	PWM DC-Machine Control Module	2				
2.28	Drill Bench	1				
2.29	PCB shears	1	Un			
2.30	Electrical hand driller	1	University of Jaffna	2	4	
2.31	Rheostat	4	sity c	2 Weeks	4 Weeks	
2.32	Rheostat	4	of Jaf	ks	ks	
2.33	Rheostat	4	Ína			
2.34	Digital and Analog Communication Trainer kit with jumper wire	1				
2.35	Digital Storage Oscilloscope	10				
2.36	Inductor bank	2				
2.37	Resistor bank	3				
2.38	Capacitor bank	2				
2.39	Glue gun and sticks	10				
2.40	Wireless Microphone set	2				
2.41	Wheatstone Bridge	5				
2.42	NI ELVIS II+ for Labview	2				
2.43	Multisim Education 25 user	1				
2.44	Digital Duplicator machine	1	]			
2.45	Colour Laser Printer	1	1			
2.46	Hot air gun	3	1			
2.47	QUADCOPTER FOR DEVELOPERS	1				

2.48	humanoid robot	1				
2.49	Three phase synchronous generator	2				
2.50	Three phase induction motor	2				
2.51	Single phase motor	2				
2.52	Synchronizing module	3				
2.53	Optical fibre training kit	1				
2.54	UV Laser based PCB machine	1				
2.55	Reflow oven	1				
2.56	Altera FPGA Starter Development Kit	20				
2.57	Signal Generators	10				
2.58	Spectrum Analyzer	5				
2.59	Arbitrary Waveform Generator	2				
2.60	Transmission Line trainer	1				
2.61	AnalogMultimeter	10				
2.62	Genuino Starter Kit (Original)	20	Un		4 Weeks	
2.63	Arduino MEGA 2560 / Genuino MEGA 2560 (Original)	20	University of Jaffna	2 Weeks		
2.64	Arduino Due(Original)	20	f Jaf	ks	ks	
2.65	Arduino ZERO/ Genuino ZERO(Original)	10	fna			
2.66	ArduinoYún(Original)	10				
2.67	ArduinoWiFi Shield(Original)	5				
2.68	Arduino Ethernet Shield WITH PoE Module(Original)	5				
2.69	Arduino GSM Shield (integrated antenna)(Original)	5				
2.70	Arduino Motor Shield (Original)	15				
2.71	Motor/Stepper/Servo Shield for Arduino Kit(Original)	20				
2.72	Assembled Data Logging shield for Arduino(Original)	20				
2.73	Android Phone to generic shield converter for Arduino(Original)	20				
2.74	Music Shield(Original)	20				
2.75	USB Stick DSP Development Tool(Original)	20				
2.76	Advanced USB Stick DSP Development Tool(Original)	20				

2.77	DSP Evaluation Module(Original)	15
2.78	DSP Starter Kit (DSK)(Original)	20
2.79	Proteous	1
2.80	4DOF Robot Arm Kit	5
2.81	6DOF Robot Arm	1
2.82	dual measurement multimeter digital	10

\* Destination of delivery: - Faculty of Engineering,

University of Jaffna, Ariviyal Nagar, Kilinochchi.



## 2. Technical Specifications

Item No	Name ar	Qty	Remarks	
2.1	Rasberry Pi Single board Li	10		
	Model			
	Country of Origin	Specify Specify		
	Architecture	Raspberry Pi 2(B)		
	CPU	A 900MHz quad-core ARM Cortex-A7		
	RAM	1GB		
	No. of USB 2.0 ports	4		
	No. of GPIO pins	40 pins with 2 EEPROM Plate identification pins		
	Full HDMI port	required (on-board)		
	Ethernet port	required (on-board)		
	Camera interface (CSI)	required (on-board)		
	Display interface (DSI)	required (on-board)		
	Micro SD card slot	required (on-board)		
	Video core	video core IV with 3D graphics core		
	Power supply	5V		
	Supply protection	polarity protection		
	Supply protection	2A fuse		
	Womenty	hot-swap protection		
	Warranty	Specify Degwined		
	User manual and product	Required		
	documentation	All relevant technical brochures should be		
	Additional Requirement	forwarded with Tender		
		Documents.		
		Comprehensive user guide, Complete track		
		record on where the supplier has supplied the		
		product, Recommendation letter about the		
		product, Recommendation letter about the product from the institutions where the		
		supplier has supplied the product.		
		Manufactures' authorization should be		
		submitted with the		
		tender documents		
2.2	Beagle Bone Single board Li		04	
	Model	Specify		
	Country of Origin	Specify		
	CPU	AM3358BZCZ100		
	Architecture	BeagleBone		
	Clock speed	1GHz		
	DRAM	512MB DDR3L 800MHZ		
	JTAG	onboard 20-pin CTI		
	Serial debug interface	Header (UART0 access via 6-pin 3.3V TTL header)		
	on board flack storage	4GB 8-bit eMMC		
	on-board flash storage			+
	floating-point accelerator	NEON		

The bidder shall follow the following technical requirement and other requirement

	32-bit microcontrollers	2 x PRU type		
	USB client for power &	required		
	communication			
	USB host	required (2.0)		
	10/100 RJ45 Ethernet port	required		
	HDMI port	required (on-board)		
	Pin Header	92-pin header with cape compatibility		
	Power supply	5V		
	Warranty	Specify		
	User manual and product	Required		
	documentation			
	Additional Requirement	All relevant technical brochures should be		
		forwarded with Tender		
		Documents. Comprehensive user guide,		
		Complete track record on where		
		the supplier has supplied the product,		
		Recommendation letter about the		
		product from the institutions where the		
		supplier has supplied the		
		product. Manufactures' authorization should		
		be submitted with the		
2.3	Banana Pi Single board Linu	tender documents	05	
2.3	Model	Specify	03	
	Country of Origin	Specify		
	SoC	ARM Cortex-A7 dual-core, 1GHz,		
	500	Mali400MP2 GPU		
	Architecture	Banana Pi		
	System Memory	1GB DDR3 DRAM		
	Video output	HDMI		
	viaco output	Composite		
		Extensible with on-board LVDS		
	Audio output			
	Audio output	3.5mm stereo jack output On-board microphone input		
-	Connectivity	Gigabit Ethernet		
-	Connectivity USB	6		
	USD	2 x USB 2.0 ports 1 x OTG micro USB port		
		1 x micro USB for power supply		
	Expansion	Extensible 26-pin headers		
		Camera connector,		
		Display connector for LVDS and touch		
	Miss	screen		
	Misc.	3 x on-board buttons, (Power, Reset, Uboot		
		key) IR receiver		
1		I NDOOITU		
	Warranty	Specify		
	Warranty User manual and product documentation	Required		
	User manual and product documentation			
	User manual and product	Required		

	the supplier has Recommendati product from th supplier has sup product. Manuf be submitted w tender document	Complete track record on where the supplier has supplied the product, Recommendation letter about the product from the institutions where the supplier has supplied the product. Manufactures' authorization should be submitted with the tender documents			
2.4	Programmable microcontroller development	ooard	15		
	Model	Specify			
	Country of Origin	Specify			
	Microcontrollers	Microchip PIC16F & 18F			
		(40 pin)			
	Dual layered PCB with SMD components	required			
	40 Pin ZIF socket(for microcontroller insertion)	required			
	LEDs (SMD)	8 (on-board)			
	Keypad	4 x 4 model			
	Real time clock	DS1307 (with battery		1	
		holder)			
	Temperature sensor	DS18B20 (on-board)			
	Buzzer	required (on-board)			
	EEPROM	required (on-board)			
	IR sensor	required (on-board)			
	Seven segment display	4			
	MicroSD card slot	required			
	Potentiometer	2  x variable  (0 - 5  V)			
	on-board LCD display module	16x2 Blue Character with			
		separate brightness control			
	RS232 Connectivity	required			
	USB connectivity	required			
	On-board 5V voltage regulator	required (LM2596)			
	On board socket to insert variable Oscillator	required			
	audio output	required			
	Accessories	Crystal			
		oscillators(4MHz,8MHz,20			
		MHz)			
		Micro jumpers for			
		configuration			
		User manual/			
		documentation			
	Warranty	Specify			
	Additional Requirement	All relevant technical			
		brochures should be			
		forwarded with Tender			
		Documents.			
		Comprehensive user guide,			
		Complete track record on			
		where the supplier has supplied			
		the supplier has supplied			
		the product, Recommendation letter			
		about the			
		about the			

		product from the institutions where the supplier has supplied the product. Manufactures' authorization should be submitted with the tender documents		
2.5	Micro controller programmer with univer USB cable and 6 pin cable	sal programming adapter seat,	05	
	Model	Specify		
	Country of Origin	Specify		
	Supported microcontrollers (for both programmer and adapter seat)	Microship PIC16/18XX 40PIN Series devices (except 16F59) Microship PIC16/18XX 28PIN Series devices (except 16F57) Microship PIC16/18XX 18PIN Series devices Microship PIC 8PIN/14PIN/20PIN family of		
		devices (except 10FXX)		
	Real-time clock execution	Required		
	MPLAB IDE compatible	Required		
	Built-in over-voltage/short circuit monitorFirmware upgradeable from PC/web	required required		
	download	required		
	Supply voltage	2 - 6 V		
	Diagnostic LED	required		
	Required functionalities	Read/Write program in data memory of microcontroller.Erase the program memory and verify it.		
	Accessories	USB cable (Full speed 12 Mbits/s interface to host PC) 6 pin cable (connects the programmer and adapter seat) User manual/documentation		
	Warranty	Specify		
	Additional Requirement	All relevant technical brochures should be forwarded with Tender Documents. Comprehensive user guide, Complete track record on where the supplier has supplied the product, Recommendation letter about the product from the institutions where the supplier has supplied the		

2.6	Programmable microcontroller developme	product. Manufactures' authorization should be submitted with the tender documents ent board with bread board	15	
	Model	Specify		
	Country of Origin	Specify		
	Compatible microcontroller	Microchip PIC18F4550		
	In-built power supply components	Required (on-board)		
	Internal Flash Program Memory	32 kb		
	Direct USB in-circuit programming interface			
	On-board push buttons	4		
	Adjustable analog inputs	4		
	Test LEDs	4		
	Bread board (on-board)	required		
	Connectivity	RS232 and USB		
	In-circuit debugger	required with Microchip ICD2 Unit		
	Warranty	Specify		
	User manual/documentation	Required		
	Additional Requirement	All relevant technical brochures should be forwarded with Tender Documents. Comprehensive user guide, Complete track record on where the supplier has supplied the product, Recommendation letter about the product from the institutions where the supplier has supplied the product. Manufactures' authorization should be submitted with the tender documents		
2.7	Microcontroller starter kit with necessary simulator ,emulator) and ISP programmer	· ,	15	
	Model	Specify		
	Country of Origin	ountry of Origin Specify		
	Device support	ATtiny series (13, 26, 2313, 45,		
		261, 461, 85, 861, 24, 44, 84- ISP only) ATmega series (48, 8, 88, 16, 161, 162, 163, 164P, 165, 168, 169, 32, 325, 324P, 329, 644, 644P, 645, 649, 8515, 8535) AT90CAN series (32, 64, 128) AT90PWM series (2/3, 31)		

2 x 20 1 x 28 2 x 40 0.1" (2.54mm) DIL headers for		
2 x 40 0.1" (2.54mm) DIL headers for		
0.1" (2.54mm) DIL headers for		
all ports, including a Vcc and Ground pin for external circuitry		
74HC573 address latch and		
(USB)		
. Programming lead, LED and Socket leads		
Software tools and manuals: - Programming software - Application Builder - User Manual - Code Examples - Board schematics - Device datasheets - Atmel AVR Studio3 and 4. - AVREdit IDE/Editor with AVRGCC 3.2 C Compiler		
Specify		
<ul> <li>should be forwarded with</li> <li>Tender</li> <li>Documents. Comprehensive</li> <li>user guide, Complete track</li> <li>record on where</li> <li>the supplier has supplied the</li> <li>product, Recommendation letter</li> <li>about the</li> <li>product from the institutions</li> <li>where the supplier has supplied</li> <li>the product. Manufactures'</li> <li>authorization should be</li> </ul>		
	pin for external circuitryrequired>= 8required14-way connector3.3V and 5Vrequiredrequired74HC573 address latch andFlash RAM socketsrequired (for peripherals)Necessary AVR deviceISP Parallel Port Programmer(USB). Programming lead, LED and Socket leadsSoftware tools and manuals: - Programming software. Application Builder- User Manual - Code Examples. Board schematics. Device datasheets. Atmel AVR Studio3 and 4. - AVREdit IDE/Editor with AVRGCC 3.2 C CompilerSpecifyAll relevant technical brochures should be forwarded with Tender Documents. Comprehensive user guide, Complete track record on where the supplier has supplied the product, Recommendation letter about the product from the institutions where the supplier has supplied the product. Manufactures'	pin for external circuitryrequired>= 8required14-way connector3.3V and 5Vrequiredrequiredrequired74HC573 address latch andFlash RAM socketsrequired (for peripherals)Necessary AVR deviceISP Parallel Port Programmer(USB). Programming lead, LED and Socket leadsSoftware tools and manuals: - Programming software- Application Builder- User Manual - Code Examples- Board schematics- Device datasheets- Atmel AVR Studio3 and 4. - AVREdit IDE/Editor with AVRGCC 3.2 C CompilerSpecifyAll relevant technical brochures should be forwarded with Tender Documents. Comprehensive user guide, Complete track record on where the supplier has supplied the product, Recommendation letter about the product from the institutions where the supplier has supplied the product. Manufactures' authorization should be submitted with the

2.8	FPGA trainer board				15	
	Model	Specify				
	Country of Origin	Specify				
	Device (IC)	Xilinx Artix-7 FP	GA (XC7A	35T-		
		1CPG236C)	× ·			
	Connectivity	USB A				
		USB micro-B				
		Four 12-pin Pmod	connectors	5		
		VGA				
	No. of logical cells	>=33,280				
	RAM	>=1800 kb				
	clock management tiles	5 (each with a PLI	_)			
	DSP slices	>=90	,			
	Internal clock speed	450 MHz				
	On-chip analog-to-digital converte	required				
	USB-JTAG port	required				
	Required on-board items.	Serial Flash				
		USB-UART Bridg	ge			
		12-bit VGA outpu	t			
		USB HID Host for	r mice, keyl	boards and		
		memory sticks				
		>=16 user switche	S			
		>=16 user LEDs				
		>=5 user pushbutt	ons			
		4-digit 7-segment	display			
		4 Pmod connector	s			
		3 Standard 12-pin	Pmod conn	nectors		
	Accessories	User manual/ docu	iments	Required		
		Standard USB A to	o micro-B	2.0 and		
		cable		above		
				5ft		
				(nearly)		
	Warranty	Minimum one yea	r			
	Additional Requirement	All relevant techni	cal brochu	res should		
		be forwarded with				
		Documents. Comp		-		
		Complete track red				
		the supplier has su				
		Recommendation				
		product from the i		where the		
		supplier has suppli		rization		
		product. Manufact		ilzation		
		tender documents	eu with the			
2.9	Transistor based voltage regulator trainer kit				04	
	Model		Specify			
	Country of Origin		Specify			
	Demonstration circuit for Zener volta	age regulation	required			
	circuit	0				
	Demonstration circuit for Zener volta	age regulator with	required			
	series and parallel		-			

	transistor			
	Demonstration circuit for Voltage regulator with	required		
	variable output	required		
	Demonstration circuit for voltage regulator with	required		
	short-circuit protection and	required		
	Darlington transistor			
	Training manual	required		
	Power supply	15 Vdc, 750 mA		
	Warranty	Minimum one year		
	Additional Requirement	All relevant technical		
		brochures should be		
		forwarded with		
		Tender		
		Documents.		
		Comprehensive user		
		guide, Complete		
		track record on		
		where		
		the supplier has		
		supplied the product,		
		Recommendation		
		letter about the		
		product from the		
		institutions where the		
		supplier has supplied		
		the		
		product.		
		Manufactures'		
		authorization should		
		be submitted with		
		the		
2 10	<b>D</b> . 4 1	tender documents	0.4	
2.10	Digital combinatory logic training kit	Grazify	04	
	Model	Specify		
	Country of Origin	Specify		
	Required operations	adders		
	(with isolated circuit for each operation)	subtractors		
		multipliers		
		code converters		
		Multiplexers		
		demultiplexers		
	Minimum no. Of logic gates	-4 AND (2-input)		
		-3 AND (3-input)		
1		-12 NAND		
1				
		(2-input)		
		-4 NAND (4-input)		
		-4 NAND (4-input) -2 NAND		
		-4 NAND (4-input) -2 NAND TRIGGER		
		-4 NAND (4-input) -2 NAND TRIGGER (4-input)		
		-4 NAND (4-input) -2 NAND TRIGGER (4-input) -4 OR (2-input)		
		-4 NAND (4-input) -2 NAND TRIGGER (4-input)		

Power supply         Accessories         Warranty         Additional Requirement	-4 NOR (2-input)-2 NOR (4-input)-4 XOR (2-input)-6 inverters-2 AOI (2 and 3input)-12 silicon diodes-1 dual-in-line16-pin socket5Vdc, 5WInstruction manual/teaching materialMinimum one yearAll relevanttechnical brochuresshould beforwarded withTenderDocuments.Comprehensiveuser guide,Complete trackrecord on wherethe supplier hassupplied theproduct,Recommendationletter about theproduct from theinstitutions wherethe supplier hassupplied theproduct.Manufactures'authorizationshould besubplied theproduct.Manufactures'authorizationshould besubmitted with the		
2.11 Digital sequential logic trainer kit		02	
Model	Specify		
Country of Origin	Specify		
Required operations (with isolated circuit for each operation)			
	synchronous and asynchronous counters		
	shift registers		
	astable and monostablemultivibrators seven segment displays		
Minimum no. Of components (used in the circuits)	• 4 JK/MS flip-flop • 2 D flip-flop		

r	1		DCD 1		[]
			• a BCD synchronous		
			counter		
			• a binary 4-bit		
			synchronous counter		
			• a BCD asynchronous		
			counter		
			• a binary 4-bit		
			asynchronous counter • 2		
			monostablemultivibrators		
			• a shift register, 8-bit		
			SI-SO		
			• 2 BCD 7-segment		
			decoders		
			• 2 7-segment displays		
			• 2 BCD rotating switches		
			• 8 capacitors		
			• 2 linear potentiometers		
	Power supply		5Vdc, 5W		
	Accessories		Instruction manual/		
			teaching material		
	Warranty		Minimum one year		
	Additional Requirement		All relevant technical		
			brochures should be		
			forwarded with Tender		
			Documents.		
			Comprehensive user		
			guide, Complete track		
			record on where the		
			supplier has supplied the		
			product,		
			Recommendation letter		
			about the product from		
			the institutions where the		
			supplier has supplied the		
			product. Manufactures'		
			authorization should be		
			submitted with the tender documents		
2.12	Digital Electropic trainer kit		documents	04	
2.12	Digital Electronic trainer kitModel	Specify		04	
	Country of Origin	Specify			
	Required operations	Basic logic circuits			
		Schmitt tri			
			ultivibrators		
			emultivibrators		
			erters, coders		
		Arithmetic			
		Counting c			
		Register ci			
		-	mode Arithmetic Logic		
	Multiple		mode Anumetic Logic		

	Unit		
	Memory circuits		
	Analog-Digital converters		
	Digital-Analog converters		
Minimum no. Of components			
Minimum no. Of components (used in the circuits)	-4-bit comparator -4 JK-flip flops / RS flip flops		
(used in the circuits)	-4 D-flip flops		
	-2 adders (4-bit), with input and		
	output carry		
	-Multiplexer (4 channels)		
	-Demultiplexer (4 channels)		
	-Shift register (4-bit, parallel and		
	serial operation possible,		
	bi-directional)		
	-ALU (for conducting 16 arithmetic		
	and 16 logical computing operations		
	with 4-bit dual numbers)		
	-Binary counter (4-bit, up/down		
	counter)		
	-2 inverters		
	-2 Schmitt triggers( inverting )		
	-Units complements for negating a		
	4-bit binary number		
	-Antivalence and equivalence gates EEPROM		
	-AD/DA converter 8-bit		
Auxiliary section (on board)	8 logic probes with led for high and		
Auxiliary section (on board)	low level		
	8 switches with led to generate logic		
	level		
	B192 seven segment led displays with		
	BCD decoder		
Accessories	Instruction manual/ teaching material		
	instruction manual, teaching material		
Warranty	Minimum one year		
Additional Requirement	All relevant technical brochures		
ruantona requirement	should be forwarded with Tender		
	Documents. Comprehensive user		
	guide, Complete track record on		
	where		
	the supplier has supplied the product,		
	Recommendation letter about the		
	product from the institutions where		
	the supplier has supplied the		
	product. Manufactures' authorization		
	should be submitted with the		
	tender documents	0.4	
2.13 Stepper Motor Control kit		04	
Model	Specify		

	Required operations         Power supply         Technical features	Analysis of the operation of a stepper motorAnalysis of the control criteria and of the power modulesFull step or half stepVariable speed rotation controlInversion of the rotation direction230 Vac, 50 HzStep angle: 1.8°Number of phases: 4Max. power: 16 WSense of rotation: reversible		
		Current/phase max: 1.5 A Variable frequency from 20 Hz to 500 Hz through potentiometer		
	Accessories	Instruction manual/ teaching material		
	Warranty	Minimum one year		
	Additional Requirement	All relevant technical brochures should be forwarded with Tender Documents. Comprehensive user guide, Complete track record on where the supplier has supplied the product, Recommendation letter about the product from the institutions where the supplier has supplied the product. Manufactures' authorization should be submitted with the tender documents		
2.14	Universal motor control board		03	
	Model	Specify		
	Country of Origin	Specify		
	Required features	Integrated four-quadrant display		
	(operational)	Variable centrifugal mass		
		Dual-channel encoder		
		Built-in four-quadrant amplifier		
	Technical features	Linear H bridge to have full motor control		
		Dual optical sensor for speed and direction Main Motor/Generator 12 V (around), 3000 rpm (around), 1.2 A (around), 3.2 Ncm (around) Load to be connected to the secondary Motor/Generator Shunt to limit and measure the current		

	Accessories		Instru	action manual/ teachi	ing material		
	Warranty		Mini	mum one year			
	Additional Requirement		All relevant technical brochures				
	······			d be forwarded with			
				ments. Comprehensi			
				, Complete track rec			
			0	e the supplier has sup			
				ict, Recommendation			
			about	t the product from the	e institutions		
			where	e the supplier has sup	oplied the		
				ict. Manufactures' au			
				d be submitted with	the		
			tende	er documents			
2.15	Digital Lux meter					01	
	Model	Specify					
	Country of Origin	Specify					
	Classification		- · ·	1985 class B			
				2006 general AA cl	ass		
	Light receiving element	Silicon p					
	Display			git, 2000 count LCD			
			unit: lx (lux) Display update				
			rate: $500 \text{ ms} \pm 20 \text{ ms}$				
	Preferred measurement ranges	Range		Measurement	Display		
		20.1		range	step		
		20 lx		0.00 lx to 20.00 lx	1		
		200 lx 2000 lx		0.0 lx to 200.0 lx	count/step		
		2000  Ix 20000 1x	r	0 lx to 2000 lx 00 lx to 20000 lx	10		
		20000 1X	<b>L</b>	00 IX 10 20000 IX	count/step		
		2000001	lv	000 lx to 200000	100		
		2000001	IA	lx	count/step		
	Range selection	Auto/Ma	anual		count/step		
	Linearity	$<=\pm 2\%$					
	Temperature characteristics	$<=\pm 2\%$	0				
	Humidity characteristics	$<= \pm 3\%$					
	Response time			vithin 5 seconds			
	E		_	within 2 seconds			
	Power supply		-	line battery $\times 2$			
	11 5			e battery $\times 2$			
				ver 5V DC			
	Operating temperature and			$C (14^{\circ}F \text{ to } 104^{\circ}F), 80$	0% RH or		
	humidity	less (non	n-con	densing)			
	Storage temperature and			$C (-4^{\circ}F \text{ to } 122^{\circ}F), 80$	% RH or		
	humidity	less (non	n-con	densing)			
	Applicable standards	Safety: E	EN61	010, EMC: EN61326	5		
	Dustproof and waterproof	IP40 (EN	N6052	29)			
	Accessories	Instructi	on M	anual ×1			
		AA/LR6	alka	line battery ×2			
				vith strap) ×1			
				$(\text{soft}) \times 1$			
		Strap ×1	, U <mark>S</mark> I	B cable (0.9 m) ×1			

		CD	R (USB driver)			
			cated computer application	ation software		
	Warranty		communications specifications) ×1 Minimum one year			
	Additional Requirement		relevant technical broc	humaa ahauld ha		
	Additional Requirement		arded with Tender	nules should be		
			uments. Comprehensiv	vo usor guido		
			plete track record on v			
			supplier has supplied the			
			ommendation letter ab			
			luct from the institution			
		-	blier has supplied the			
			luct. Manufactures' au	thorization should		
			ubmitted with the			
			er documents			
2.16	Power Pack				01	
	Model	Specify				
	Country of Origin	Specify				
	Supply voltage		220-230V			
	Frequency	50Hz. 3-	ph.			
	Output voltage	DC fixed		220 V 3.5 A		
		DC varia	ble	0-220 V 16 A		
	-	AC fixed	[	230/133 V 10 A		
				3-ph		
	-	AC varia	ble	3 x 0-230 V 10 A		
				3-ph		
	Standard Fixed AC	230 V 10	) A	-		
	Physical requirements	Mobile u	pile unit			
	Warranty	Minimun	n one year			
	User manual and product documentation	Required	l			
	Additional Requirement	All relev	ll relevant technical brochures should be rwarded with Tender			
		forwarde				
		Documen	nts. Comprehensive us			
			ord on where the suppl			
		-	Recommendation lette	-		
			institutions where the			
			the product. Manufact			
2 15			e submitted with the te	nder documents	01	
2.17	Power Factor Control Un	ш	Specify		01	
<u> </u>	Model		Specify			
<u> </u>	Country of Origin		Specify			
<u> </u>	Number of 3-ph groups		>= 6	onocitivo		
	Power factor setting		0.7 inductive to $0.7$ c	apacitive		
	Nominal voltage		3 x 400 V,50 Hz			
	Nominal power PF-Controller		0-2 kVAr cap.			
	rr-Controller		Automatic or manual			
			Adjustable delay tim			
	Monitoria a and		sequences and strateg	gies		
	Monitoring and		Voltage			
	Measurement on the		Current			
	controller		Power factor			

	Switching modes	Linear and circular		
	Indication lamps	Indication lamps for the capacitor groups		
	L.	which are connect		
	Power supply	1-ph 220 - 240 V, 50 Hz		
	Warranty	Minimum one year		
	User manual and product	Required		
	documentation	-		
	Additional Requirement	All relevant technical brochures should		
		be forwarded with Tender		
		Documents. Comprehensive user guide,		
		Complete track record on where		
		the supplier has supplied the product,		
		Recommendation letter about the		
		product from the institutions where the		
		supplier has supplied the		
		product. Manufactures' authorization should be submitted with the		
2 10		tender documents	01	
2.18	Asynchronous Wind Mill System in Model	0 0	01	
		Specify Specify		
	Country of Origin	Specify		
	Minimum/maximum power by design			
	Magnetising capacitors	3-step selector (switch)		
	Compensating inductors Resistiveloadbank onDC-side	3-step selector (switch) continuously controlled by PWM-		
	Resistiveloadbank onDC-side	unit		
	3-phase rectifier block	Required		
	V-meter for AC-input	250 V AC		
	V-meter for DC-output	400 V DC		
	A-meter for AC-input	6 A AC		
	A-meter for capacitive current	6 A AC		
	A-meter for inductive current	4 A AC		
	A-meter for DC-output	6 A DC		
	Short- and long HVDC cable model	Required		
	Suitable induction machine std	~ 0.75 – 1.5 kW		
	Advanced 4Q-converter including	>1.5 kW		
	software			
	External alternative inputs from	3x230 V generator, ind. or synchr.		
		3x230 V power supply max 300 V		
		DC		
	Power supply	3x400V AC,16A,50Hz		
	Warranty	Minimum one year		
	User manual and product	Required		
	documentation			
	Additional Requirement	All relevant technical brochures		
		should be forwarded with Tender		
		Documents. Comprehensive user		
		guide, Complete track record on		
		where the supplier has supplied the product		
		the supplier has supplied the product, Recommendation letter about the		
		product from the institutions where		
		product from the institutions where		

			the supplier has	11		
	product. Manufactures' authorization					
		should be submitted with the				
2 10		tender documents				
2.19	Flex Stand		C a c i f a		06	
	Model		Specify Specify			
	Country of Origin		Specify 1 – 1.5 m			
	Height Weight		1 - 1.5  m <= 10kg			
	No. of slots		>= 10 kg			
	Warranty		Minimum or	20 1/00		
	User manual and product	documentation	Required	ic year		
	Additional Requirement	documentation		technical brochures		
	Ruthonal Requirement			rwarded with Tender		
				Comprehensive user		
				blete track record on		
				pplier has supplied		
				Recommendation		
				he product from the		
				where the supplier has		
			supplied the product.			
				es' authorization		
				bmitted with the		
			tender docur	nents		
2.20	Flex set	- 10			01	
	Model	Specify				
	Country of Origin	Specify				
	No. of Leads	100				
	Area	$2.5 \text{ mm}^2$	D1 D11- 1	V - 11 ( <b>C</b>		
	No. colours Required Lengths	5 (Red, Yellow 25 cm	, Blue, Black,	r ellow/Green)		
	Required Lenguis	50 cm				
		100 cm				
		200 cm				
	Quantity	Red		5 in each length		
	Quantity	Yellow		5 in each length		
	-	Blue		5 in each length		
	-	Black		5 in each length		
	_	Yellow/green		5 in each length		
	Warranty	Minimum one	vear	e in even rengen		
	User manual and	Required				
	product documentation	1				
	Additional Requirement	All relevant tec	chnical brochure	es should be		
		forwarded with	Tender Docun	nents. Comprehensive		
		user guide, Cor	nplete track rec	cord on where the		
		user guide, Complete track record on where the supplier has supplied the product, Recommendation				
		letter about the	product from t	he institutions where		
		letter about the the supplier has	product from t s supplied the p	he institutions where roduct.		
		letter about the the supplier has Manufactures'	product from t s supplied the p authorization s	he institutions where		
		letter about the the supplier has	product from t s supplied the p authorization s	he institutions where roduct.		
2.21	<b>Flywheel</b> Model	letter about the the supplier has Manufactures'	product from t s supplied the p authorization s	he institutions where roduct.	01	

	Country of Origin	Specify			
	Moment of inertia	~0.4kgm2			
	Dimensions		400*300*300mm (Aprox.)		
	Weight	50 - 60kg			
-	Balancing	Dynamic			
	protective casing	Required			
	Couplings	2			
	Required foundation material	Aluminium			
	Warranty	Minimum one year	r		
	User manual and product documentation	Required	L		
	Additional Requirement	All relevant techni	cal brochures		
	Auditional Requirement	should be forwarde			
		Tender			
		Documents. Comp	rehensive		
		user guide, Compl			
		record on where th			
		supplied the produ			
		Recommendation			
		the product from the	ne institutions		
		where the supplier			
		the product. Manu			
		authorization shou			
		submitted with the tender			
		documents			
2.22	TECNEL. Unit			01	
	Model	Specify			
	Country of Origin	Specify			
	Diagram in the front panel with similar	Required			
	distribution of elements like in the real				
	unit.	Steel Box			
	Enclosure	Diode modules	>-6		
	Front panel contents:	Diode modules	>= 6 diodes		
		Thyristors module	>= 6		
			>= 0 thyristors		
		IGBTS Module	>= 6		
			IGBTS		
		Snubber net	Required		
		Sensors module:	Voltage		
		Sensors module.	sensors >=		
			4		
			Current		
			sensors >=		
			2		
		Power supply	For Vr,		
		connections :	Vs, Vt,		
			Neutral		
			and		
			Ground		
		Practice schemes	Required		
			1		
	Back panel contents:	Data Acquisition Board Connector	Required		

	(SCSI connector)			
	Tachodynamo	Required		
	connector	Required		
	Main fuses (Vr, Vs,	Required		
	Vt) and LEDs	Required		
	Circuit breaker (main	Required		
	switch)	Required		
Single-phase driver and Three-phase	Required			
driver	Required			
IGBT driver	Required			
TSI board	Required			
PIC board	Required			
SKHI61 board	Required			
Relays board	>= 4			
Three-phase relays	>= 4			
Commuted power supply	Required			
 1 11 0				
Three-phase magnetothermal Control Interface	Required			
	Required	hoord		
DAB(Data Acquisition Board) Requirements:	-PCI Data acquisition (National Instruments)			
Requirements.		to be placed		
	in a computer slot -Bus PCI			
	Analog input:			
	- Number of channels 2	-16 cinala		
	ended or $\geq 8$ different			
	-Resolution =16 bits, 1			
	-Resolution = 10  bits, 1	III 05550.		
	- Sampling rate up to: 2	250 VSDS		
	(Kilo samples per seco			
	- Input range $(V) = \pm 10$ -Data transfers=DMA,			
	programmed I/0	interrupts,		
	Number of DMA chan	nola > -6		
		1101S > -0.		
	Analog output			
	Analog output: -Number of channels >	_7		
	-Resolution =16 bits, 1			
	-Maximum output rate			
	KS/s -Output range (V			
	-Data transfers=DMA,			
	programmed I/0 Digital Input/Output:			
	-Number of channels >			
		/— <i>2</i> / <del>4</del>		
	inputs/outputs. -D0 or DI Sample Cloo	~k		
	frequency: 0 to 1 MHz			
	- Timing: Counter/tim			
	- Resolution $\geq$ 32 bits	(10 - 2)		
 TECNEL/CCSOE ComputerControl Dat	- Compatible with With	ndows		
TECNEL/CCSOF.ComputerControl+Dat	-			
aAcquisition+Data Management Software:	operating system. Grap			
Software.	intuitive simulation of			
	in screen. Compatible	with the		
	industry standards.			

			1	
		- Registration and visualization of		
		all process variables in an		
		automatic and simultaneous way.		
		- Flexible, open and multicontrol		
		software developed with		
		actual windows graphic systems,		
		acting simultaneously on all		
		process parameters.		
		- Management, processing,		
		comparison and storage of data.		
		- Sampling rate up to 250,000 data		
		per second.		
		- Comparative analysis of the		
		obtained data, after the process and		
		modification of the conditions		
		during the process.		
	Cables and Accessories	Required (for normal operation)		
	Warranty	Minimum one year		
	Set of manuals should include:	Required Services, Assembly and		
		Installation, Interface and Control		
		Software, Starting-up, Safety,		
		Maintenance, Calibration &		
		Practices Manuals		
-	Additional Requirement	All relevant technical brochures		
		should be forwarded with Tender		
		Documents. Comprehensive user		
		guide, Complete track record on		
		where the supplier has supplied the		
		product, Recommendation letter		
		about the product from the		
		institutions where the supplier has		
		supplied the product.		
		Manufactures' authorization		
		should be submitted with the		
		tender documents		
2.23	Pulse Generator (1)		01	
	Model	Specify		
	Country of Origin	Specify		
	Frequency range	1mHz to 150 MHz		
	Timing resolution	4digits ,10ps best case		
	RMS jitter(period, width, delay)	0.003%+20ps		
		6.65ns to 999s		
	Period range			
	Variable Transitions	Accuracy $\pm 0.1\%$		
		$\leq 2 \text{ ns}$		
	Output	10 Vpp (20 Vpp) into 50 Ω		
	Resolution	<= 10 ps		
	Frequency Accuracy	<= 0.1%		
	Pattern per Channel	4 kbit		
	3 and 4 Level Signals	Required		
	Output Channels	2		
	Programming Commands	SCPI		
1			1	1
	Graphic Display	Required		

	Warranty	Minimum one year		
	User manual and product documentation	Required		
	Additional Requirement	All relevant technical brochures		
		should be forwarded with Tender		
		Documents. Comprehensive user		
		guide, Complete track record on		
		where the supplier has supplied the		
		product, Recommendation letter		
		about the product from the		
		institutions where the supplier has		
		supplied the product.		
		Manufactures' authorization		
		should be submitted with the		
		tender documents		
2.24	Power factor meter		02	
	Model	Specify		
	Country of Origin	Specify		
	Three-phase instrument, symmetric load.	Required		
	Measuring range	cap. 0.5 1 0.5 ind.		
	Current range	0-5 A		
	Voltage range	380 V ± 20 % 3-phase		
	Frequency range	40-65 Hz		
	Accuracy class	1.5		
	Warranty	Minimum one year		
	User manual and product documentation	Required		
	Additional Requirement	All relevant technical brochures		
	1	should be forwarded with Tender		
		Documents. Comprehensive user		
		guide, Complete track record on		
		where the supplier has supplied the		
		product, Recommendation letter		
		about the product from the		
		institutions where the supplier has		
		supplied the product.		
		Manufactures' authorization		
		should be submitted with the		
		tender documents		
2.25	Frequency meter		02	
	Model	Specify		
	Country of Origin	Specify		
	Measuring range	~46-54 Hz		
	Accuracy class	0.5		
	Warranty	Minimum one year		
	User manual and product documentation	Required		
	Additional Requirement	All relevant technical brochures		
		should be forwarded with Tender		
		Documents. Comprehensive user		
		guide, Complete track record on		
		where the supplier has supplied the		
		product, Recommendation letter		
		about the product from the		
		institutions where the supplier has		
1		supplied the product.		

			Manufactures' authorization		
			should be submitted with the		
			tender documents		
2.26	Current Transformer			03	
	Model		Specify		
	Country of Origin		Specify		
	Primary		20-10-5 A		
	Secondary		1 A		
	Accuracy class		1		
	Warranty		Minimum one year		
	User manual and product documentation	ion	Required		
	Additional Requirement		All relevant technical brochures		
	-		should be forwarded with Tender		
			Documents. Comprehensive user		
			guide, Complete track record on		
			where the supplier has supplied the		
			product, Recommendation letter		
			about the product from the		
			institutions where the supplier has		
			supplied the product.		
			Manufactures' authorization		
			should be submitted with the		
			tender documents		
2.27	PWM DC-Machine Control Module			02	
	Model	Spec			
	Country of Origin	Spec	5		
	Functional principle		ıadrant		
	max current	6A			
	Terminal for excitation		V/2A		
	Duty cycle	0-10			
	Frequency		0-1300Hz		
	Current limit	0-10	00%		
	Loads	R/L	active and passive		
	Control signal	0-10	)V		
	Power supply		-240V 1-phase AC,50Hz		
		3*23	30V 3-phase AC,50HZ		
	Warranty	Min	imum one year		
	User manual and product	Req	uired		
	documentation				
	Additional Requirement		relevant technical brochures should		
			orwarded with Tender		
			uments. Comprehensive user guide,		
			plete track record on where the		
			plier has supplied the product,		
			ommendation letter about the		
			luct from the institutions where the		
			plier has supplied the product.		
		Man	nufactures' authorization should be		
		subr	nitted with the tender documents		
2.28	Drill Bench (1)			01	
	Model		Specify		
	Country of Origin		Specify		

	Power source:	Electrical		
	Control type	manually-controlled		
	Structure	column type		
	bench-top model	Required		
	Diameter:	Min.<= 0.8 mm		
		Max.>= 3.2 mm		
	Voltage	230 V AC 50 Hz		
	Rotational speed	Min<=11000 rpm (69115.04		
		rad/min)		
		Max>=33000 rpm (207345.12		
		rad/min)		
	Drilling depth	>=260 mm		
	Accessories	Set of drill bits – 3 Sets		
	Warranty	Minimum one year		
	User manual and product documentation	Required		
	Additional Requirement	All relevant technical brochures		
		should be forwarded with Tender		
		Documents. Comprehensive user		
		guide, Complete track record on		
		where the supplier has supplied the		
		product, Recommendation letter		
		about the product from the		
		institutions where the supplier has		
		supplied the product. Manufactures' authorization		
		should be submitted with the		
2.29	PCB shears		01	
2.29	PCB shears Model	should be submitted with the tender documents	01	
2.29		should be submitted with the tender documents Specify	01	
2.29	Model Country of Origin	should be submitted with the tender documents	01	
2.29	Model	should be submitted with the tender documents Specify Specify	01	
2.29	Model Country of Origin Cutting Capacity	should be submitted with the tender documents Specify Specify Max>= 305mm	01	
2.29	ModelCountry of OriginCutting CapacityAluminium Cutting Capacity:	should be submitted with the tender documents Specify Specify Max>= 305mm >= 1.5mm	01	
2.29	ModelCountry of OriginCutting CapacityAluminium Cutting Capacity:External Depth:	should be submitted with the tender documents Specify Specify Max>= 305mm >= 1.5mm ~440mm	01	
2.29	ModelCountry of OriginCutting CapacityAluminium Cutting Capacity:External Depth:External Width:	should be submitted with the tender documents Specify Max>= 305mm >= 1.5mm ~440mm >= 245mm	01	
2.29	ModelCountry of OriginCutting CapacityAluminium Cutting Capacity:External Depth:External Width:Cut Width Max:	should be submitted with the tender documents Specify Max>= 305mm >= 1.5mm ~440mm >= 245mm >= 305mm Max >= 1.5mm Max >= 2mm	01	
2.29	ModelCountry of OriginCutting CapacityAluminium Cutting Capacity:External Depth:External Width:Cut Width Max:Cut Thickness for AluminiumCut Thickness for PCBsWarranty	should be submitted with the tender documents Specify Max>= 305mm >= 1.5mm ~440mm >= 245mm >= 305mm Max >= 1.5mm	01	
2.29	ModelCountry of OriginCutting CapacityAluminium Cutting Capacity:External Depth:External Width:Cut Width Max:Cut Thickness for AluminiumCut Thickness for PCBsWarrantyUser manual and product documentation	should be submitted with the tender documents Specify Max>= 305mm >= 1.5mm ~440mm >= 245mm >= 305mm Max >= 1.5mm Max >= 2mm Minimum one year Required	01	
2.29	ModelCountry of OriginCutting CapacityAluminium Cutting Capacity:External Depth:External Width:Cut Width Max:Cut Thickness for AluminiumCut Thickness for PCBsWarranty	should be submitted with the tender documentsSpecifyMax>= 305mm>= 1.5mm $\sim$ 440mm>= 245mm>= 305mmMax >= 1.5mmMax >= 2mmMinimum one yearRequiredAll relevant technical brochures	01	
	ModelCountry of OriginCutting CapacityAluminium Cutting Capacity:External Depth:External Width:Cut Width Max:Cut Thickness for AluminiumCut Thickness for PCBsWarrantyUser manual and product documentation	should be submitted with the tender documents  Specify Specify Max>= 305mm >= 1.5mm ~440mm >= 245mm >= 305mm Max >= 1.5mm Max >= 1.5mm Max >= 2mm Minimum one year Required All relevant technical brochures should be forwarded with Tender	01	
	ModelCountry of OriginCutting CapacityAluminium Cutting Capacity:External Depth:External Width:Cut Width Max:Cut Thickness for AluminiumCut Thickness for PCBsWarrantyUser manual and product documentation	should be submitted with the tender documentsSpecifyMax>= 305mm>= 1.5mm $\sim 440mm$ >= 245mm>= 305mmMax >= 1.5mmMax >= 2mmMinimum one yearRequiredAll relevant technical brochures should be forwarded with Tender Documents. Comprehensive user	01	
	ModelCountry of OriginCutting CapacityAluminium Cutting Capacity:External Depth:External Width:Cut Width Max:Cut Thickness for AluminiumCut Thickness for PCBsWarrantyUser manual and product documentation	should be submitted with the tender documents Specify Max>= $305$ mm >= $1.5$ mm ~440mm >= $245$ mm >= $245$ mm Max >= $1.5$ mm Max >= $1.5$ mm Max >= $2$ mm Minimum one year Required All relevant technical brochures should be forwarded with Tender Documents. Comprehensive user guide, Complete track record on	01	
	ModelCountry of OriginCutting CapacityAluminium Cutting Capacity:External Depth:External Width:Cut Width Max:Cut Thickness for AluminiumCut Thickness for PCBsWarrantyUser manual and product documentation	should be submitted with the tender documents Specify Max>= $305mm$ >= $1.5mm$ ~ $440mm$ >= $245mm$ >= $305mm$ Max >= $1.5mm$ Max >= $1.5mm$ Max >= $1.5mm$ Max >= $2mm$ Minimum one year Required All relevant technical brochures should be forwarded with Tender Documents. Comprehensive user guide, Complete track record on where the supplier has supplied the	01	
2.29	ModelCountry of OriginCutting CapacityAluminium Cutting Capacity:External Depth:External Width:Cut Width Max:Cut Thickness for AluminiumCut Thickness for PCBsWarrantyUser manual and product documentation	should be submitted with the tender documentsSpecifyMax>= 305mm>= 1.5mm~440mm>= 245mm>= 305mmMax >= 1.5mmMax >= 2mmMinimum one yearRequiredAll relevant technical brochures should be forwarded with Tender Documents. Comprehensive user guide, Complete track record on where the supplier has supplied the product, Recommendation letter	01	
	ModelCountry of OriginCutting CapacityAluminium Cutting Capacity:External Depth:External Width:Cut Width Max:Cut Thickness for AluminiumCut Thickness for PCBsWarrantyUser manual and product documentation	should be submitted with the tender documents Specify Max>= $305mm$ >= $1.5mm$ ~ $440mm$ >= $245mm$ >= $245mm$ Max >= $1.5mm$ Max >= $1.5mm$ Max >= $2mm$ Minimum one year Required All relevant technical brochures should be forwarded with Tender Documents. Comprehensive user guide, Complete track record on where the supplier has supplied the product, Recommendation letter about the product from the	01	
	ModelCountry of OriginCutting CapacityAluminium Cutting Capacity:External Depth:External Width:Cut Width Max:Cut Thickness for AluminiumCut Thickness for PCBsWarrantyUser manual and product documentation	should be submitted with the tender documents Specify Max>= 305mm >= 1.5mm $\sim$ 440mm >= 245mm >= 305mm Max >= 1.5mm Max >= 1.5mm Max >= 2mm Minimum one year Required All relevant technical brochures should be forwarded with Tender Documents. Comprehensive user guide, Complete track record on where the supplier has supplied the product, Recommendation letter about the product from the institutions where the supplier has		
	ModelCountry of OriginCutting CapacityAluminium Cutting Capacity:External Depth:External Width:Cut Width Max:Cut Thickness for AluminiumCut Thickness for PCBsWarrantyUser manual and product documentation	should be submitted with the tender documents Specify Max>= $305mm$ >= $1.5mm$ ~ $440mm$ >= $245mm$ >= $305mm$ Max >= $1.5mm$ Max >= $1.5mm$ Max >= $2mm$ Minimum one year Required All relevant technical brochures should be forwarded with Tender Documents. Comprehensive user guide, Complete track record on where the supplier has supplied the product, Recommendation letter about the product from the institutions where the supplier has supplied the product.		
	ModelCountry of OriginCutting CapacityAluminium Cutting Capacity:External Depth:External Width:Cut Width Max:Cut Thickness for AluminiumCut Thickness for PCBsWarrantyUser manual and product documentation	should be submitted with the tender documents Specify Max>= $305mm$ >= $1.5mm$ ~440mm >= $245mm$ >= $305mm$ Max >= $1.5mm$ Max >= $1.5mm$ Max >= $2mm$ Minimum one year Required All relevant technical brochures should be forwarded with Tender Documents. Comprehensive user guide, Complete track record on where the supplier has supplied the product, Recommendation letter about the product from the institutions where the supplier has supplied the product. Manufactures' authorization		
	ModelCountry of OriginCutting CapacityAluminium Cutting Capacity:External Depth:External Width:Cut Width Max:Cut Thickness for AluminiumCut Thickness for PCBsWarrantyUser manual and product documentation	should be submitted with the tender documents Specify Max>= $305mm$ >= $1.5mm$ ~ $440mm$ >= $245mm$ >= $305mm$ Max >= $1.5mm$ Max >= $1.5mm$ Max >= $2mm$ Minimum one year Required All relevant technical brochures should be forwarded with Tender Documents. Comprehensive user guide, Complete track record on where the supplier has supplied the product, Recommendation letter about the product from the institutions where the supplier has supplied the product.		

2.30	Electric hand driller			01	
	Model	Specify			
	Country of Origin	Specify			+
	Input voltage	230V AC 50 Hz			+
	Power input	500W		<u> </u>	1
	No load speed	~0-2800 rpm			-
	Max drilling capacity:	Steel/concrete	>=12 mm		+
	Grand Calmered.	Wood	>=20 mm		
	Weight	~2kg			
	Accessories	$\sim 2 \text{ kg}$ 3 sets of drill bits su	uitable for Steel		
	Accessories	(1), Concrete $(1)$ and			
		containing at least 5			
	Warranty	Specify			
	User manual and product documentation	Required		<del> </del>	
	Additional Requirement	All relevant technic	al brochures		
		should be forwarded			
		Documents. Compr			
		guide, Complete tra			
		where the supplier h			
		product, Recommer			
		about the product fr			
		institutions where the			
		supplied the produc			
		Manufactures' auth			
		should be submitted			
		tender documents			
2.31	Rheostat (4)			04	
2.31	Model	Specify		04	
2.31	Model Country of Origin	Specify		04	
2.31	Model Country of Origin Rating	Specify 5 kOhms, 10A		04	
2.31	Model Country of Origin Rating Tolerance	Specify 5 kOhms, 10A 10%		04	
2.31	Model Country of Origin Rating Tolerance Temperature	Specify 5 kOhms, 10A 10% 70 deg C maximum		04	
2.31	Model Country of Origin Rating Tolerance Temperature Type	Specify 5 kOhms, 10A 10% 70 deg C maximum Linear or Rotary		04	
2.31	Model Country of Origin Rating Tolerance Temperature Type Warranty	Specify 5 kOhms, 10A 10% 70 deg C maximum Linear or Rotary Specify		04	
2.31	ModelCountry of OriginRatingToleranceTemperatureTypeWarrantyUser manual and product documentation	Specify 5 kOhms, 10A 10% 70 deg C maximum Linear or Rotary Specify Required		04	
2.31	Model Country of Origin Rating Tolerance Temperature Type Warranty	Specify 5 kOhms, 10A 10% 70 deg C maximum Linear or Rotary Specify Required All relevant technic	al brochures	04	
2.31	ModelCountry of OriginRatingToleranceTemperatureTypeWarrantyUser manual and product documentation	Specify 5 kOhms, 10A 10% 70 deg C maximum Linear or Rotary Specify Required All relevant technic should be forwarded	al brochures 1 with Tender	04	
2.31	ModelCountry of OriginRatingToleranceTemperatureTypeWarrantyUser manual and product documentation	Specify 5 kOhms, 10A 10% 70 deg C maximum Linear or Rotary Specify Required All relevant technic should be forwarded Documents. Compre	al brochures d with Tender ehensive user	04	
2.31	ModelCountry of OriginRatingToleranceTemperatureTypeWarrantyUser manual and product documentation	Specify 5 kOhms, 10A 10% 70 deg C maximum Linear or Rotary Specify Required All relevant technic should be forwarded Documents. Compre guide, Complete tra	al brochures d with Tender ehensive user ck record on		
2.31	ModelCountry of OriginRatingToleranceTemperatureTypeWarrantyUser manual and product documentation	Specify 5 kOhms, 10A 10% 70 deg C maximum Linear or Rotary Specify Required All relevant technic should be forwarded Documents. Compr guide, Complete tra where the supplier h	al brochures d with Tender ehensive user ck record on nas supplied the		
2.31	ModelCountry of OriginRatingToleranceTemperatureTypeWarrantyUser manual and product documentation	Specify 5 kOhms, 10A 10% 70 deg C maximum Linear or Rotary Specify Required All relevant technic should be forwarded Documents. Compr guide, Complete tra where the supplier h product, Recommer	al brochures d with Tender ehensive user ck record on has supplied the idation letter		
2.31	ModelCountry of OriginRatingToleranceTemperatureTypeWarrantyUser manual and product documentation	Specify 5 kOhms, 10A 10% 70 deg C maximum Linear or Rotary Specify Required All relevant technic should be forwarded Documents. Compr guide, Complete tra where the supplier H product, Recommer about the product fr	al brochures d with Tender ehensive user ck record on has supplied the indation letter om the		
2.31	ModelCountry of OriginRatingToleranceTemperatureTypeWarrantyUser manual and product documentation	Specify 5 kOhms, 10A 10% 70 deg C maximum Linear or Rotary Specify Required All relevant technic should be forwarded Documents. Compr guide, Complete tra where the supplier h product, Recommer about the product fr institutions where th	al brochures d with Tender ehensive user ck record on has supplied the indation letter om the he supplier has		
2.31	ModelCountry of OriginRatingToleranceTemperatureTypeWarrantyUser manual and product documentation	Specify 5 kOhms, 10A 10% 70 deg C maximum Linear or Rotary Specify Required All relevant technic should be forwarded Documents. Compr guide, Complete tra where the supplier the product, Recomment about the product fr institutions where the supplied the product	al brochures d with Tender ehensive user ck record on has supplied the indation letter om the he supplier has t.		
2.31	ModelCountry of OriginRatingToleranceTemperatureTypeWarrantyUser manual and product documentation	Specify 5 kOhms, 10A 10% 70 deg C maximum Linear or Rotary Specify Required All relevant technic should be forwarded Documents. Compr guide, Complete tra where the supplier h product, Recommer about the product fr institutions where th supplied the produc Manufactures' author	al brochures d with Tender ehensive user ck record on has supplied the indation letter om the he supplier has t. orization		
2.31	ModelCountry of OriginRatingToleranceTemperatureTypeWarrantyUser manual and product documentation	Specify5 kOhms, 10A10%70 deg C maximumLinear or RotarySpecifyRequiredAll relevant technicshould be forwardedDocuments. Comprguide, Complete trawhere the supplier hproduct, Recommerabout the product frinstitutions where thsupplied the productManufactures' authshould be submitted	al brochures d with Tender ehensive user ck record on has supplied the indation letter om the he supplier has t. orization		
2.31	ModelCountry of OriginRatingToleranceTemperatureTypeWarrantyUser manual and product documentation	Specify 5 kOhms, 10A 10% 70 deg C maximum Linear or Rotary Specify Required All relevant technic should be forwarded Documents. Compr guide, Complete tra where the supplier h product, Recommer about the product fr institutions where th supplied the produc Manufactures' author	al brochures d with Tender ehensive user ck record on has supplied the indation letter om the he supplier has t. orization	04	
	Model         Country of Origin         Rating         Tolerance         Temperature         Type         Warranty         User manual and product documentation         Additional Requirement	Specify 5 kOhms, 10A 10% 70 deg C maximum Linear or Rotary Specify Required All relevant technic should be forwarded Documents. Compr guide, Complete tra where the supplier h product, Recommer about the product fr institutions where th supplied the produc Manufactures' authors should be submitted tender documents	al brochures d with Tender ehensive user ck record on has supplied the indation letter om the he supplier has t. orization		
	Model         Country of Origin         Rating         Tolerance         Temperature         Type         Warranty         User manual and product documentation         Additional Requirement         Rheostat         Model	Specify 5 kOhms, 10A 10% 70 deg C maximum Linear or Rotary Specify Required All relevant technic should be forwarded Documents. Compre guide, Complete tra where the supplier the product, Recomment about the product fre institutions where the supplied the product Manufactures' authors should be submitted tender documents	al brochures d with Tender ehensive user ck record on has supplied the indation letter om the he supplier has t. orization		
	Model         Country of Origin         Rating         Tolerance         Temperature         Type         Warranty         User manual and product documentation         Additional Requirement	Specify 5 kOhms, 10A 10% 70 deg C maximum Linear or Rotary Specify Required All relevant technic should be forwarded Documents. Compr guide, Complete tra where the supplier h product, Recommer about the product fr institutions where th supplied the produc Manufactures' authors should be submitted tender documents	al brochures d with Tender ehensive user ck record on has supplied the indation letter om the he supplier has t. orization		
	Model         Country of Origin         Rating         Tolerance         Temperature         Type         Warranty         User manual and product documentation         Additional Requirement         Rheostat         Model         Country of Origin	Specify 5 kOhms, 10A 10% 70 deg C maximum Linear or Rotary Specify Required All relevant technic should be forwarded Documents. Compre guide, Complete tra where the supplier h product, Recommer about the product fr institutions where th supplied the produc Manufactures' authorshould be submitted tender documents	al brochures d with Tender ehensive user ck record on has supplied the indation letter om the he supplier has t. orization		

	Adjustable Type	Screwdriver slot		
	Resistive Element	Wire Wound		
	Warranty	Specify		
	User manual and product documentation	Required		
	Additional Requirement	All relevant technical brochures should be forwarded with Tender		
		Documents. Comprehensive user		
		guide, Complete track record on		
		where the supplier has supplied the		
		product, Recommendation letter		
		about the product from the		
		institutions where the supplier has		
		supplied the product.		
		Manufactures' authorization		
		should be submitted with the		
		tender documents		
2.33	Rheostat		04	
	Model	Specify		
	Country of Origin	Specify		
	Value	1 ohm		
	Current Rating	10 A		
	Adjustable Type	Screwdriver slot		
	Resistive Element	Wire Wound		
	Warranty	Specify		
	User manual and product documentation	Required		
	Additional Requirement	All relevant technical brochures		
		should be forwarded with Tender		
		Documents. Comprehensive user		
		guide, Complete track record on		
		where the supplier has supplied the		
		product, Recommendation letter		
		about the product from the		
		institutions where the supplier has		
		supplied the product.		
		Manufactures' authorization		
		should be submitted with the tender documents		
2.34	Digital and Analog Communication Tra		01	
2.34	0		UI	
	Model	Specify		
	Country of Origin	Specify		
	Experiments covered with the trainer:	RF Oscillator Circuits Design		
		Second Order Filter Circuits Design		
		AM, FM modulation and		
		Demodulation Circuit Design		
		A/D, D/A converter circuit design		
		<i>T</i> ( <i>D</i> , <i>D</i> ) <i>T</i> converter encant design		
		Pulse Width Modulation/		

				ASK, FSK,PSK QP and demodulation ci			
				ASK Coherent Dete	-		
	Accessorie	es	]	Cables: Signal Cable Power Cables -100 I cables – 40 Nos.	es – 200 Nos. ,		
	Warranty			Minimum one year			
		al and product		Required			
		Requirement	 	All relevant technica should be forwarded Documents. Compre guide, Complete trad	l with Tender chensive user ck record on		
			1	where the supplier h product, Recommen about the product fro	dation letter		
			i S J	institutions where the supplied the product Manufactures' authors should be submitted tender documents	e supplier has  prization		
2.35	Digital St	orage Oscillos		tender documents		10	
2.33	Model	Mage Oscillos	Specify			10	
	Country of	<sup>-</sup> Origin	Specify				
	Quantity	011811	1	4	5		
	Vertical						
	Channels		2	2	2		
	Bandwidth	l	DC-500MHz (- 3dB)	DC-70MHz (- 3dB)	DC-150MHz (- 3dB)		
	Rise time		<= 700ps Approx.	<= 5ns Approx.	<=2.5 ns Approx.		
	Input coup	ling		AC, DC & Ground			
	Input Impe	edance		1MΩ±2%, -15pF Normal &Invert 300V (DC+AC peak), CATI +, -, FFT			
	Polarity						
	Maximum		>= 300				
	Waveform Process						
	EXT Trig	ger					
	Range Input Impe	dance		±15V 1MΩ±2%, ~16pF			
	Signal Aq			11v122-270,~10pr			
	Signal Aq Sampling	Real-Time	>= 4GSa/s	>= 2GSa/s	>= 1GSa/s		
	rate	Equivalent- Time	>= 100GSa/s	>= 100GSa/s	>= 105a/s $>= 25GSa/s$		
	Vertical R			8 Bits			
	Memory L Channel		>= 2	25k points	>= 2M points		
	Acquisition	n Mode	Norma	al, Peak Detect, Ave	erage		
	Peak Detec			<= 2ns	<=10ns		
	Voltage M	easurement	V min , Ris	avg, V rms, V hi, se-Preshoot/Oversho			
			l P	Preshoot/Overshoot			
	Time Measurement	Freq, Period, Rise Time, F	Fall Time,				
------	--	---	--	----	--		
		Positive, Width, Negative, W					
		Cycle, delay measurer	nents				
	Cursors Measurement	Voltage difference between c					
		Time difference between cu	. ,				
	Control Panel Functions		\ /				
	Save Setup	Up to 20 sets of measurement conditions	Up to 15 sets.				
	Save Waveform	24 sets of waveform	15 sets.				
	USB Port for PC Connection	Required					
	Data Logger	Required					
	GPIB	Required	No				
	Power Source	240 V/ 50 Hz					
	Warranty	Minimum one year					
	User manual and	Required					
	product documentation	*					
	Additional Requirement	All relevant technical brochures sh	ould be				
	_	forwarded with Tender Documents	s. Comprehensive				
		user guide, Complete track record	on where the				
		supplier has supplied the product,	Recommendation				
		letter about the product from the in					
		the supplier has supplied the produ	ict.				
		Manufactures' authorization shoul	d be submitted				
		with the tender documents					
2.36	Inductor bank			02			
	Model	Specify					
	Country of Origin	Specify					
	Description	This is a (300j) Inductive Load Mo	odule fitted with				
		9 inductors in three identical group	os to realise				
		holowood on waholowood 2 whose lo	ade (star and				
1		balanced or unbalanced 3-phase lo	aus (stai allu				
		delta) and single phase loads. Each					
		-	n phase shall be				
		delta) and single phase loads. Each independently changed in 7 unifor max current value of full load. Sin	n phase shall be m steps from 0 to gle phase				
		delta) and single phase loads. Each independently changed in 7 unifor	n phase shall be m steps from 0 to gle phase				
	Power variation:	delta) and single phase loads. Each independently changed in 7 unifor max current value of full load. Sin connection provides 21 regulation 0-100%	n phase shall be m steps from 0 to gle phase				
	Duty cycle:	delta) and single phase loads. Each independently changed in 7 uniformax current value of full load. Sin connection provides 21 regulation 0-100%	n phase shall be m steps from 0 to gle phase				
	Duty cycle: Input/Outputs:	<ul> <li>delta) and single phase loads. Each independently changed in 7 uniformax current value of full load. Sing connection provides 21 regulation</li> <li>0-100%</li> <li>100%</li> <li>4 mm CE safety sockets</li> </ul>	n phase shall be m steps from 0 to gle phase				
	Duty cycle: Input/Outputs: Unit type	<ul> <li>delta) and single phase loads. Each independently changed in 7 uniformax current value of full load. Sing connection provides 21 regulation</li> <li>0-100%</li> <li>100%</li> <li>4 mm CE safety sockets</li> <li>Table top / frame unit</li> </ul>	n phase shall be m steps from 0 to gle phase				
	Duty cycle: Input/Outputs: Unit type Warranty	<ul> <li>delta) and single phase loads. Each independently changed in 7 uniformax current value of full load. Sing connection provides 21 regulation</li> <li>0-100%</li> <li>100%</li> <li>4 mm CE safety sockets</li> <li>Table top / frame unit</li> <li>Minimum one year</li> </ul>	n phase shall be m steps from 0 to gle phase				
	Duty cycle: Input/Outputs: Unit type Warranty User manual and	<ul> <li>delta) and single phase loads. Each independently changed in 7 uniformax current value of full load. Sing connection provides 21 regulation</li> <li>0-100%</li> <li>100%</li> <li>4 mm CE safety sockets</li> <li>Table top / frame unit</li> </ul>	n phase shall be m steps from 0 to gle phase				
	Duty cycle: Input/Outputs: Unit type Warranty	delta) and single phase loads. Each independently changed in 7 unifor max current value of full load. Sin connection provides 21 regulation 0-100% 100% 4 mm CE safety sockets Table top / frame unit Minimum one year Required	n phase shall be m steps from 0 to gle phase steps.				
	Duty cycle: Input/Outputs: Unit type Warranty User manual and	<ul> <li>delta) and single phase loads. Each independently changed in 7 uniformax current value of full load. Sing connection provides 21 regulation</li> <li>0-100%</li> <li>100%</li> <li>4 mm CE safety sockets</li> <li>Table top / frame unit</li> <li>Minimum one year</li> </ul>	n phase shall be m steps from 0 to gle phase steps.				
	Duty cycle: Input/Outputs: Unit type Warranty User manual and product documentation	delta) and single phase loads. Each independently changed in 7 unifor max current value of full load. Sin connection provides 21 regulation 0-100% 100% 4 mm CE safety sockets Table top / frame unit Minimum one year Required All relevant technical brochures sh	n phase shall be m steps from 0 to gle phase steps.				
	Duty cycle: Input/Outputs: Unit type Warranty User manual and product documentation	<ul> <li>delta) and single phase loads. Each independently changed in 7 uniformax current value of full load. Sinconnection provides 21 regulation</li> <li>0-100%</li> <li>100%</li> <li>4 mm CE safety sockets</li> <li>Table top / frame unit</li> <li>Minimum one year</li> <li>Required</li> <li>All relevant technical brochures sh forwarded with Tender</li> </ul>	n phase shall be m steps from 0 to gle phase steps.				
	Duty cycle: Input/Outputs: Unit type Warranty User manual and product documentation	<ul> <li>delta) and single phase loads. Each independently changed in 7 uniformax current value of full load. Sinconnection provides 21 regulation</li> <li>0-100%</li> <li>100%</li> <li>4 mm CE safety sockets</li> <li>Table top / frame unit</li> <li>Minimum one year</li> <li>Required</li> <li>All relevant technical brochures sh forwarded with Tender</li> <li>Documents. Comprehensive user generation</li> </ul>	n phase shall be m steps from 0 to gle phase steps.				
	Duty cycle: Input/Outputs: Unit type Warranty User manual and product documentation	<ul> <li>delta) and single phase loads. Each independently changed in 7 uniformax current value of full load. Sinconnection provides 21 regulation</li> <li>0-100%</li> <li>100%</li> <li>4 mm CE safety sockets</li> <li>Table top / frame unit</li> <li>Minimum one year</li> <li>Required</li> <li>All relevant technical brochures sh forwarded with Tender</li> <li>Documents. Comprehensive user g track record on where</li> </ul>	n phase shall be m steps from 0 to gle phase steps.				
	Duty cycle: Input/Outputs: Unit type Warranty User manual and product documentation	<ul> <li>delta) and single phase loads. Each independently changed in 7 uniformax current value of full load. Sinconnection provides 21 regulation 0-100%</li> <li>100%</li> <li>4 mm CE safety sockets</li> <li>Table top / frame unit</li> <li>Minimum one year</li> <li>Required</li> <li>All relevant technical brochures sh forwarded with Tender</li> <li>Documents. Comprehensive user g track record on where</li> <li>the supplier has supplied the produce the supplice the produce the produce</li></ul>	n phase shall be m steps from 0 to gle phase steps.				
	Duty cycle: Input/Outputs: Unit type Warranty User manual and product documentation	<ul> <li>delta) and single phase loads. Each independently changed in 7 uniformax current value of full load. Sinconnection provides 21 regulation</li> <li>0-100%</li> <li>100%</li> <li>4 mm CE safety sockets</li> <li>Table top / frame unit</li> <li>Minimum one year</li> <li>Required</li> <li>All relevant technical brochures sh forwarded with Tender</li> <li>Documents. Comprehensive user g track record on where</li> <li>the supplier has supplied the production</li> </ul>	n phase shall be m steps from 0 to gle phase steps.				
	Duty cycle: Input/Outputs: Unit type Warranty User manual and product documentation	<ul> <li>delta) and single phase loads. Each independently changed in 7 uniformax current value of full load. Sinconnection provides 21 regulation</li> <li>0-100%</li> <li>100%</li> <li>4 mm CE safety sockets</li> <li>Table top / frame unit</li> <li>Minimum one year</li> <li>Required</li> <li>All relevant technical brochures sh forwarded with Tender</li> <li>Documents. Comprehensive user g track record on where</li> <li>the supplier has supplied the product Recommendation letter about the product from the institutions where</li> </ul>	n phase shall be m steps from 0 to gle phase steps.				

Resistor bank		03	
Model	Specify		
Country of Origin			
	Module fitted with 9 resistors in three identical		
	groups to realise balanced or unbalanced 3-phase		
Description	loads (star and delta) and single phase loads.		
Description	Each phase can be independently varied in 7		
	uniform steps from 0 to max current value for full		
	power. Single phase connection provides 21		
	regulation steps.		
Power variation:	0-100%		
Duty cycle:	100%		
Input/Outputs:	4 mm CE safety sockets		
Unit type:	Table top / frame unit		
Warranty	Minimum one year		
User manual and	Required		
product documentation			
Additional Requirement	All relevant technical brochures should be		
	forwarded with Tender		
	Documents. Comprehensive user guide, Complete		
	track record on where		
	the supplier has supplied the product,		
	-		
	tender documents	0.2	
	Specify	02	
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Ŭ			
* *			
Inculation Redictance · T			
Test Voltage: T – T	T - T: 9,030 VDC for 60 seconds		
Test Voltage: T – T Test Voltage: T – C	T – T: 9,030 VDC for 60 seconds           T – C: 9000 VAC 10seconds		
Test Voltage: T – T Test Voltage: T – C Warranty	T – T: 9,030 VDC for 60 secondsT – C: 9000 VAC 10secondsMinimum one year		
Test Voltage: T – T Test Voltage: T – C Warranty User manual and product	T – T: 9,030 VDC for 60 secondsT – C: 9000 VAC 10secondsMinimum one year		
Test Voltage: T – T Test Voltage: T – C Warranty User manual and product documentation	T – T: 9,030 VDC for 60 secondsT – C: 9000 VAC 10secondsMinimum one yearRequired		
Test Voltage: T – T Test Voltage: T – C Warranty User manual and product	T – T: 9,030 VDC for 60 seconds         T – C: 9000 VAC 10seconds         Minimum one year         Required         All relevant technical brochures should be		
Test Voltage: T – T Test Voltage: T – C Warranty User manual and product documentation	T – T: 9,030 VDC for 60 seconds         T – C: 9000 VAC 10seconds         Minimum one year         Required         All relevant technical brochures should be forwarded with Tender		
Test Voltage: T – T Test Voltage: T – C Warranty User manual and product documentation	T – T: 9,030 VDC for 60 seconds         T – C: 9000 VAC 10seconds         Minimum one year         Required         All relevant technical brochures should be forwarded with Tender         Documents. Comprehensive user guide,		
Test Voltage: T – T Test Voltage: T – C Warranty User manual and product documentation	T – T: 9,030 VDC for 60 seconds         T – C: 9000 VAC 10seconds         Minimum one year         Required         All relevant technical brochures should be forwarded with Tender         Documents. Comprehensive user guide, Complete track record on where		
Test Voltage: T – T Test Voltage: T – C Warranty User manual and product documentation	T – T: 9,030 VDC for 60 secondsT – C: 9000 VAC 10secondsMinimum one yearRequiredAll relevant technical brochures should be forwarded with Tender Documents. Comprehensive user guide, Complete track record on where the supplier has supplied the product,		
Test Voltage: T – T Test Voltage: T – C Warranty User manual and product documentation	T – T: 9,030 VDC for 60 seconds         T – C: 9000 VAC 10seconds         Minimum one year         Required         All relevant technical brochures should be forwarded with Tender         Documents. Comprehensive user guide, Complete track record on where		
	Country of Origin Description Power variation: Duty cycle: Input/Outputs: Unit type: Warranty User manual and product documentation Additional Requirement Additional Requirement <b>Capacitor bank</b> Model Country of Origin Bank Capacitance Rated Voltage Frequency Dissipation Factor Operating Temperature	Model         Specify           Country of Origin         Specify           This is a (300, 600, 1200 ohms) Resistive Load Module fitted with 9 resistors in three identical groups to realise balanced or unbalanced 3-phase loads (star and delta) and single phase loads. Each phase can be independently varied in 7 uniform steps from 0 to max current value for full power. Single phase connection provides 21 regulation steps.           Power variation:         0-100%           Duty cycle:         100%           Input/Outputs:         4 mm CE safety sockets           Unit type:         Table top / frame unit           Warranty         Minimum one year           User manual and product documentation         Required           Additional Requirement         All relevant technical brochures should be forwarded with Tender Documents. Comprehensive user guide, Complete track record on where the supplier has supplied the product, Recommendation letter about the product. Manufactures' authorization should be submitted with the tender documents           Model         Specify           Country of Origin         Specify           Bank         Capacitor 30 P.F 300j 50V plate           Capacitance         0.8 ~ 1.2 uF. +/-3%           Rated Voltage         2,100 VAC           Frequency         50/60 Hz.           Dissipation Factor         0.0035 maximum           Operating Temperature         -10 to +85 degC <td>Model         Specify         Image: Specify           Country of Origin         Specify         Specify           Description         This is a (300, 600, 1200 ohms) Resistive Load Module fitted with 9 resistors in three identical groups to realise balanced or unbalanced 3-phase loads (star and delta) and single phase loads. Each phase can be independently varied in 7 uniform steps from 0 to max current value for full power. Single phase connection provides 21 regulation steps.           Power variation:         0-100%           Duty cycle:         100%           Input/Outputs:         4 mm CE safety sockets           Unit type:         Table top / frame unit           Warranty         Minimum one year           Required         Power devine econometation           Additional Requirement         All relevant technical brochures should be forwarded with Tender           Documents.         Comprehensive user guide, Complete track record on where the supplier has supplied the product, Recommendation letter about the product. Manufactures' authorization should be submitted with the tender documents           Capacitor bank         Capacitor 30 P.F 300j 50V plate         Capacitance           Qaecitor 30 P.F. 300j 50V plate         Capacitance         0.8 ~ 1.2 uF, +/-3%           Rated Voltage         2,100 VAC         Frequency         50/60 Hz.</td>	Model         Specify         Image: Specify           Country of Origin         Specify         Specify           Description         This is a (300, 600, 1200 ohms) Resistive Load Module fitted with 9 resistors in three identical groups to realise balanced or unbalanced 3-phase loads (star and delta) and single phase loads. Each phase can be independently varied in 7 uniform steps from 0 to max current value for full power. Single phase connection provides 21 regulation steps.           Power variation:         0-100%           Duty cycle:         100%           Input/Outputs:         4 mm CE safety sockets           Unit type:         Table top / frame unit           Warranty         Minimum one year           Required         Power devine econometation           Additional Requirement         All relevant technical brochures should be forwarded with Tender           Documents.         Comprehensive user guide, Complete track record on where the supplier has supplied the product, Recommendation letter about the product. Manufactures' authorization should be submitted with the tender documents           Capacitor bank         Capacitor 30 P.F 300j 50V plate         Capacitance           Qaecitor 30 P.F. 300j 50V plate         Capacitance         0.8 ~ 1.2 uF, +/-3%           Rated Voltage         2,100 VAC         Frequency         50/60 Hz.

		product. Manufactures' au submitted with the tender documents	thorization should be		
2.39	Glue gun and sticks	tender documents		10	
,	Model	Specify		-•	
	Country of Origin	Specify			
	Description	Uses standard hot melt glu	ue sticks		
	Power Supply	230V 50 Hz			
	Fold out stand for safety	Required			
	Trigger feed mechanism	Required			
	Compatible glue sticks	GS20DT/25DT, GS260/5	00		
	Included glue stick sizes	GS20DT	20		
		GS25DT	20		
		GS260	20		
		GS500	20		
	Warranty	Specify			
	User manual and product	Required			
	documentation				
	Additional Requirement	All relevant technical broo	chures should be		
		forwarded with Tender			
		Documents. Comprehensi	ve user guide,		
		Complete track record on			
		supplied the product, Reco			
		about the product from the			
		the supplier has supplied t			
		Manufactures' authorizati			
		submitted with the tender	documents		
2.40	Wireless Microphone set	a :c		02	
	Model	Specify			
	Country of Origin	Specify	·		
	Features	Automatic frequency and	interference		
		management	ntion		
	-	Secure 256 bit AES encry			
		Speech optimized condent capsule (MME 865)	ser microphone		
	-	Remote controllable			
		Long operation time (mor	e than 10 hours)		
		AF frequency response	20 to 20,000 Hz		
			20 10 20,000 112		
		Signal-to-noise ratio	> 90 dB(A)		
		Modulation	GFSK with back		
			channel		
		Transmission method	TDMA, space		
			diversity		
	Handheld	RF output power	adaptive, up to 250 mW		
		AF frequency response	50 to 20,000 Hz		
		AF frequency response Mute switch	available		
	Receiver		< -90  dBm		
	Ketterver	RF sensitivity RF output power back	adaptive, up to 250		
		channel	mW		

		Network socket	5	available		1
	Accessories	Handheld trans	mitter	3		
		MME 865 micr	ophone	3		
		capsule				
		BA 10 accupac	k	3		
		Rack Receiver		1		
		power supply)	(8			
		Rack mount kit		available		
	Warranty	Minimum one y				
	User manual and product	Required	our			-
	documentation	noquinou				
	Additional Requirement	All relevant tec	hnical broch	nures should be		
		forwarded with				
		Documents. Co		e user guide		
		Complete track				
		the supplier has				
		Recommendation				
				is where the supplier		
		has supplied the				
		authorization sh	1			
		tender documen				
2.41	Wheatstone Bridge				05	
	Model	Specify				
	Country of Origin	Specify				
	Description	Each set consist	s of a resist	ance bridge, three		
	-	resistance decad	les, two pre	cision resistors and a		
		zero point Galva	-			
	Resistance Bridge	Scale	0-1000mn	n		
	-	Scale divisions	mm			+
		Resistance	Length	~1m		
		wire	Material	NiCr	-	
	-	Connection	4mm safet			-
	-	Maximum	~8V	ly jucks		-
		voltage				
	-	Maximum	~1.5A			
		Current	1.51			
	Resistance decade -1	Measurement	0.1 Ω to 1	0		+
		Range	0.1 22 10 1	55		
		Step Size	0.1 Ω		-	
		Max. Current	~1A		-	
		Accuracy	~1A <= 1%		-	
	Resistance decade - 2	Measurement	$1 \Omega$ to 10	0		+
		Range	1 22 10 10	22		
		Step Size	1Ω		-	
		Max. Current	~750 mA		-	
		Accuracy	$\sim 730 \text{ IIIA}$		-	
	Resistance decade -3	Measurement	< -1% 10 $\Omega$ to 10			+
	Resistance decade -3		10 32 10 10	22 00		
		Range	10 Ω		-	
		Step Size			4	
		Max. Current	$\sim 250 \text{ mA}$		-	
	Precision resistor-1	Accuracy	<= 0.5%			+
	r recision resistor-1	Resistance	$10 \Omega$		1	1

		Talananaa	< 10/			
		Tolerance	<= 1%			
		Load rating	~4W			
	Precision resistor-2	Resistance	1Ω			
		Tolerance	<= 1%			
		Load rating	~4W			
	Zero Point Galvanometer	Measurement	100mV DC, 30µA DC, 3 mA			
		ranges	DC			
		Integrated	3333 Ohm, 460 Ohm, 500			
		resistance	Ohm			
		Accuracy	$\pm 1.5\%$			
		Zero point	center			
		Mirrored scale	yes			
		Connection	4-mm-security sockets			
		Fuse	0.315 A HBC 380 V 50 kA			
		1 450	0.515 A HBC 500 V 50 KA			
	Accessories	Connecting lead	le			
	Warranty	Minimum one y				
	-		/cui			
	User manual and product documentation	Required				
	Additional Requirement	All relevant tecl				
	-	forwarded with				
		Documents. Con	mprehensive user guide,			
		Complete track				
		supplied the product, Recommendation letter				
		about the produ				
		-	pplied the product. Manufactures'			
			hould be submitted with the			
		tender documen				
2.42	NI ELVIS II+ for LabView			02		
	Model	Specify				
	Country of Origin	Specify				
	Included items in system	NI ELVIS II+	Workstation			
	configuration	NI ELVIS II				
		Detachable pro				
		USB cable and				
	NI ELVIS II+ Oscilloscope	Maximum	100 MS/s			
		sampling rate	100 1910/0			
	Accessories- Optional		Probes (2), Courseware			
	Processories- Optional	(Electronics an				
		T ALICCHOMICS all				
	Warranty		vear	I		
	Warranty User manual and product	Minimum one	year			
	User manual and product documentation	Minimum one Required				
	User manual and product	Minimum one Required	year chnical brochures should be			
	User manual and product documentation	Minimum one Required	chnical brochures should be			
	User manual and product documentation	Minimum one Required All relevant teo forwarded with	chnical brochures should be			
	User manual and product documentation	Minimum one Required All relevant teo forwarded with Documents. Co	chnical brochures should be n Tender omprehensive user guide,			
	User manual and product documentation	Minimum one Required All relevant teo forwarded with Documents. Co Complete track	chnical brochures should be n Tender omprehensive user guide, k record on where			
	User manual and product documentation	Minimum one Required All relevant teo forwarded with Documents. Co Complete track the supplier ha	chnical brochures should be n Tender omprehensive user guide,			

		has supplied the		
		product. Manufactures' authorization should be		
		submitted with the		
		tender documents		
2.43	Multisim Education 25 Use		01	
	Model	Specify		
	Country of Origin	Specify		
	License Type	25 Users		
	Warranty	Specify		
	User manual and product	Required		
	documentation	101000		
	Additional Requirement	All relevant technical brochures should be		
	1	forwarded with Tender		
		Documents. Comprehensive user guide,		
		Complete track record on where the supplier		
		has supplied the product, Recommendation		
		letter about the product from the institutions		
		where the supplier has supplied the product.		
		Manufactures' authorization should be		
		submitted with the		
		tender documents		
2.44	Duplo machine		01	
	Model	Specify		
	Country of Origin	Specify		
	Resolution	600 X 600 dpi		
	Document Size	4" x 6" (100 mm x 148 mm) to 11" x 17" (297		
		mm x 432 mm)		
	Image Mode	Text, Photo, Text/Photo, Pencil, Screen		
	Paper Weight	46gsm - 210 gsm		
	Colour duplication	available		
	LAN network interface	Available to print directly from computers		
	Paper supply capacity	Minimum 1000 sheets (64g/m2)		
	Print speed	60ppm – 150ppm		
		Five steps variable from the control panel (60,		
		80, 100, 110, 120ppm), 150ppm: Selectable from the touch panel		
	User interface	LCD Touch Panel with Progress Arrow		
		indicators		
	Input port	USB2.0, 3.0 , Ethernet		
	Sound level (100ppm at	Less than 65dB		
	operating position)			
	Power source	220V – 240V AC, 50Hz		
	duplex	available		
	Warranty	Minimum one year		
	User manual and product	Required		
	documentation	- Colonou		
	Additional Requirement	All relevant technical brochures should be		
		forwarded with Tender		
		Documents. Comprehensive user guide,		
		Complete track record on where		
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		1 1 1	1. 1. 1 1		
			s supplied the product,		
			on letter about the		
		1	ne institutions where the supplier		
			e product. Manufactures'		
			hould be submitted with the		
		tender docume	nts		
2.45	Colour Laser Printer			01	
	Model	Specify			
	Country of Origin	Specify			
	Processor speed	minimum 800	MHz		
	Print Speed Black	Minimum 14 p	pm		
	Print Speed Colour	Minimum 14 p			
	Print Resolution, Black	Minimum to 6	÷		
	Print Resolution, Colour	Minimum to 6	1		
	Maximum Number Of	Up to 99 copie	1		
	Copies	op to yy copie			
	Connectivity, Standard	Wireless Ether	rnet direct printing		
		USB printing	PB		
	Compatible Operating		nstalls supported on: Microsoft		
	Systems		bit and 64 bit or above and		
			er 2008 or above		
	Power Supply		220 to 240 VAC (+/- 10%), 50		
		Hz $(+/-2 \text{ Hz})$			
	Warranty	Minimum one			
	User manual and product	Required			
	documentation	Requirea			
	Additional Requirement	All relevant tec	chnical brochures should be		
		forwarded with			
			omprehensive user guide,		
			record on where the supplier		
		_	e product, Recommendation		
			product from the institutions		
			lier has supplied the product.		
			authorization should be		
			the tender documents		
2.46	Hot air station			03	
	Model	Specify			
	Country of Origin	Specify			
	Description	- · ·	ing iron, desoldering gun and		
	Description	hot air with me			
	Power	230 V 50 Hz			
	Hot air gun	Power	Up to 500 watts		
		Consumption	0p to 500 waits		
		Temperature	100 deg to 480 deg C		
		-	100 deg 10 400 deg C		
	-	Range	Motel Heating Core		
		Heating	Metal Heating Core		
	Caldering inter	Element	60 motto mo-		
	Soldering iron	Power	60 watts max		
		Consumption			
		Heating	Ceramic		

		Temp Range	200 deg-480 deg C		
	Desoldering gun	Power	70 watts max		
	661	Consumption			
		Temp Range	200-480 deg C		
		Number of	3 (1.2mm, 1.5mm, 1.8mm)		
		nozzles			
	accessories		eating element for hot air gun		
	_	Six nozzles for	hot air gun		
	_	Cleaning pin			
	_		e-soldering pistol		
		And necessary	items		
	Warranty	Minimum one	year		
	User manual and product	Required			
	documentation				
	Additional Requirement		hnical brochures should be		
		forwarded with			
			omprehensive user guide,		
		-	record on where the supplier		
			e product, Recommendation		
			product from the institutions		
			lier has supplied the product. authorization should be		
			the tender documents		
2.47	Quadcopter for developers		the tender documents	01	
	Model	Specify			
	Country of Origin	Specify			
	Features		wer and communication ports		
		Expansion ba		-	
			e mounting and balancing		
			rm angle for greater torque		
		50% less vib	rations, rigid, strong system		
		Responsive,	quick release landing pads		
		Dedicated re	mote controller 3.1 miles		
1		range(5km)			
		range(5km) Full mobile a	app support	-	
		range(5km) Full mobile a Enhanced GI	pp support PS	-	
	Performance	range(5km) Full mobile a Enhanced GI Hovering	PS Vertical: 0.5 m, Horizontal:	-	
	Performance	range(5km) Full mobile a Enhanced GI Hovering Accuracy	PS Vertical: 0.5 m, Horizontal: 2.5 m	-	
	Performance	range(5km) Full mobile a Enhanced GI Hovering Accuracy Tilt Angle	PS Vertical: 0.5 m, Horizontal:	-	
		range(5km) Full mobile a Enhanced GI Hovering Accuracy Tilt Angle Speed	PS Vertical: 0.5 m, Horizontal: 2.5 m ~ 35° 20 m/s	-	
	Performance Remote controller	range(5km) Full mobile a Enhanced GI Hovering Accuracy Tilt Angle	PS Vertical: 0.5 m, Horizontal: 2.5 m ~ 35° 20 m/s	-	
		range(5km) Full mobile a Enhanced GI Hovering Accuracy Tilt Angle Speed	PS Vertical: 0.5 m, Horizontal: 2.5 m ~ 35° 20 m/s	-	
		range(5km) Full mobile a Enhanced GI Hovering Accuracy Tilt Angle Speed Transmission	PS Vertical: 0.5 m, Horizontal: 2.5 m ~ 35° 20 m/s		
		range(5km) Full mobile a Enhanced GI Hovering Accuracy Tilt Angle Speed Transmission Distance	app supportPSVertical: $0.5 \text{ m}$ , Horizontal: $2.5 \text{ m}$ $\sim 35^{\circ}$ $20 \text{ m/s}$ $n$ $\sim 5 \text{km}$		
		range(5km) Full mobile a Enhanced GI Hovering Accuracy Tilt Angle Speed Transmission Distance Video	app supportPSVertical: $0.5 \text{ m}$ , Horizontal: $2.5 \text{ m}$ $\sim 35^{\circ}$ $20 \text{ m/s}$ $n$ $\sim 5 \text{km}$		
		range(5km) Full mobile a Enhanced GI Hovering Accuracy Tilt Angle Speed Transmission Distance Video Output Power Supply	app support   PS   Vertical: 0.5 m, Horizontal:   2.5 m   ~ 35°   20 m/s   n   ~ 5km   USB, Mini-HDMI   Built-in battery		
		range(5km) Full mobile a Enhanced GI Hovering Accuracy Tilt Angle Speed Transmission Distance Video Output Power Supply Output	PS Vertical: 0.5 m, Horizontal: 2.5 m ~ 35° 20 m/s n ~ 5km USB, Mini-HDMI		
	Remote controller	range(5km) Full mobile a Enhanced GI Hovering Accuracy Tilt Angle Speed Transmission Distance Video Output Power Supply Output Power	app support   PS   Vertical: 0.5 m, Horizontal:   2.5 m   ~ 35°   20 m/s   n   ~ 5km   USB, Mini-HDMI   Built-in battery   9 W		
		range(5km) Full mobile a Enhanced GI Hovering Accuracy Tilt Angle Speed Transmission Distance Video Output Power Supply Output	app support   PS   Vertical: 0.5 m, Horizontal:   2.5 m   ~ 35°   20 m/s   n   ~ 5km   USB, Mini-HDMI   Built-in battery		

	Guidance	concore	ultrasonic sensors, images		
	Guidance	sensors	and IMU readings.		
			0~16 m/s		
		Valasita	0~10 III/S		
		Velocity Detection			
		Range			
		Velocity	0.04 m/s		
		Detection			
		Accuracy			
		Effective	0.20 m ~ 20 m		
		Sensor			
		Range			
	Warranty	Minimum on	e year		
	User manual and product	Required			
	documentation				
	Additional Requirement	All relevant t	echnical brochures should be		
		forwarded with	th Tender		
		Documents.	Comprehensive user guide,		
		Complete tra	ck record on where		
		the supplier h	as supplied the product,		
			ation letter about the product		
			itutions where the supplier has		
			product. Manufactures'		
			should be submitted with the		
		tender docum	nents		
2.48	humanoid robot			01	
	Model	Specify			
	Country of Origin	Specify			
	Denerintien	T. 1 1	id shape that enables it to move		
1	Description	It has a humano	ond shape that enables it to move		
	Description		bid shape that enables it to move world around it. It has at least		
	Description	and adapt to the	world around it. It has at least		
	Description	and adapt to the	e world around it. It has at least tural interaction. It is designed		
	Motherboard	and adapt to the 7 sensors for na	e world around it. It has at least tural interaction. It is designed		
		and adapt to the 7 sensors for na to be personalis CPU	e world around it. It has at least atural interaction. It is designed ed. ATOM Z350 1.6 GHz or better		
		and adapt to the 7 sensors for na to be personalis	e world around it. It has at least tural interaction. It is designed ed.		
		and adapt to the 7 sensors for na to be personalis CPU RAM	e world around it. It has at least itural interaction. It is designed ed. ATOM Z350 1.6 GHz or better >= 1GB		
		and adapt to the 7 sensors for na to be personalis CPU RAM Flash	e world around it. It has at least atural interaction. It is designed ed. ATOM Z350 1.6 GHz or better		
		and adapt to the 7 sensors for na to be personalis CPU RAM Flash memory	e world around it. It has at least tural interaction. It is designed ed. ATOM Z350 1.6 GHz or better >= 1GB >= 2GB		
	Motherboard	and adapt to the 7 sensors for na to be personalis CPU RAM Flash memory Micro SDHC	e world around it. It has at least tural interaction. It is designed ed. ATOM Z350 1.6 GHz or better >= 1GB >= 2GB >=8GB		
		and adapt to the 7 sensors for na to be personalis CPU RAM Flash memory Micro SDHC Force Sensitive	e world around it. It has at least itural interaction. It is designed ed. ATOM Z350 1.6 GHz or better >= 1GB >= 2GB >=8GB Resistors, Inertial		
	Motherboard	and adapt to the 7 sensors for na to be personalis CPU RAM Flash memory Micro SDHC Force Sensitive unit (3-axis Gyr	e world around it. It has at least tural interaction. It is designed ed. ATOM Z350 1.6 GHz or better >= 1GB >= 2GB >=8GB Resistors, Inertial rometers with an		
	Motherboard	and adapt to the 7 sensors for na to be personalis CPU RAM Flash memory Micro SDHC Force Sensitive unit (3-axis Gyr angular speed of	e world around it. It has at least tural interaction. It is designed ed. ATOM Z350 1.6 GHz or better >= 1GB >= 2GB >=8GB Resistors, Inertial rometers with an f ~500°/s),		
	Motherboard Sensors	and adapt to the 7 sensors for na to be personalis CPU RAM Flash memory Micro SDHC Force Sensitive unit (3-axis Gyr angular speed of Sonars, Joint po	e world around it. It has at least tural interaction. It is designed ed. ATOM Z350 1.6 GHz or better >= 1GB >= 2GB >=8GB Resistors, Inertial rometers with an f ~500°/s) , osition sensors		
	Motherboard	and adapt to the 7 sensors for na to be personalis CPU RAM Flash memory Micro SDHC Force Sensitive unit (3-axis Gyr angular speed of Sonars, Joint por	e world around it. It has at least tural interaction. It is designed ed. ATOM Z350 1.6 GHz or better >= 1GB >= 2GB >=8GB Resistors, Inertial rometers with an $f \sim 500^{\circ}/s)$ , position sensors thest Button, Tactile		
	Motherboard Sensors	and adapt to the 7 sensors for na to be personalis CPU RAM Flash memory Micro SDHC Force Sensitive unit (3-axis Gyr angular speed of Sonars, Joint po Tactile Head, C Hands, Feet Bu	e world around it. It has at least tural interaction. It is designed ed. ATOM Z350 1.6 GHz or better >= 1GB >= 2GB >=8GB Resistors, Inertial rometers with an f ~500°/s) , osition sensors hest Button, Tactile mpers etc		
	Motherboard Sensors	and adapt to the 7 sensors for na to be personalis CPU RAM Flash memory Micro SDHC Force Sensitive unit (3-axis Gyr angular speed of Sonars, Joint po Tactile Head, C Hands, Feet Bu at least two can	e world around it. It has at least tural interaction. It is designed ed. ATOM Z350 1.6 GHz or better >= 1GB >= 2GB >=8GB Resistors, Inertial cometers with an f ~500°/s) , position sensors thest Button, Tactile mpers etc heras with high resolution to		
	Motherboard Sensors Contact and tactile sensors	and adapt to the 7 sensors for na to be personalis CPU RAM Flash memory Micro SDHC Force Sensitive unit (3-axis Gyr angular speed of Sonars, Joint po Tactile Head, C Hands, Feet Bu	e world around it. It has at least tural interaction. It is designed ed. ATOM Z350 1.6 GHz or better >= 1GB >= 2GB >=8GB Resistors, Inertial cometers with an f ~500°/s) , position sensors thest Button, Tactile mpers etc heras with high resolution to		
	Motherboard Sensors Contact and tactile sensors	and adapt to the 7 sensors for na to be personalis CPU RAM Flash memory Micro SDHC Force Sensitive unit (3-axis Gyr angular speed of Sonars, Joint po Tactile Head, C Hands, Feet Bu at least two can	e world around it. It has at least tural interaction. It is designed ed. ATOM Z350 1.6 GHz or better >= 1GB >= 2GB >=8GB Resistors, Inertial rometers with an f ~500°/s) , position sensors thest Button, Tactile mpers etc heras with high resolution to es and objects		
	Motherboard Sensors Contact and tactile sensors Connectivity	and adapt to the 7 sensors for na to be personalis CPU RAM Flash memory Micro SDHC Force Sensitive unit (3-axis Gyr angular speed of Sonars, Joint po Tactile Head, C Hands, Feet Bu at least two can recognise shape Ethernet, WiFi,	e world around it. It has at least tural interaction. It is designed ed. ATOM Z350 1.6 GHz or better >= 1GB >= 2GB >=8GB Resistors, Inertial rometers with an f ~500°/s) , position sensors thest Button, Tactile mpers etc heras with high resolution to es and objects		
	Motherboard Sensors Contact and tactile sensors Connectivity Connecting	and adapt to the 7 sensors for na to be personalis CPU RAM Flash memory Micro SDHC Force Sensitive unit (3-axis Gy angular speed of Sonars, Joint po Tactile Head, C Hands, Feet Bu at least two can recognise shape Ethernet, WiFi, Loudspeakers, p	e world around it. It has at least tural interaction. It is designed ed. ATOM Z350 1.6 GHz or better >= 1GB >= 2GB = 2GB Resistors, Inertial rometers with an f ~500°/s) , position sensors thest Button, Tactile mpers etc neras with high resolution to es and objects USB microphones, video		
	Motherboard Sensors Contact and tactile sensors Connectivity Connecting Interactions	and adapt to the 7 sensors for na to be personalis CPU RAM Flash memory Micro SDHC Force Sensitive unit (3-axis Gyr angular speed of Sonars, Joint po Tactile Head, C Hands, Feet Bu at least two can recognise shape Ethernet, WiFi,	e world around it. It has at least tural interaction. It is designed ed. ATOM Z350 1.6 GHz or better >= 1GB >= 2GB = 2GB Resistors, Inertial rometers with an f ~500°/s) , position sensors thest Button, Tactile mpers etc neras with high resolution to es and objects USB microphones, video		
	Motherboard Sensors Contact and tactile sensors Connectivity Connecting	and adapt to the 7 sensors for na to be personalis CPU RAM Flash memory Micro SDHC Force Sensitive unit (3-axis Gyr angular speed of Sonars, Joint po Tactile Head, C Hands, Feet Bu at least two can recognise shape Ethernet, WiFi, Loudspeakers, r cameras, LEDs Nominal	e world around it. It has at least tural interaction. It is designed ed. ATOM Z350 1.6 GHz or better >= 1GB >= 2GB >=8GB Resistors, Inertial rometers with an f ~500°/s) , osition sensors thest Button, Tactile mpers etc neras with high resolution to es and objects USB microphones, video 21.6 V / 2.25 Ah		
	Motherboard Sensors Contact and tactile sensors Connectivity Connecting Interactions	and adapt to the 7 sensors for na to be personalis CPU RAM Flash memory Micro SDHC Force Sensitive unit (3-axis Gyr angular speed of Sonars, Joint por Tactile Head, C Hands, Feet Bu at least two can recognise shape Ethernet, WiFi, Loudspeakers, r cameras, LEDs	e world around it. It has at least tural interaction. It is designed ed. ATOM Z350 1.6 GHz or better >= 1GB >= 2GB >=8GB Resistors, Inertial rometers with an f ~500°/s) , osition sensors thest Button, Tactile mpers etc neras with high resolution to es and objects USB microphones, video 21.6 V / 2.25 Ah		

		dur	ation			
			conomy	~ 1hr use		
	Warranty	_	ears			
	User manual and product	Required				
	documentation	Rec	lunca			
	Additional Requirement	Δ11	relevant techr	ical brochures should be		
	Additional Requirement		warded with T			
				prehensive user guide,		
				ecord on where		
			1	upplied the product,		
				letter about the product from		
				here the supplier has supplied		
				ufactures' authorization		
				ed with the tender documents		
2.49	Three phase synchronous ge				02	
	Model		Specify			
	Country of Origin		Specify			
	salient pole rotor		Required			
	Motor/ Generator dual mode		Required			
	Nominal voltage		230 V (phase	2)		
	Nominal frequency		50 Hz	·		
	Excitation voltage		220 V DC			
	Nominal speed		~ 3000 rpm			
	Nominal power		-	erator) / 1 kW (motor)		
			The same siz	ze or a different size of this		
			series alternator can be operated in			
	Parallel operation			tive power sharing conform		
			<b>▲</b>	s and technical conditions		
				led excitation with thyristor		
	Excitation System		voltage regu			
				ing of motor and generator		
	Required Accessories		shafts	6 6		
	Warranty		Minimum or	ne year		
	User manual and product		Required	•		
	documentation		1			
	Additional Requirement		All relevant	technical brochures should be		
			forwarded w	ith Tender		
			Documents.	Comprehensive user guide,		
				ick record on where		
			-	has supplied the product,		
				ation letter about the		
			product from	the institutions where the		
				supplied the product.		
			Manufacture	s' authorization should be		
			submitted wi	th the tender documents		
2.50	Three phase induction moto	r			02	
	Model		Specify			
	Country of Origin		Specify			
	Output Power		175 W			
	Stator Voltage (3 phase)		240/415 V -	50 Hz		
	Rotor Voltage (3 phase)		120/208 V -	50 Hz		
	Full Load Speed		1315 rpm			

	Full load current	0.48 A		
		Should permit delta or star configuration		
	Essentate			
	Faceplate	Rotor winding terminals should be		
		brought out to the faceplate		
		Wound rotor induction motor, phase		
	Boggible Operations	shifter, Single phase variable coupling		
	Possible Operations	motor, Asynchronous generator, frequency		
		converter		
	Warranty	Minimum one year		
	User manual and product	Required		
	documentation			
	Additional Requirement	All relevant technical brochures should be		
		forwarded with Tender		
		Documents. Comprehensive user guide,		
		Complete track record on where		
		the supplier has supplied the product,		
		Recommendation letter about the		
		product from the institutions where the		
		supplier has supplied the		
		product. Manufactures' authorization		
		should be submitted with the		
		tender documents		
2.51	Single phase motor		02	
	Model	Specify		
	Country of Origin	Specify		
	Motor/ Generator dual mode	Required		
	Nominal voltage	220 V		
	Excitation voltage	220 V DC		
	Nominal speed	3000 rpm		
	Nominal power	2 kW		
	Warranty	Minimum one year		
	User manual and product	Required		
	documentation			
	Additional Requirement	All relevant technical brochures should be		
		forwarded with Tender		
		Documents. Comprehensive user guide,		
		Complete track record on where		
		the supplier has supplied the product, Recommendation letter about the		
		product from the institutions where the		
		supplier has supplied the		
		product. Manufactures' authorization should be submitted with the		
		tender documents		
2.52	Synchronizing module		03	
		Specify	- 05	
2.32	Model			
2.32	Model			
2.32	Country of Origin	Specify		
2.32	Country of Origin Power supply			
	Country of Origin	Specify		

	Ambient temperature (operat	ion) $\sim 20$ to 70 °C	[ [ [	
	Ambient temperature (operat	RH 95 %, non-condensing		
<u> </u>	Voltage AC input	480Vac true RMS		
	Accuracy	Class 1		
	Current AC input	1A or 5A true RMS, isolated		
	Accuracy Iac	Class 1		
	Discrete inputs (isolated)			
	· · · · · · · · · · · · · · · · · · ·	Range: 12/24Vdc (6 to 32Vdc)		
	Relay outputs	Relays, dry contacts         2A@24Vdc and 250Vac		
	Load (resistive)	2A@24 v dc and 250 v ac 0/4 to 20mA		
	Analog inputs			
	Analog outputs (isolated)	0/4 to 20 mA (freely scalable)		
	Housing			
	Front panel mounting	Plastic housing		
	Sealing (front/back)	IP42/IP21		
	Warranty	Minimum one year		
	User manual and product documentation	Required		
2.52	Additional Requirement	All relevant technical brochures should be forwarded with Tender Documents. Comprehensive user guide, Complete track record on where the supplier has supplied the product, Recommendation letter about the product from the institutions where the supplier has supplied the product. Manufactures' authorization should be submitted with the tender documents	0.1	
2.53	Optical fibre training kit Model	Cassify	01	
	Country of Origin	Specify Specify		
	Country of Origin	Specify		
<u> </u>				
	Fibre cleaver			
	Fibre cleaverCladding diameter	125µm		
	Fibre cleaverCladding diameterFiber count/Size	125μm         Single fiber (for fiber coating ø0.25~ø0.9mm)		
	Fibre cleaverCladding diameter	125μm         Single fiber (for fiber coating ø0.25~ø0.9mm)         5~20mm (for fiber coating ø0.25mm)		
	Fibre cleaverCladding diameterFiber count/SizeCleave length	125μmSingle fiber (for fiber coating ø0.25~ø0.9mm)5~20mm (for fiber coating ø0.25mm)10~20mm (for fiber coating ø0.9mm)		
	Fibre cleaverCladding diameterFiber count/SizeCleave lengthOff-cut collector	125μmSingle fiber (for fiber coating Ø0.25~Ø0.9mm)5~20mm (for fiber coating Ø0.25mm)10~20mm (for fiber coating Ø0.9mm)Required		
	Fibre cleaverCladding diameterFiber count/SizeCleave lengthOff-cut collectorAutomatic blade rotation	125μmSingle fiber (for fiber coating Ø0.25~Ø0.9mm)5~20mm (for fiber coating Ø0.25mm)10~20mm (for fiber coating Ø0.9mm)RequiredRequired		
	Fibre cleaverCladding diameterFiber count/SizeCleave lengthOff-cut collectorAutomatic blade rotationBlade life	125μmSingle fiber (for fiber coating Ø0.25~Ø0.9mm)5~20mm (for fiber coating Ø0.25mm)10~20mm (for fiber coating Ø0.9mm)Required		
	Fibre cleaverCladding diameterFiber count/SizeCleave lengthOff-cut collectorAutomatic blade rotationBlade lifeFusion splicer	125μm         Single fiber (for fiber coating ø0.25~ø0.9mm)         5~20mm (for fiber coating ø0.25mm)         10~20mm (for fiber coating ø0.9mm)         Required         Required         >= 60,000 fibers		
	Fibre cleaverCladding diameterFiber count/SizeCleave lengthOff-cut collectorAutomatic blade rotationBlade lifeFusion splicerMaterial	125μm         Single fiber (for fiber coating ø0.25~ø0.9mm)         5~20mm (for fiber coating ø0.25mm)         10~20mm (for fiber coating ø0.9mm)         Required         Required         >= 60,000 fibers         Silica glass		
	Fibre cleaverCladding diameterFiber count/SizeCleave lengthOff-cut collectorAutomatic blade rotationBlade lifeFusion splicer	125μm         Single fiber (for fiber coating ø0.25~ø0.9mm)         5~20mm (for fiber coating ø0.25mm)         10~20mm (for fiber coating ø0.9mm)         Required         Required         >= 60,000 fibers         Silica glass         Single/SMF(G.652), MMF(G.651),         DSF(G.653), NZDSF(G.655), BIF(G.657),         EDF		
	Fibre cleaverCladding diameterFiber count/SizeCleave lengthOff-cut collectorAutomatic blade rotationBlade lifeFusion splicerMaterial	125μm         Single fiber (for fiber coating ø0.25~ø0.9mm)         5~20mm (for fiber coating ø0.25mm)         10~20mm (for fiber coating ø0.9mm)         Required         Required         >= 60,000 fibers         Silica glass         Single/SMF(G.652), MMF(G.651),         DSF(G.653), NZDSF(G.655), BIF(G.657),		
	Fibre cleaverCladding diameterFiber count/SizeCleave lengthOff-cut collectorAutomatic blade rotationBlade lifeFusion splicerMaterialFiber count / Profile typesFiber diameter	125µmSingle fiber (for fiber coating $\emptyset 0.25 \sim \emptyset 0.9 \text{mm}$ )5~20mm (for fiber coating $\emptyset 0.25 \text{mm}$ )10~20mm (for fiber coating $\emptyset 0.9 \text{mm}$ )RequiredRequired>= 60,000 fibersSilica glassSingle/SMF(G.652), MMF(G.651),DSF(G.653), NZDSF(G.655), BIF(G.657),EDFCladding diameter: ~80 - 150 um, Coatingdiameter : ~100 - 1,000 um		
	Fibre cleaverCladding diameterFiber count/SizeCleave lengthOff-cut collectorAutomatic blade rotationBlade lifeFusion splicerMaterialFiber count / Profile types	125µmSingle fiber (for fiber coating $\emptyset 0.25 \sim \emptyset 0.9$ mm)5~20mm (for fiber coating $\emptyset 0.25$ mm)10~20mm (for fiber coating $\emptyset 0.9$ mm)RequiredRequired>= 60,000 fibersSilica glassSingle/SMF(G.652), MMF(G.651),DSF(G.653), NZDSF(G.655), BIF(G.657),EDFCladding diameter: ~80 - 150um, Coatingdiameter : ~100 - 1,000um5 - 16mm with coating clampSMF : ~0.01dB, MMF : ~0.01dB, DSF :~		
	Fibre cleaverCladding diameterFiber count/SizeCleave lengthOff-cut collectorAutomatic blade rotationBlade lifeFusion splicerMaterialFiber count / Profile typesFiber diameterCleave lengthSplice loss (typical)	125µmSingle fiber (for fiber coating $\emptyset 0.25 \sim \emptyset 0.9 \text{mm}$ )5~20mm (for fiber coating $\emptyset 0.25 \text{mm}$ )10~20mm (for fiber coating $\emptyset 0.9 \text{mm}$ )RequiredRequired>= 60,000 fibersSilica glassSingle/SMF(G.652), MMF(G.651), DSF(G.653), NZDSF(G.655), BIF(G.657), EDFCladding diameter: ~80 - 150um, Coating diameter : ~100 - 1,000um5 - 16mm with coating clampSMF : ~0.01dB, MMF : ~0.01dB, DSF :~ 0.05dB, NZDSF : ~0.03dB		
	Fibre cleaverCladding diameterFiber count/SizeCleave lengthOff-cut collectorAutomatic blade rotationBlade lifeFusion splicerMaterialFiber count / Profile typesFiber diameterCleave lengthSplice loss (typical)Return loss (typical)	125µmSingle fiber (for fiber coating $\emptyset 0.25 \sim \emptyset 0.9$ mm)5~20mm (for fiber coating $\emptyset 0.25$ mm)10~20mm (for fiber coating $\emptyset 0.9$ mm)RequiredRequired>= 60,000 fibersSilica glassSingle/SMF(G.652), MMF(G.651), DSF(G.653), NZDSF(G.655), BIF(G.657), EDFCladding diameter: ~80 - 150um, Coating diameter : ~100 - 1,000um5 - 16mm with coating clampSMF : ~0.01dB, MMF : ~0.01dB, DSF :~ 0.05dB, NZDSF : ~0.03dB60dB or greater		
	Fibre cleaverCladding diameterFiber count/SizeCleave lengthOff-cut collectorAutomatic blade rotationBlade lifeFusion splicerMaterialFiber count / Profile typesFiber diameterCleave lengthSplice loss (typical)	125µmSingle fiber (for fiber coating $\emptyset 0.25 \sim \emptyset 0.9 \text{mm}$ )5~20mm (for fiber coating $\emptyset 0.25 \text{mm}$ )10~20mm (for fiber coating $\emptyset 0.9 \text{mm}$ )RequiredRequired>= 60,000 fibersSilica glassSingle/SMF(G.652), MMF(G.651), DSF(G.653), NZDSF(G.655), BIF(G.657), EDFCladding diameter: ~80 - 150um, Coating diameter : ~100 - 1,000um5 - 16mm with coating clampSMF : ~0.01dB, MMF : ~0.01dB, DSF :~ 0.05dB, NZDSF : ~0.03dB		

	battery full charge"			
	Fiber view & magnification	2 CMOS cameras preferred,		
		$\sim$ 52OX (zoom : 7OOX) for X or Y single		
		axis view,		
		~88X for both X & Y dual axis view		
	Splice programs	$Max. \ge 300$		
		$Max. \ge 100$		
	Heating programs	>= 200 images / 10,000 splice data internal		
	Splice image capture / splice data storage			
	uata storage	memory, >= 50,200/20,000 (with 8GB SD card)		
	Attenuation enliging	>= 50,200/20,000 (with 80B SD card) O.1dB to 15dB in O.1dB increments		
	Attenuation splicing			
	Universal clamps	Required,( 250um, 900um tight & loose		
	Devenible spating slowing	buffer fiber)		
	Reversible coating clamps	Required		
	Automatic fiber	Required		
	identification	Descripted		
	USB port	Required		
	Battery pack and charger	Required		
	Power Supply	230V, 50 Hz		
	Required Accessories	AC adapter (1), AC power cord(1), Cooling		
		tray(1), Spare electrode(1), Carrying case with		
		worktable(1), Hand strap (1), USB Cable (1),		
		V-groove cleaning brush (1), Loose tube cutter		
		(1), Alcohol dispenser (1), Fibre protection		
		sleeve(60mm,40mm,61mm) (100 each), Jacket		
		Remover(1), Hot Jacket Remover(1), Handheld		
		fiber cleaver (1), Cable stripper(1), Fiber		
		Holders(For 0.25mm single fiber, 0.9mmsingle		
		fiber, 0.9mm loose buffered single fiber, fro		
		drop/indoor cabl-typ.2.0x3.1 or 2.6mm, indoor		
		cable-typ.1.6x2.0mm , 3mm cable)		
	Warranty	Minimum one year		
	User manual and product	Required		
	documentation			
	Additional Requirement	All relevant technical brochures should be	T	
		forwarded with Tender		
		Documents. Comprehensive user guide,		
		Complete track record on where the supplier		
		has supplied the product, Recommendation		
		letter about the product from the institutions		
		where the supplier has supplied the product.		
		Manufactures' authorization should be		
		submitted with the tender documents		
2.54	UV Laser based PCB machin		01	
	Purpose	Multipurpose rapid prototyping (ex:		
		structuring, engraving, and depaneling in		
		one pass)		
	Technical specifications			
	Model	Specify		
	Country of Origin	Specify		
	Laser	Ultraviolet		
	accuracy	2 um		
	· · · ·			

[	Laser power	~5W		
	diameter of focused LASER beam	~20 um		
	LASER wavelength	355 nm		
	LASER pulse frequency	~25 - 200 kHz		
-	allowable PCB board size	L 230 mm W 300 mm H 10 mm		
	Software	Required (at least compatible with		
	Software	Windows 7 and above)		
		Efficient CAM software which can import		
		existing CAD data and converts them into		
		laser process.		
	Additional tools			
	Dust extraction unit	Required (compatible unit)		
	Compressor system compressed	Required (compatible unit)		
	air supply			
-	Adjustment tool	Required (compatible unit)		
	Measuring microscope	Required (~x60)		
	Warranty	Minimum three year		
	User manual and product	Required		
	documentation	1		
	Additional Requirement	All relevant technical brochures should be		
		forwarded with Tender		
		Documents. Comprehensive user guide,		
		Complete track record on where		
		the supplier has supplied the product,		
		Recommendation letter about the		
		product from the institutions where the		
		supplier has supplied the product.		
		supplier has supplied the product. Manufactures' authorization should be		
	7.0	supplier has supplied the product.		
2.55	Reflow oven	supplier has supplied the product. Manufactures' authorization should be submitted with the tender documents	01	
2.55	Reflow oven Purpose	supplier has supplied the product. Manufactures' authorization should be submitted with the tender documents RoHS compliant lead-free reflow	01	
2.55	Purpose	supplier has supplied the product. Manufactures' authorization should be submitted with the tender documents	01	
2.55	Purpose Technical specifications	supplier has supplied the product. Manufactures' authorization should be submitted with the tender documents RoHS compliant lead-free reflow soldering	01	
2.55	Purpose Technical specifications Model	supplier has supplied the product. Manufactures' authorization should be submitted with the tender documents RoHS compliant lead-free reflow soldering Specify	01	
2.55	Purpose Technical specifications Model Country of Origin	supplier has supplied the product. Manufactures' authorization should be submitted with the tender documents RoHS compliant lead-free reflow soldering Specify Specify	01	
2.55	Purpose Technical specifications Model Country of Origin allowable PCB board size	supplier has supplied the product. Manufactures' authorization should be submitted with the tender documents RoHS compliant lead-free reflow soldering Specify Specify ~ L 230mm W 300mm	01	
2.55	Purpose Technical specifications Model Country of Origin allowable PCB board size maximum preheat temperature/	supplier has supplied the product. Manufactures' authorization should be submitted with the tender documents RoHS compliant lead-free reflow soldering Specify Specify	01	
2.55	Purpose Technical specifications Model Country of Origin allowable PCB board size maximum preheat temperature/ time	supplier has supplied the product. Manufactures' authorization should be submitted with the tender documents RoHS compliant lead-free reflow soldering Specify Specify ~ L 230mm W 300mm 220 deg. C / ~999 s	01	
2.55	Purpose Technical specifications Model Country of Origin allowable PCB board size maximum preheat temperature/ time maximum reflow	supplier has supplied the product. Manufactures' authorization should be submitted with the tender documents RoHS compliant lead-free reflow soldering Specify Specify ~ L 230mm W 300mm	01	
2.55	Purpose Technical specifications Model Country of Origin allowable PCB board size maximum preheat temperature/ time maximum reflow temperature/time	supplier has supplied the product. Manufactures' authorization should be submitted with the tender documents RoHS compliant lead-free reflow soldering Specify Specify ~ L 230mm W 300mm 220 deg. C / ~999 s 320 deg. C/ ~600 s	01	
2.55	Purpose Technical specifications Model Country of Origin allowable PCB board size maximum preheat temperature/ time maximum reflow temperature/time Long thermal treatment:	supplier has supplied the product. Manufactures' authorization should be submitted with the tender documents RoHS compliant lead-free reflow soldering Specify Specify ~ L 230mm W 300mm 220 deg. C / ~999 s	01	
2.55	Purpose Technical specifications Model Country of Origin allowable PCB board size maximum preheat temperature/ time maximum reflow temperature/time Long thermal treatment: temperature/time	supplier has supplied the product. Manufactures' authorization should be submitted with the tender documents RoHS compliant lead-free reflow soldering Specify Specify ~ L 230mm W 300mm 220 deg. C / ~999 s 320 deg. C / ~600 s 220 deg. C / ~64 hours	01	
2.55	Purpose Technical specifications Model Country of Origin allowable PCB board size maximum preheat temperature/ time maximum reflow temperature/time Long thermal treatment: temperature/time temperature stabilizing time	supplier has supplied the product. Manufactures' authorization should be submitted with the tender documents RoHS compliant lead-free reflow soldering Specify Specify ~ L 230mm W 300mm 220 deg. C / ~999 s 320 deg. C / ~600 s 220 deg. C / ~64 hours less than 5 min.	01	
2.55	Purpose Technical specifications Model Country of Origin allowable PCB board size maximum preheat temperature/ time maximum reflow temperature/time Long thermal treatment: temperature/time temperature stabilizing time PCB cooling method	supplier has supplied the product. Manufactures' authorization should be submitted with the tender documents RoHS compliant lead-free reflow soldering Specify Specify ~ L 230mm W 300mm 220 deg. C / ~999 s 320 deg. C / ~600 s 220 deg. C / ~64 hours less than 5 min. Required: Two fans with adjustable speed	01	
2.55	Purpose Technical specifications Model Country of Origin allowable PCB board size maximum preheat temperature/ time maximum reflow temperature/time Long thermal treatment: temperature/time temperature stabilizing time PCB cooling method Power Supply	supplier has supplied the product. Manufactures' authorization should be submitted with the tender documents RoHS compliant lead-free reflow soldering Specify > L 230mm W 300mm 220 deg. C / ~999 s 320 deg. C / ~600 s 220 deg. C / ~64 hours less than 5 min. Required: Two fans with adjustable speed 230V, 50Hz	01	
	Purpose Technical specifications Model Country of Origin allowable PCB board size maximum preheat temperature/ time maximum reflow temperature/time Long thermal treatment: temperature/time temperature stabilizing time PCB cooling method Power Supply Max. Power consumption	supplier has supplied the product. Manufactures' authorization should be submitted with the tender documents RoHS compliant lead-free reflow soldering Specify Specify ~ L 230mm W 300mm 220 deg. C / ~999 s 320 deg. C / ~600 s 220 deg. C / ~64 hours less than 5 min. Required: Two fans with adjustable speed 230V, 50Hz <= 3.2 kW		
	Purpose Technical specifications Model Country of Origin allowable PCB board size maximum preheat temperature/ time maximum reflow temperature/time Long thermal treatment: temperature/time temperature stabilizing time PCB cooling method Power Supply Max. Power consumption Operating conditions	supplier has supplied the product. Manufactures' authorization should be submitted with the tender documents RoHS compliant lead-free reflow soldering Specify > L 230mm W 300mm 220 deg. C / ~999 s 320 deg. C / ~600 s 220 deg. C / ~600 s less than 5 min. Required: Two fans with adjustable speed 230V, 50Hz <= 3.2 kW Temp ~15-30 deg.C, Humidity:~ 30-80%	01	
	Purpose Technical specifications Model Country of Origin allowable PCB board size maximum preheat temperature/ time maximum reflow temperature/time Long thermal treatment: temperature/time temperature stabilizing time PCB cooling method Power Supply Max. Power consumption	supplier has supplied the product. Manufactures' authorization should be submitted with the tender documents RoHS compliant lead-free reflow soldering Specify ~ L 230mm W 300mm 220 deg. C / ~999 s 320 deg. C / ~600 s 220 deg. C / ~600 s less than 5 min. Required: Two fans with adjustable speed 230V, 50Hz <= 3.2 kW Temp ~15-30 deg.C, Humidity:~ 30-80% Required (at least compatible with	01	
	Purpose Technical specifications Model Country of Origin allowable PCB board size maximum preheat temperature/ time maximum reflow temperature/time Long thermal treatment: temperature/time temperature stabilizing time PCB cooling method Power Supply Max. Power consumption Operating conditions	supplier has supplied the product. Manufactures' authorization should be submitted with the tender documents RoHS compliant lead-free reflow soldering Specify > L 230mm W 300mm 220 deg. C / ~999 s 320 deg. C / ~999 s 320 deg. C / ~600 s 220 deg. C / ~64 hours less than 5 min. Required: Two fans with adjustable speed 230V, 50Hz <= 3.2 kW Temp ~15-30 deg.C, Humidity:~ 30-80% Required (at least compatible with Windows 7 and above)		
	Purpose Technical specifications Model Country of Origin allowable PCB board size maximum preheat temperature/ time maximum reflow temperature/time Long thermal treatment: temperature/time temperature stabilizing time PCB cooling method Power Supply Max. Power consumption Operating conditions	supplier has supplied the product. Manufactures' authorization should be submitted with the tender documents RoHS compliant lead-free reflow soldering Specify ~ L 230mm W 300mm 220 deg. C / ~999 s 320 deg. C / ~600 s 220 deg. C / ~600 s less than 5 min. Required: Two fans with adjustable speed 230V, 50Hz <= 3.2 kW Temp ~15-30 deg.C, Humidity:~ 30-80% Required (at least compatible with	01	
	Purpose Technical specifications Model Country of Origin allowable PCB board size maximum preheat temperature/ time maximum reflow temperature/time Long thermal treatment: temperature/time temperature stabilizing time PCB cooling method Power Supply Max. Power consumption Operating conditions	supplier has supplied the product. Manufactures' authorization should be submitted with the tender documents RoHS compliant lead-free reflow soldering Specify > L 230mm W 300mm 220 deg. C / ~999 s 320 deg. C / ~999 s 320 deg. C / ~600 s 220 deg. C / ~64 hours less than 5 min. Required: Two fans with adjustable speed 230V, 50Hz <= 3.2 kW Temp ~15-30 deg.C, Humidity:~ 30-80% Required (at least compatible with Windows 7 and above)		

	Required accessories	Temperature indicating device		
	Warranty	Minimum one year		
	User manual and product	Required		
	documentation			
	Additional Requirement	All relevant technical brochures should be		
	1	forwarded with Tender		
		Documents. Comprehensive user guide,		
		Complete track record on where		
		the supplier has supplied the product,		
		Recommendation letter about the		
		product from the institutions where the		
		supplier has supplied the		
		product. Manufactures' authorization		
		should be submitted with the		
		tender documents		
2.56	Altera FPGA Starter Developme		20	
	Model	Specify		
	Country of Origin	Specify		
	Configuration	USB-BlasterTM download cable		
		(embedded)		
		EPCS4 serial configuration device		
	Memory	8-Mbyte SDRAM		
		512-Kb SRAM		
		1- to 4-Mbyte flash		
	Clocking	SMA connector (external clock input)		
	Audio	24-bit coder/decoder (CODEC)		
	Switches and indicators	Ten switch and four push buttons		
		Four, 7-segment displays		
		Ten red and eight green LEDs		
	Connectors	VGA, RS-232, and PS/2 ports		
		Two 40-pin expansion ports		
		SD/MMC socket		
	Cables/power	USB cable		
		External power supply		
	HDL design software	Quartus II		
	Other required accessories	Reference guide, User manual, Reference		
		designs and demo for FPGA Starter Kit		
	Warranty	Minimum one year		
	User manual and product	Required		
	documentation			
	Additional Requirement	All relevant technical brochures should be		
		forwarded with Tender		
		Documents. Comprehensive user guide,		
		Complete track record on where		
		the supplier has supplied the product,		
		Recommendation letter about the		
		product from the institutions where the		
		supplier has supplied the product.		
		Manufactures' authorization should be		
		submitted with the		
		tender documents		

2.57	Signal Generators		10	
	Model	Specify		
	Country of Origin	Specify		
	Frequency Range	0.5Hz ~ 5MHz		
	Amplitude	$>10$ Vpp (into 50 $\Omega$ load)		
	Impedance	50Ω±10%		
	Attenuator	-20dB±1dBx2		
	DC Offset	$<-5V \sim >5V$ (into 50 $\Omega$ load)		
	Duty Control	80% ~ 20%, maximum 1MHz		
		(continuously adjustable)		
	Sine wave			
	Distortion	<1%, 0.5Hz ~ 100kHz		
	THD (Total Harmonic Distortion)	< 30dB, below fundamental in all ranges,		
		from Max to 1/10 level		
	Flatness	< 0.3dB, below 500kHz		
		< 1dB, below 5MHz		
	Triangle Wave			
	Linear	> 98%, 0.5Hz ~ 100kHz		
		> 95%, 100kHz ~ 5MHz		
	SQUARE WAVE			
	Symmetry Diamon Diamon	±2%, 1Hz ~ 100kHz		
	Rise or Fall Time	$<$ 50nS at maximum output (into 50 $\Omega$		
	CMOS OUTPUT	load)		
	Level	4Vpp±1Vpp ~ 14.5Vpp±0.5Vpp		
	Level	adjustable		
	Rise or Fall Time	< 120nS		
	TTL OUTPUT	< 120115		
	Level			
		> 3Vpp		
	Fan Out	20 TTL load		
	Rise or Fall Time	< 25nS		
	VCF (Voltage Controlled Freque			
	Input Voltage	$0V \sim 10V \pm 1V (100:1)$		
	Input Impedance	10kΩ±10%		
	GCV (Generator Controlled Volta			
	Output Voltage	Sets the voltage between $0V \sim 2V$		
		according to the frequency		
	SWEEP OPERATION	Switch selector		
	Sweep Selection			
	Sweep Rate Sweep Time	Maximum 100 : 1, adjustable		
	-	0.5sec ~ 30sec, adjustable		
	Sweep Mode	Lin/Log switch selector		
	AMPLITUDE MODULATION			
	Depth	0 ~ 100%		
	MOD. Frequency	400Hz (INT), DC ~ 1MHz(EXT)		
	Carrier Bandwidth	100Hz ~ 5MHz (-3dB)		
	EXT Sensitivity	< 10Vpp for 100% modulation		
	FREQUENCY COUNTER			
	INT/EXT	Switch selector		

	Range	0.5Hz ~ 5MHz (5Hz ~ 150MHz EXT)		
	Accuracy	Time base accuracy±1 count		
	Time Base	$\pm 20$ ppm(23° C $\pm$ 5° C)after 30 minutes		
		warm up OR better		
	Resolution	100nHz for 1Hz, 1Hz for 100MHz OR		
		better		
	Input Impedance	1MΩ // 150pF		
	Sensitivity	< 35mVrms (5Hz ~ 100MHz)		
		<45mVrms (100MHz ~ 150MHz)		
	POWER SOURCE	AC 230V, 50Hz		
	Warranty	Minimum one year		
	User manual and product documentation	Required		
	Additional Requirement	All relevant technical brochures should		
		be forwarded with Tender		
		Documents. Comprehensive user guide,		
		Complete track record on where		
		the supplier has supplied the product,		
		Recommendation letter about the		
		product from the institutions where the		
		supplier has supplied the product.		
		Manufactures' authorization should be		
		submitted with the		
		tender documents		
2.58	Spectrum Analyzer		05	
	Model	Specify		
	Country of Origin	Specify		
	Frequency Range	9 kHz to 3.0 GHz		
	Frequency Range Resolution			
	Frequency RangeResolutionFrequency Reference:	9 kHz to 3.0 GHz 1 Hz		
	Frequency RangeResolutionFrequency Reference:Aging Rate	9 kHz to 3.0 GHz 1 Hz <= ±2 ppm max.		
	Frequency RangeResolutionFrequency Reference:Aging RateFrequency Stability over	9 kHz to 3.0 GHz 1 Hz		
	Frequency RangeResolutionFrequency Reference:Aging RateFrequency Stability overTemperature	9 kHz to 3.0 GHz 1 Hz $<= \pm 2 \text{ ppm max.}$ $<= \pm 0.025 \text{ ppm (0 to 50 °C )}$		
	Frequency RangeResolutionFrequency Reference:Aging RateFrequency Stability overTemperatureSupply Voltage Stability	9 kHz to 3.0 GHz 1 Hz <= ±2 ppm max. <= ±0.025 ppm (0 to 50 °C ) <=±0.02 ppm		
	Frequency RangeResolutionFrequency Reference:Aging RateFrequency Stability overTemperatureSupply Voltage StabilityFrequency Readout Accuracy	9 kHz to 3.0 GHz 1 Hz <= ±2 ppm max. <= ±0.025 ppm (0 to 50 °C ) <=±0.02 ppm		
	Frequency RangeResolutionFrequency Reference:Aging RateFrequency Stability overTemperatureSupply Voltage Stability	9 kHz to 3.0 GHz 1 Hz $<= \pm 2 \text{ ppm max.}$ $<= \pm 0.025 \text{ ppm (0 to 50 °C )}$ $<=\pm 0.02 \text{ ppm}$ 7 : Span >= 100 Hz (601)		
	Frequency RangeResolutionFrequency Reference:Aging RateFrequency Stability overTemperatureSupply Voltage StabilityFrequency Readout AccuracySweep points	9 kHz to 3.0 GHz 1 Hz $<= \pm 2 \text{ ppm max.}$ $<= \pm 0.025 \text{ ppm (0 to 50 °C )}$ $<=\pm 0.02 \text{ ppm}$ 7 : Span >= 100 Hz (601) Span = 0 Hz (6 to 601)		
	Frequency RangeResolutionFrequency Reference:Aging RateFrequency Stability overTemperatureSupply Voltage StabilityFrequency Readout AccuracySweep pointsMarker Frequency Counter :	9 kHz to 3.0 GHz 1 Hz $<= \pm 2 \text{ ppm max.}$ $<= \pm 0.025 \text{ ppm (0 to 50 °C )}$ $<=\pm 0.02 \text{ ppm}$ 7 : Span >= 100 Hz (601) Span = 0 Hz (6 to 601)		
	Frequency RangeResolutionFrequency Reference:Aging RateFrequency Stability overTemperatureSupply Voltage StabilityFrequency Readout AccuracySweep pointsMarker Frequency Counter :Resolution	9 kHz to 3.0 GHz 1 Hz $<= \pm 2 \text{ ppm max.}$ $<= \pm 0.025 \text{ ppm (0 to 50 °C )}$ $<=\pm 0.02 \text{ ppm}$ 7 : Span >= 100 Hz (601) Span = 0 Hz (6 to 601) 1 Hz, 10 Hz, 100 Hz, 1 kHz		
	Frequency RangeResolutionFrequency Reference:Aging RateFrequency Stability overTemperatureSupply Voltage StabilityFrequency Readout AccuracySweep pointsMarker Frequency Counter :	9 kHz to 3.0 GHz 1 Hz $<= \pm 2 \text{ ppm max.}$ $<= \pm 0.025 \text{ ppm (0 to 50 °C )}$ $<=\pm 0.02 \text{ ppm}$ 7 : Span >= 100 Hz (601) Span = 0 Hz (6 to 601) 1 Hz, 10 Hz, 100 Hz, 1 kHz RBW/Span >=0.02		
	Frequency RangeResolutionFrequency Reference:Aging RateFrequency Stability overTemperatureSupply Voltage StabilityFrequency Readout AccuracySweep pointsMarker Frequency Counter :ResolutionAccuracy related	9 kHz to 3.0 GHz 1 Hz $<= \pm 2 \text{ ppm max.}$ $<= \pm 0.025 \text{ ppm (0 to 50 °C )}$ $<=\pm 0.02 \text{ ppm}$ 7 : Span >= 100 Hz (601) Span = 0 Hz (6 to 601) 1 Hz, 10 Hz, 100 Hz, 1 kHz		
	Frequency RangeResolutionFrequency Reference:Aging RateFrequency Stability overTemperatureSupply Voltage StabilityFrequency Readout AccuracySweep pointsMarker Frequency Counter :ResolutionAccuracy relatedFrequency Span :	9 kHz to 3.0 GHz 1 Hz $<= \pm 2 \text{ ppm max.}$ $<= \pm 0.025 \text{ ppm (0 to 50 °C )}$ $<=\pm 0.02 \text{ ppm}$ 7 : Span >= 100 Hz (601) Span = 0 Hz (6 to 601) 1 Hz, 10 Hz, 100 Hz, 1 kHz RBW/Span >=0.02 Mkr level to DNL>30 dB		
	Frequency RangeResolutionFrequency Reference:Aging RateFrequency Stability overTemperatureSupply Voltage StabilityFrequency Readout AccuracySweep pointsMarker Frequency Counter :ResolutionAccuracy relatedFrequency Span :Range	9 kHz to 3.0 GHz 1 Hz $<= \pm 2 \text{ ppm max.}$ $<= \pm 0.025 \text{ ppm (0 to 50 °C )}$ $<=\pm 0.02 \text{ ppm}$ 7 : Span >= 100 Hz (601) Span = 0 Hz (6 to 601) 1 Hz, 10 Hz, 100 Hz, 1 kHz RBW/Span >=0.02 Mkr level to DNL>30 dB 0 Hz (zero span), 100 Hz to 3 GHz		
	Frequency RangeResolutionFrequency Reference:Aging RateFrequency Stability overTemperatureSupply Voltage StabilityFrequency Readout AccuracySweep pointsMarker Frequency Counter :ResolutionAccuracy relatedFrequency Span :RangeResolution	9 kHz to 3.0 GHz 1 Hz $<= \pm 2 \text{ ppm max.}$ $<= \pm 0.025 \text{ ppm (0 to 50 °C )}$ $<=\pm 0.02 \text{ ppm}$ 7 : Span >= 100 Hz (601) Span = 0 Hz (6 to 601) 1 Hz, 10 Hz, 100 Hz, 1 kHz RBW/Span >=0.02 Mkr level to DNL>30 dB		
	Frequency RangeResolutionFrequency Reference:Aging RateFrequency Stability overTemperatureSupply Voltage StabilityFrequency Readout AccuracySweep pointsMarker Frequency Counter :ResolutionAccuracy relatedFrequency Span :RangeResolutionPhase Noise :	9 kHz to 3.0 GHz 1 Hz $<= \pm 2 \text{ ppm max.}$ $<= \pm 0.025 \text{ ppm (0 to 50 °C )}$ $<=\pm 0.02 \text{ ppm}$ 7 : Span >= 100 Hz (601) Span = 0 Hz (6 to 601) 1 Hz, 10 Hz, 100 Hz, 1 kHz RBW/Span >=0.02 Mkr level to DNL>30 dB 0 Hz (zero span), 100 Hz to 3 GHz 1 Hz		
	Frequency RangeResolutionFrequency Reference:Aging RateFrequency Stability overTemperatureSupply Voltage StabilityFrequency Readout AccuracySweep pointsMarker Frequency Counter :ResolutionAccuracy relatedFrequency Span :RangeResolution	9 kHz to 3.0 GHz 1 Hz $<= \pm 2 \text{ ppm max.}$ $<= \pm 0.025 \text{ ppm (0 to 50 °C )}$ $<=\pm 0.02 \text{ ppm}$ 7 : Span >= 100 Hz (601) Span = 0 Hz (6 to 601) 1 Hz, 10 Hz, 100 Hz, 1 kHz RBW/Span >=0.02 Mkr level to DNL>30 dB 0 Hz (zero span), 100 Hz to 3 GHz 1 Hz Fc =1 GHz; RBW = 1 kHz, VBW = 10		
	Frequency RangeResolutionFrequency Reference:Aging RateFrequency Stability overTemperatureSupply Voltage StabilityFrequency Readout AccuracySweep pointsMarker Frequency Counter :ResolutionAccuracy relatedFrequency Span :RangeResolutionPhase Noise :Offset from Carrier	9 kHz to 3.0 GHz         1 Hz $<= \pm 2$ ppm max. $<= \pm 0.025$ ppm (0 to 50 °C ) $<=\pm 0.02$ ppm $<=\pm 0.02$ ppm         7:         Span >= 100 Hz (601)         Span = 0 Hz (6 to 601)         1 Hz, 10 Hz, 100 Hz, 1 kHz         RBW/Span >=0.02         Mkr level to DNL>30 dB         0 Hz (zero span), 100 Hz to 3 GHz         1 Hz         Fc =1 GHz; RBW = 1 kHz, VBW = 10         Hz;Average ≥ 40		
	Frequency RangeResolutionFrequency Reference:Aging RateFrequency Stability overTemperatureSupply Voltage StabilityFrequency Readout AccuracySweep pointsMarker Frequency Counter :ResolutionAccuracy relatedFrequency Span :RangeResolutionOffset from Carrier10 kHz	9 kHz to 3.0 GHz 1 Hz $<= \pm 2 \text{ ppm max.}$ $<= \pm 0.025 \text{ ppm (0 to 50 °C )}$ $<=\pm 0.02 \text{ ppm}$ 7 : Span >= 100 Hz (601) Span = 0 Hz (6 to 601) 1 Hz, 10 Hz, 100 Hz, 1 kHz RBW/Span >=0.02 Mkr level to DNL>30 dB 0 Hz (zero span), 100 Hz to 3 GHz 1 Hz Fc =1 GHz; RBW = 1 kHz, VBW = 10 Hz;Average $\geq 40$ <-88  dBc/Hz		
	Frequency RangeResolutionFrequency Reference:Aging RateFrequency Stability overTemperatureSupply Voltage StabilityFrequency Readout AccuracySweep pointsMarker Frequency Counter :ResolutionAccuracy relatedFrequency Span :RangeResolutionPhase Noise :Offset from Carrier10 kHz100 kHz	9 kHz to 3.0 GHz 1 Hz $<= \pm 2 \text{ ppm max.}$ $<= \pm 0.025 \text{ ppm (0 to 50 °C )}$ $<=\pm 0.02 \text{ ppm}$ 7 : Span >= 100 Hz (601) Span = 0 Hz (6 to 601) 1 Hz, 10 Hz, 100 Hz, 1 kHz RBW/Span >=0.02 Mkr level to DNL>30 dB 0 Hz (zero span), 100 Hz to 3 GHz 1 Hz Fc =1 GHz; RBW = 1 kHz, VBW = 10 Hz;Average $\geq 40$ <-88  dBc/Hz <-95  dBc/Hz		
	Frequency RangeResolutionFrequency Reference:Aging RateFrequency Stability overTemperatureSupply Voltage StabilityFrequency Readout AccuracySweep pointsMarker Frequency Counter :ResolutionAccuracy relatedFrequency Span :RangeResolutionPhase Noise :Offset from Carrier10 kHz100 kHz1 MHz	9 kHz to 3.0 GHz 1 Hz $<= \pm 2 \text{ ppm max.}$ $<= \pm 0.025 \text{ ppm (0 to 50 °C )}$ $<=\pm 0.02 \text{ ppm}$ 7: Span >= 100 Hz (601) Span = 0 Hz (6 to 601) 1 Hz, 10 Hz, 100 Hz, 1 kHz RBW/Span >=0.02 Mkr level to DNL>30 dB 0 Hz (zero span), 100 Hz to 3 GHz 1 Hz Fc =1 GHz; RBW = 1 kHz, VBW = 10 Hz;Average $\geq 40$ <-88  dBc/Hz <-95  dBc/Hz <-113  dBc/Hz		
	Frequency RangeResolutionFrequency Reference:Aging RateFrequency Stability overTemperatureSupply Voltage StabilityFrequency Readout AccuracySweep pointsMarker Frequency Counter :ResolutionAccuracy relatedFrequency Span :RangeResolutionPhase Noise :Offset from Carrier10 kHz100 kHz	9 kHz to 3.0 GHz 1 Hz $<= \pm 2 \text{ ppm max.}$ $<= \pm 0.025 \text{ ppm (0 to 50 °C )}$ $<=\pm 0.02 \text{ ppm}$ 7: Span >= 100 Hz (601) Span = 0 Hz (6 to 601) 1 Hz, 10 Hz, 100 Hz, 1 kHz RBW/Span >=0.02 Mkr level to DNL>30 dB 0 Hz (zero span), 100 Hz to 3 GHz 1 Hz Fc =1 GHz; RBW = 1 kHz, VBW = 10 Hz;Average $\geq 40$ <-88  dBc/Hz <-95  dBc/Hz <-113  dBc/Hz		

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$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$		bandwidth ) $200 \text{ Hz} = 0 \text{ Hz} = 120 \text{ Hz} = 1 \text{ Mz} = (64 \text{ Hz})$	
Accuracy: $< = \pm$ 5%, RBW = 1 MHz $< = \pm$ 5%, RBW < 1 MHz			
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	 A	,	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Accuracy:	,	
Video Bandwidth (VBW) Filter1 Hz to 1 MHz in 1-3-10 sequence (-3dB bandwidth)Amplitude Range: 100 kHz to 1 MHzDisplayed Average Noise Level (DANL) to 18 dBm1 MHz to 10 MHzDANL to 20 dBm10 MHz to 3 GHzDANL to 30 dBmInput Attenuator Range : 	 Shana Eastan		
$\begin{tabular}{ c c c c c c } \hline (-3dB bandwidth) & (-3dB bandwidth)$			
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	 · · · ·		
Image: the formula is the formula			
10 MHz to 3 GHzDANL to 30 dBmInput Attenuator Range :0 to 50 dB, in 1 dB step manual setup)Maximum Safe Input Level :Average Total Power>= 33 dBmDC Voltage $\pm 50$ V1 dB Gain Compression :Total Power at 1st Mixer> 0 dBmTotal Power at 1st MixerPreamp off(@Setting: 0 dB attenuation; RF Input is terminated with a 50 Ohn load. RBW 10 Hz; VBW 10 Hz; span 500 Hz; reference level = -60dBm; trace average $\geq 40$ )9 kHz to 100 kHz, <-93 dBm 100 kHz to 1 MHz, <-90 dBm - 3 x (f/100 kHz) dBPreamp on(@Setting: 0 dB attenuation; RF Input is 		to 18 dBm	
Input Attenuator Range :0 to 50 dB, in 1 dB step manual setup)(Auto or manual setup)Maximum Safe Input Level :Average Total Power>= 33 dBmDC Voltage $\pm$ 50 V1 dB Gain Compression :Total Power at Ist Mixer> 0 dBmTotal Power at Ist Mixer> 0 dBmDisplayed Average Noise Level (DANL) :Preamp off[@@Exting: 0 dB attenuation: RF Input is terminated with a 50 Ohm load. RBW 10 Hz; vBW 10 Hz; span 500 Hz; reference level = -60dBm; trace average $\geq$ 40 )9 kHz to 100 kHz, <-93 dBm			
Maximum Safe Input Level : $\sim$ Average Total Power>= 33 dBmDC Voltage $\pm$ 50 VI dB Gain Compression : $\sim$ 0 dBmTotal Power at 1st Mixer> 0 dBmTotal Power at the Preamp> -22 dBmDisplayed Average Noise Level (DANL) : $\sim$ Preamp off(@Setting: 0 dB attenuation; RF Input is terminated with a 50 Ohm load. RBW 10 Hz; vBW 10 Hz; span 500 Hz; reference level = -60dBm; trace average $\geq$ 40 )9 kHz to 100 kHz, < -93 dBm			
$\begin{tabular}{ c c c c c c } \hline >= 33 \ dBm &  c c c c c c c c c c c c c c c c c c $	Input Attenuator Range :	· · · · · · · · · · · · · · · · · · ·	
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	Maximum Safe Input Level :		
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$		>= 33 dBm	
Total Power at 1st Mixer       > 0 dBm         Total Power at the Preamp       > -22 dBm         Displayed Average Noise Level (DANL) :		± 50 V	
Total Power at 1st Mixer       > 0 dBm         Total Power at the Preamp       > -22 dBm         Displayed Average Noise Level (DANL) :	6		
Displayed Average Noise Level (DANL) :         Preamp off       (@Setting: 0 dB attenuation; RF Input is terminated with a 50 Ohm load. RBW 10 Hz; span 500 Hz; reference level = -60dBm; trace average ≥ 40 )         9 kHz to 100 kHz, < -93 dBm		> 0 dBm	
Preamp off(@Setting: 0 dB attenuation; RF Input is terminated with a 50 Ohn Ioad. RBW 10 Hz; VBW 10 Hz; span 500 Hz; reference level = -60dBm; trace average $\geq 40$ ) 9 kHz to 100 kHz, < -93 dBm 100 kHz to 1 MHz, < -90 dBm - 3 x (f/100 kHz) dB 1 MHz to 10 MHz, < -122 dBm 10 MHz to 3 GHz, < -122 dBm 10 MHz to 3 GHz, < -122 dBmPreamp on(@Setting: 0 dB attenuation; RF Input is terminated with a 50 Ohn Ioad. RBW 10 Hz; vBW 10Hz; span 500 Hz; reference level = -60dBm; trace average $\geq 40$ )Preamp on(@Setting: 0 dB attenuation; RF Input is terminated with a 50 Ohn Ioad. RBW 10 Hz; vBW 10Hz; span 500 Hz; reference level = -60dBm; trace average $\geq 40$ )100 kHz to 1 MHz, < -108 dBm - 3 x (f/100 kHz) dB1 MHz to 10 MHz, < -108 dBm - 3 x (f/100 kHz) dB100 kHz to 1 MHz, < -108 dBm - 3 x (f/100 kHz) dB1 MHz to 10 MHz, < -142 dBm 10 MHz to 3 GHz, < -142 dBm + 3 x (f/1 GHz) dBInternal Data storage>= 16 MB nominalWarm-up Time - 20 °C to +45 °C (Operating) or better -20 °C to +70 °C (Storage ) or betterTracking Generator:	Total Power at the Preamp	> -22 dBm	
Preamp off(@Setting: 0 dB attenuation; RF Input is terminated with a 50 Ohn Ioad. RBW 10 Hz; VBW 10 Hz; span 500 Hz; reference level = -60dBm; trace average $\geq 40$ ) 9 kHz to 100 kHz, < -93 dBm 100 kHz to 1 MHz, < -90 dBm - 3 x (f/100 kHz) dB 1 MHz to 10 MHz, < -122 dBm 10 MHz to 3 GHz, < -122 dBm 10 MHz to 3 GHz, < -122 dBmPreamp on(@Setting: 0 dB attenuation; RF Input is terminated with a 50 Ohn Ioad. RBW 10 Hz; vBW 10Hz; span 500 Hz; reference level = -60dBm; trace average $\geq 40$ )Preamp on(@Setting: 0 dB attenuation; RF Input is terminated with a 50 Ohn Ioad. RBW 10 Hz; vBW 10Hz; span 500 Hz; reference level = -60dBm; trace average $\geq 40$ )100 kHz to 1 MHz, < -108 dBm - 3 x (f/100 kHz) dB1 MHz to 10 MHz, < -108 dBm - 3 x (f/100 kHz) dB100 kHz to 1 MHz, < -108 dBm - 3 x (f/100 kHz) dB1 MHz to 10 MHz, < -142 dBm 10 MHz to 3 GHz, < -142 dBm + 3 x (f/1 GHz) dBInternal Data storage>= 16 MB nominalWarm-up Time - 20 °C to +45 °C (Operating) or better -20 °C to +70 °C (Storage ) or betterTracking Generator:	Displayed Average Noise Level (	DANL):	
$\begin{tabular}{ c c c c c } \hline & 100 \ \text{kHz to 1 MHz, < -90 \ dBm - 3 x} \\ (f'100 \ \text{kHz}) \ \text{dB} \\ & 1 \ \text{MHz to 10 \ MHz, < -122 \ dBm} \\ \hline & 10 \ \text{MHz to 3 \ GHz, < -122 \ dBm} \\ \hline & 10 \ \text{MHz to 3 \ GHz, < -122 \ dBm} \\ \hline & 10 \ \text{MHz to 3 \ GHz, < -122 \ dBm} \\ \hline & 10 \ \text{MHz to 3 \ GHz, < -122 \ dBm} \\ \hline & 10 \ \text{MHz to 3 \ GHz, < -122 \ dBm} \\ \hline & 10 \ \text{MHz to 3 \ GHz, < -122 \ dBm} \\ \hline & 100 \ \text{kHz to 10 \ MHz, < -108 \ dBm - 3 x} \\ (f'100 \ \text{kHz}) \ \text{dB} \\ \hline & 10 \ \text{MHz to 10 \ MHz, < -142 \ dBm} \\ \hline & 10 \ \text{MHz to 10 \ MHz, < -142 \ dBm} \\ \hline & 10 \ \text{MHz to 3 \ GHz, < -142 \ dBm + 3 x} (f'1 \ \text{GHz}) \ \text{dB} \\ \hline \hline & 10 \ \text{MHz to 3 \ GHz, < -142 \ dBm + 3 x} (f'1 \ \text{GHz}) \ \text{dB} \\ \hline \hline & 10 \ \text{MHz to 3 \ GHz, < -142 \ dBm + 3 x} (f'1 \ \text{GHz}) \ \text{dB} \\ \hline \hline & 10 \ \text{MHz to 3 \ GHz, < -142 \ dBm + 3 x} (f'1 \ \text{GHz}) \ \text{dB} \\ \hline \hline & 10 \ \text{MHz to 3 \ GHz, < -142 \ dBm + 3 x} (f'1 \ \text{GHz}) \ \text{dB} \\ \hline \hline & 10 \ \text{MHz to 3 \ GHz, < -142 \ dBm + 3 x} (f'1 \ \text{GHz}) \ \text{dB} \\ \hline \hline & 10 \ \text{MHz to 3 \ GHz, < -142 \ dBm + 3 x} (f'1 \ \text{GHz}) \ \text{dB} \\ \hline \hline & 10 \ \text{MHz to 3 \ GHz, < -142 \ dBm + 3 x} (f'1 \ \text{GHz}) \ \text{dB} \\ \hline \hline & 10 \ \text{MHz to 3 \ GHz, < -142 \ dBm + 3 x} (f'1 \ \text{GHz}) \ \text{dB} \\ \hline \hline & 10 \ \text{MHz to 3 \ GHz, < -142 \ dBm + 3 x} (f'1 \ \text{GHz}) \ \text{dB} \\ \hline \hline & 10 \ \text{Mz co 3 \ Ghz} = 16 \ \text{MB \ nominal} \\ \hline \hline & 10 \ \text{Mz co 3 \ Ghz} = 16 \ \text{MB \ nominal} \\ \hline \hline & 10 \ \text{Co co + 70 \ ^{\circ}C} (\text{Storage}) \ \text{or better} \\ \hline & -20 \ ^{\circ}C \ \text{to + 70 \ ^{\circ}C} (\text{Storage}) \ \text{or better} \\ \hline \hline & 10 \ \text{Mz co - 70 \ ^{\circ}C} (\text{Storage}) \ \text{or better} \\ \hline \hline & 10 \ \text{Mz co - 70 \ ^{\circ}C} (\text{Storage}) \ \text{or better} \\ \hline \hline & 10 \ \text{Mz co - 70 \ ^{\circ}C} (\text{Storage}) \ \text{or better} \\ \hline \hline \hline \hline & 10 \ \text{Mz co - 70 \ ^{\circ}C} (\text{Storage}) \ \text{or better} \\ \hline $		(@Setting: 0 dB attenuation; RF Input is terminated with a 50 Ohm load. RBW 10 Hz; VBW 10 Hz; span 500 Hz; reference	
(f/100 kHz) dB1 MHz to 10 MHz, < -122 dBm			
Image: 10 MHz to 3 GHz, < -122 dBmPreamp on(@Setting: 0 dB attenuation; RF Input is terminated with a 50 Ohm load. RBW 10 Hz; VBW 10Hz; span 500 Hz; reference level = -60dBm; trace average $\geq 40$ )100 kHz to 1 MHz, < -108 dBm - 3 x (f/100 kHz) dB1 MHz to 10 MHz, < -142 dBm 10 MHz to 3 GHz, < -142 dBm + 3 x (f/1 GHz) dBInternal Data storage>= 16 MB nominalWarm-up Time< 30 minutes		(f/100 kHz) dB	
Preamp on(@Setting: 0 dB attenuation; RF Input is terminated with a 50 Ohm load. RBW 10 Hz; VBW 10Hz; span 500 Hz; reference level = -60dBm; trace average $\geq 40$ )100 kHz to 1 MHz, < -108 dBm - 3 x (f/100 kHz) dB100 kHz to 1 MHz, < -108 dBm - 3 x (f/100 kHz) dB1 MHz to 10 MHz, < -142 dBm 10 MHz to 3 GHz, < -142 dBm + 3 x (f/1 GHz) dBInternal Data storage>= 16 MB nominalWarm-up Time< 30 minutes			
terminated with a 50 Ohm load. RBW 10 Hz; VBW 10Hz; span 500 Hz; reference level = -60dBm; trace average $\geq 40$ )100 kHz to 1 MHz, < -108 dBm - 3 x (f/100 kHz) dB1 MHz to 10 MHz, < -142 dBm			
(f/100 kHz) dB1 MHz to 10 MHz, < -142 dBm10 MHz to 3 GHz, < -142 dBm + 3 x (f/1 GHz) dBInternal Data storage>= 16 MB nominalWarm-up Time< 30 minutesTemperature Range+5 °C to +45 °C (Operating) or better -20 °C to + 70 °C (Storage ) or betterTracking Generator:	Preamp on	terminated with a 50 Ohm load. RBW 10 Hz; VBW 10Hz; span 500 Hz; reference	
Internal Data storage>= 16 MB nominalWarm-up Time< 30 minutesTemperature Range+5 °C to +45 °C (Operating) or better -20 °C to + 70 °C (Storage ) or betterTracking Generator:			
Internal Data storage       >= 16 MB nominal         Warm-up Time       < 30 minutes			
Warm-up Time< 30 minutesTemperature Range+5 °C to +45 °C (Operating) or better -20 °C to + 70 °C (Storage ) or betterTracking Generator:		GHz) dB	
Temperature Range+5 °C to +45 °C (Operating) or better -20 °C to + 70 °C (Storage ) or betterTracking Generator:Image: Comparison of the store o			
-20 °C to + 70 °C (Storage ) or better       Tracking Generator:			
Tracking Generator:	Temperature Range	1 0,	
	 	$-20 \degree C$ to $+70 \degree C$ (Storage ) or better	
Frequency Range 100 kHz to 3 GHz			
90	Frequency Range		

	Output Power	-50 dBm to 0 dBm in 0.5 dB steps		
	Absolute Accuracy	± 0.5 dB		
	Output Flatness	Referenced to 160 MHz, -10 dBm		
		100 kHz to 2 GHz : ± 1.5 dB		
	-	2 GHz to 3 GHz: $\pm$ 2.0 dB		
	Output Level Switching	± 0.8 dB		
	Uncertainty			
	Harmonics	< -30 dBc		
	Reverse Power	+30 dBm max.		
	Connector type	N-type female		
	Impedance	50 ohm		
	Output VSWR	< 1.6:1 (when source attenuation is 12dB)		
	Front Panel Input/output	RF Input		
		Power for Option		
		USB Host		
		MicroSD Socket		
	Rear Panel Input/output	Reference Output		
		Reference Input		
		Alarm Output		
		Trigger Input/ Gated Sweep Input		
		LAN TCP/IP Interface		
		USB Device		
		IF Output		
		Earphone Output		
		RS232 Interface		
		GPIB Interface		
		AC Power Input		
	XX7 /	Battery Pack (Optional)		
	Warranty	Minimum one year		
	User manual and product documentation	Required		
	Additional Requirement	All relevant technical brochures should		
		be forwarded with Tender		
		Documents. Comprehensive user guide,		
		Complete track record on where		
		the supplier has supplied the product,		
		Recommendation letter about the		
		product from the institutions where the supplier has supplied the		
		product. Manufactures' authorization		
		should be submitted with the		
		tender documents		
2.59	Arbitrary Waveform Generate		02	
	Model	Specify	02	
	Country of Origin	Specify		
	Maximum frequency	120MHz		
	Channels	2		
	Memory	Volatile: >=64 MSa/Channel, Non-Volatile:		
		>=950  MB in file system		
	Waveforms	Standard(Sine, Square, Ramp, Pulse,		
		Triangle, Gaussian Noise, PRBS		
		$\Gamma$		
		(Pseudorandom Binary Sequence), DC),		

<b></b>		Exponential Rise, Gaussian Pulse,		
		-		
		Haversine, Lorentz, D-Lorentz, Negative		
		Ramp, Sinc), User-defined arbitrary (with		
	Or exerting Marker	muti-segment sequencing)		
	Operating Modes	Continuous, Modulate, Frequency Sweep,		
		Counted Burst, Gated Burst		
	Modulation Types	AM, FM, PM, FSK, BPSK, PWM, Sum		
		(carrier + modulation)		
	Interfaces	10/100Base-T (Sockets & VXI-11		
		protocols), USB 2.0 (USB-TMC488		
		protocol), GPIB/IEEE-488.1, IEEE-488.2		
	Web user interface for remote	Required		
	operation and monitoring			
	Display	Color TFT, at least WQVGA (480x272)		
		with LED backlight		
	Waveform Characteristics	Resolution: 1-µHz		
	(Sine)	Harmonic distortion( for freq>10MHz and		
	4	Vout=10Vpp): <= -39dBc		
		Phase Noise (@100kHz offset and freq		
		120MHz): <=-125 dBc		
	Waveform Characteristics	Duty cycle: 0.01% to 99.99%, resolution:		
	(Square and pulse)	0.01%		
	Waveform output	Connector: Front-panel BNC, shell and pin		
	characteristics	isolated from chassis (±42 V maximum);		
		Function: On, Off, or Inverted;		
		Output impedance (nom:) 50 $\Omega$ ;		
		Overload protection: required		
	Two channel characteristics	Operating Independent, Coupled		
		modes parameter(s), Combined (Ch 1		
		+ Ch 2), Equal (Ch 1 = Ch 2),		
		or Differential (Ch $1 = -Ch 2$ )		
		IQ Player Required		
	Output characteristics	Connector: Rear-panel BNC, chassis-		
		referenced ;		
		Frequency (nom): 10 MHz ;		
		Level (nom) 0 dBm (632 mVpp) into 50 $\Omega$ ;		
		Impedance(nom): 50 $\Omega$		
	Power source	230 V AC, 50 Hz		
	Warranty	Minimum one year		
	User manual and product	Required		
	documentation			
	Additional Requirement	All relevant technical brochures should be		
		forwarded with Tender		
		Documents. Comprehensive user guide,		
		Complete track record on where the supplier		
		has supplied the product, Recommendation		
		letter about the product from the institutions		
		where the supplier has supplied the product.		
		Manufactures' authorization should be		
		submitted with the		
		tender documents		
2.60	Transmission Line trainer		01	
	Model	Specify		
L		92	L	1

	Country of Origin	Specify		
	Display	LED columns indicating positive and		
		negative voltages at 13 positions.		
	Propagation time	Switch 0.25, 0.5, 2 s at zero attenuation,		
		representing line lengths L, 2L, 8L		
		respectively.		
	Attenuation	Simulates attenuation due to the lines		
		series resistance. Continuously variable.		
	Step input	A centre-stable 2-way switch applies a		
	r r	signal to either end of the line.		
	Line impedance	~600Ω		
	Plugin terminations	short-circuit link (2)		
	Matched load :			
		Resistive loads (unmatched: low $\sim 50\Omega$ ,		
		medium ~200 $\Omega$ , high ~1.8k $\Omega$ , large ~		
		100kΩ		
		Capacitive Load ~100µF nominal		
		(reversible electrolytic)		
	Hold	Signals on the line are held at the instant		
		of switching		
	Power supply	240V 50Hz		
	IT J	Fuse : Required		
	Additional materials	Manual of practical demonstrations and		
		assignments, covering all the important		
		aspects of these characteristics		
	Warranty	Minimum one year		
	User manual and product	Required		
	documentation			
	Additional Requirement	All relevant technical brochures should		
		be forwarded with Tender		
		Documents. Comprehensive user guide,		
		Complete track record on where		
		the supplier has supplied the product,		
		Recommendation letter about the product		
		from the institutions where the supplier		
		has supplied the product. Manufactures'		
		authorization should be submitted with		
		the tender documents		
2.61	Analog Multimeter		10	
	Model	Specify		
	Country of Origin	Specify		
	DCV (Range selection)	0.1/0.5/2.5/10/50/250/1000V		
	ACV(Range selection)	10/50/250/1000V		
	DCA(Range selection)	50µ/ 2.5m/ 25m/250mA		
	$\Omega(\text{Range selection})$	2k/20k/200k/2M(×1/×10/×1k)/200M		
		(x100k)		
	LI- Load Current(Range selection)	1.5µ/150µ/1.5m/15m/150mA		
	Decibel (Range)	<=-10dB to >=+22dB for 10VAC		
		upto >= +62aB		
	DC high voltage	upto >= +62dB >=25kV		
	DC high voltage hFE	*		

Operating conditions	0deg C-40 deg C, 25%-80%RH		
Power source	R6(IEC) or UM-3 (1.5V)x2		
Drop shock proof	Required		
Protective body cover	Required		
Required Accessories	High voltage probe, hFE probe, Clip		
Required recessories	adapters		
Warranty	Specify		
User manual and product	Required		
documentation			
Additional Requirement	All relevant technical brochures should be forwarded with Tender Documents. Comprehensive user guide, Complete track record on where the supplier has supplied the product, Recommendation letter about the product from the institutions where the supplier has supplied the product. Manufactures' authorization should be submitted with the tender documents		
2.62 Genuino Starter Kit (Origina		20	
Model	Specify		
Country of Origin	Specify		
Each Kit should include	<ul> <li>Arduino Projects Book (170 pages) (1 No)</li> <li>Arduino / GenuinoUnoboard(latest version)(1 No)</li> <li>USB cable (1 No)</li> <li>Breadboard 400 points (1 No)</li> <li>Easy-to-assemble wooden base (1 No)</li> <li>9v battery snap (1 No)</li> <li>Solid core jumper wires (70 Nos)</li> <li>Stranded jumper wires (2 Nos)</li> <li>Photoresistor [VT90N2 LDR] (6 Nos)</li> <li>Potentiometer 10kilohm (3 Nos)</li> <li>Pushbuttons (10 Nos)</li> <li>Temperature sensor [TMP36] (1 No)</li> <li>Tilt sensor (1 No)</li> <li>alphanumeric LCD (16x2 characters) (1 No)</li> <li>LED (bright white) (1 No)</li> <li>LEDs (red) (8 Nos)</li> <li>LEDs (green) (8 Nos)</li> <li>LEDs (yellow) (8 Nos)</li> <li>LEDs (blue) (3 Nos)</li> <li>Small DC motor 6/9V (1 No)</li> <li>Small servo motor (1 No)</li> </ul>		

1			1	
		- H-bridge motor driver [L293D] (1		
		No)		
		- Optocouplers [4N35] (2 Nos)		
		- Transistor [BC547] (5 Nos)		
		- Mosfet transistors [IRF520] (2		
		Nos)		
		- Capacitors 100nF (5 Nos)		
		- Capacitors 100uF (3 Nos)		
		- Capacitor 100pF (5 Nos)		
		- Diodes [1N4007] (5 Nos)		
		- Transparent gels (red, green, blue)		
		3 Nos)		
		- Male pins strip $(40x1)$ (1 No)		
		- Resistors 220 ohm (20 Nos)		
		- Resistors 560 ohm (5 Nos)		
		- Resistors 1 kilohm (5 Nos)		
		- Resistors 4.7 kilohm (5 Nos)		
		- Resistors 10 kilohm (20 Nos)		
		- Resistors 1 megohm (5 Nos)		
		- Resistors 10 megohm (5 Nos)		
		- 9V Rechargeable battery (1 No)		
	User manual and product	Required		
	documentation			
	Warranty	Specify		
	Additional Requirement	All relevant technical brochures should		
		be forwarded with Tender		
		Documents. Comprehensive user guide,		
		Complete track record on where		
		the supplier has supplied the product,		
		Recommendation letter about the		
		product from the institutions where the		
		supplier has supplied the product.		
		Manufactures' authorization should be		
		submitted with the tender documents	• •	
2.63	Arduino MEGA 2560 / Genuino		20	
	Model	Specify		
	Country of Origin	Specify		
	Version	Latest		
	Microcontroller	ATmega2560		
	Operating Voltage	5V		
	Input Voltage (recommended)	7-12V		
	Input Voltage (limit)	6-20V		
	Digital I/O Pins	54 (of which 15 provide PWM output)		
	Analog Input Pins	16		
	DC Current per I/O Pin	20 mA		
	DC Current for 3.3V Pin	50 mA		
	Flash Memory	256 KB of which 8 KB used by		
		bootloader		
	SRAM	8 KB		
	EEPROM	4 KB		
	Clock Speed	16 MHz		
	Warranty	Specify		

	User manual and product	Required		
	documentation	noquirou		
	Additional Requirement	All relevant technical brochures should be forwarded with Tender		
		Documents. Comprehensive user guide,		
		Complete track record on where the		
		supplier has supplied the product, Recommendation letter about the product		
		from the institutions where the supplier		
		has supplied the product. Manufactures'		
		authorization should be submitted with		
		the tender documents		
2.64	Arduino Due(Original)		20	
	Model	Specify		
	Country of Origin	Specify		
	Version	Latest		
	Microcontroller	AT91SAM3X8E		
	Operating Voltage	3.3V		
	Input Voltage	7-12V		
	Input Voltage (limits)	6-16V		
	Digital I/O Pins	54 (of which 12 provide PWM output)		
	Analog Input Pins Analog Output Pins	12 2 (DAC)		
	Total DC Output Current on all	130 mA		
	I/O lines	150 m/x		
	DC Current for 3.3V Pin	800 mA		
	DC Current for 5V Pin	800 mA		
	Flash Memory	512 KB all available for the user		
	5	applications		
	SRAM	96 KB (two banks: 64KB and 32KB)		
	Clock Speed	84 MHz		
	Length	~100 mm		
	Width	~55 mm		
	Weight	<40 g		
	Warranty	Specify		
	User manual and product	Required		
	documentation Additional Requirement	All relevant technical brochures should		
	Auditional Requirement	be forwarded with Tender		
		Documents. Comprehensive user guide,		
		Complete track record on where the		
		supplier has supplied the product,		
		Recommendation letter about the product		
		from the institutions where the supplier		
		has supplied the product. Manufactures'		
		authorization should be submitted with		
•		the tender documents		
2.65	Arduino ZERO/ Genuino ZERO		10	
	Model	Specify Specify		
	Country of Origin	Specify Latest		
	Version Microcontroller	Latest ATSAMD21G18, 32-Bit ARM Cortex		

		M0+				
	Operating Voltage	3.3V				
	PWM Pins	All but pins 2 and 7				
	UART	2 (Native and Programming)				
	Digital I/O Pins	20				
	Analog Input Pins	6, 12- bit ADC channels				
	Analog Output Pins	1, 10-bit (DAC)				
	Flash Memory	256 kB				
	SRAM	32 kB				
	Clock Speed	48 MHz				
	Warranty	Specify				
	User manual and product	Required				
	documentation	Required				
	Additional Requirement	All relevant technical brochures should				
	ridanional requirement	be forwarded with Tender				
		Documents. Comprehensive user guide,				
		Complete track record on where the				
		supplier has supplied the product,				
		Recommendation letter about the product				
		from the institutions where the supplier				
		has supplied the product. Manufactures'				
		authorization should be submitted with				
		the tender documents				
2.66	ArduinoYún(Original)		10			
	Model	Specify				
	Country of Origin	Specify				
	Version	Latest				
	AVR Arduino microcontrolle	r				
	Microcontroller	ATmega32U4				
	Operating Voltage	5V				
	Input Voltage	5				
	Digital I/O Pins	20				
	PWM Channels	7				
	Analog Input Pins	12				
	DC Current per I/O Pin	40 mA				
	DC Current for 3.3V Pin	50 mA				
	Flash Memory	32 KB (of which 4 KB used by				
		bootloader)				
	SRAM	2.5 KB				
	EEPROM	1 KB				
	Clock Speed	16 MHz				
	Linux Microprocessor					
				1		
	Processor	Atheros AR9331				
	Architecture	MIPS @400MHz				
	Architecture Operating Voltage	MIPS @400MHz 3.3V				
	Architecture Operating Voltage Ethernet	MIPS @400MHz 3.3V IEEE 802.3 10/100Mbit/s				
	Architecture Operating Voltage Ethernet WiFi	MIPS @400MHz           3.3V           IEEE 802.3 10/100Mbit/s           IEEE 802.11b/g/n				
	Architecture Operating Voltage Ethernet WiFi USB Type-A	MIPS @400MHz           3.3V           IEEE 802.3 10/100Mbit/s           IEEE 802.11b/g/n           2.0 Host				
	Architecture Operating Voltage Ethernet WiFi USB Type-A Card Reader	MIPS @400MHz           3.3V           IEEE 802.3 10/100Mbit/s           IEEE 802.11b/g/n           2.0 Host           Micro-SD only				
	Architecture Operating Voltage Ethernet WiFi USB Type-A Card Reader RAM	MIPS @400MHz           3.3V           IEEE 802.3 10/100Mbit/s           IEEE 802.11b/g/n           2.0 Host           Micro-SD only           64 MB DDR2				
	Architecture Operating Voltage Ethernet WiFi USB Type-A Card Reader	MIPS @400MHz           3.3V           IEEE 802.3 10/100Mbit/s           IEEE 802.11b/g/n           2.0 Host           Micro-SD only				

	EEPROM	1 KB		
	Clock Speed	16 MHz		
	Warranty	Specify		
	User manual and product	Required		
	documentation			
	Additional Requirement	All relevant technical brochures should		
	· · · · · · · · · · · · · · · · · · ·	be forwarded with Tender		
		Documents. Comprehensive user guide,		
		Complete track record on where the		
		supplier has supplied the product,		
		Recommendation letter about the product		
		from the institutions where the supplier		
		has supplied the product. Manufactures'		
		authorization should be submitted with		
		the tender documents		
2.67	ArduinoWiFi Shield(Original)		05	
	Model	Specify		
	Country of Origin	Specify		
	Version	Latest		
	On board indicators	The shield contains a number of		
		informational LEDs as stated below		
		LINK (green) : indicates a connection to		
		a network		
		ERROR (red): indicates when there is a		
		communication error		
		DATA (blue): indicates data being		
		transmitted/received		
	Operating voltage	5V (supplied from the Arduino Board)		
	Compatibility	Arduino Due		
	Connection	802.11b/g networks		
	Encryption types	WEP and WPA2 Personal		
	Interface	SPI port		
	Additional memory slot	on-board micro SD slot		
	Programmer	ICSP headers		
	serial debugging	FTDI connection for serial debugging of		
		WiFi shield		
	Update	Mini-USB for updating WiFi shield		
		firmware		
	Warranty	Specify		
	User manual and product	Required		
	documentation			
	Additional Requirement	All relevant technical brochures should		
	1	be forwarded with Tender		
		Documents. Comprehensive user guide,		
		Complete track record on where the		
		supplier has supplied the product,		
		Recommendation letter about the product		
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		from the institutions where the supplier		
		from the institutions where the supplier has supplied the product. Manufactures'		
		has supplied the product. Manufactures' authorization should be submitted with		
		has supplied the product. Manufactures'		

2.68	Arduino Ethernet Shield WITH F	05		
	Model	Specify		
	Country of Origin	Specify		
	Version	Latest		
-	Technical specifications			
	Length	~70 mm		
	Width	~55 mm		
	Operating voltage	5V (supplied from the ArduinoBoard)		
	Ethernet Controller	W5100 with internal 16K buffer		
	Connection speed	10/100Mb		
	communicate with controller	SPI port		
	Power over Ethernet (PoE) modu			
	power from a conventional twiste			
	IEEE802.3af compliance	Required		
	Maximum output ripple and noise	100mVpp		
	Input voltage range	36V to 57V		
	protection	Overload and short-circuit		
	Output	9V		
	Efficiency of DC/DC converter	Typ 75% @ 50% load		
	Isolation (input to output)	>=1500V		
	Warranty	Specify		
	User manual and product	Required		
	documentation	-		
	Additional Requirement	All relevant technical brochures should		
	_	be forwarded with Tender		
		Documents. Comprehensive user guide,		
		Complete track record on where the		
		supplier has supplied the product,		
		Recommendation letter about the product		
		from the institutions where the supplier		
		has supplied the product. Manufactures'		
		authorization should be submitted with		
		the tender documents		
2.69	Arduino GSM Shield		05	
	Model	Specify		
	Country of Origin	Specify		
	Version	Latest		
	Board support	Arduino Uno		
	4	ArduinoMega		
	4	Arduino Mega ADK		
		Leonardo.		
		ard Indicators		
	On	shows the Shield gets power		
	Status	Turns on to when the modem is powered		
		and data is being transferred to/from the		
		GSM/GPRS network.		
	Net	Blinks when the modem is		
		communicating with the radio network.		
	Warranty	Specify		
	User manual and product	Required		
	documentation			
	Additional Requirement	All relevant technical brochures should		

2.70	Arduino Motor Shield	Complete tra the supplier h Recommenda product from supplier has s Manufactures	with Tender Comprehensive user guide, ck record on where has supplied the product, ation letter about the the institutions where the supplied the product. s' authorization should be th the tender documents	15	
2.70	Model	Specify		10	
	Country of Origin	Specify			
	Version	Latest			
	Operating Voltage	5V to 12V			
	Motor controller		es 2 DC motors or 1 stepper		
		motor	2 De motors of 1 stepper		
	Max current		el or 4A max (with external		
		power supply			
	Current sensing	1.65V/A	,		
	Warranty	Specify			
	User manual and product	Required			
	documentation	noquirea			
	Additional Requirement	be forwarded Comprehensi track record of supplied the p letter about th institutions w supplied the p	echnical brochures should with Tender Documents. we user guide, Complete on where the supplier has product, Recommendation he product from the where the supplier has product. Manufactures' should be submitted with cuments		
2.71	Motor/Stepper/Servo Shield for A	rduino Kit		20	
	Model	Specify			
	Country of Origin	Specify			
	Version	Latest			
	Connections for high precision servo-motor	2 (5V)			
	H bridges	Nos	4		
		Current per bridge	1.2 A 4.5 V DC to 13.5 V DC	-	
		Voltage range			
	DC bidirectional motors velocity selection (Arduino PWM) with resolution	8 bit			
	stepper motors [unipolar or bipolar,Pulldown resistors to take the motors off at startup, Header for polar cables]	2			
	No of stackable shields	32			
	Dimensions	~70mm x 55	mm x 10mm		

	Warranty	Specify		
	User manual and product	Required		
	documentation	-		
	Additional Requirement	All relevant technical brochures should		
		be forwarded with Tender		
		Documents. Comprehensive user guide,		
		Complete track record on where		
		the supplier has supplied the product,		
		Recommendation letter about the product		
		from the institutions where the supplier		
		has supplied the product. Manufactures'		
		authorization should be submitted with		
272	Assembled Date Logging shield f	the tender documents	20	
2.72	Assembled Data Logging shield for Model		20	
		Specify Specify		
	Country of Origin Version	Latest		
	Features	Lacol		
	SD card interface should support	FAT16 formatted cards		
	SD card interface should support	FAT32 formatted cards		
	Real Time	Clock keeps the time going even when		
	Real Time	the Arduino is unplugged.		
		Battery backup should last for atleast a		
		year		
	Prototyping area soldering	Required		
	connectors, circuitry or sensors.	1		
	Onboard regulator 3.3 V			
	Support	Arduino UNO, Duemilanove, Diecimila,		
		Leonardo or ADK/Mega R3 or higher.		
	Dimensions	~70mm x 55mm x 18mm		
	Weight	<=25g		
	This board/chip interface	I2C 7-bit		
	Warranty	Specify		
	User manual and product	Required		
	documentation			
	Additional Requirement	All relevant technical brochures should be forwarded with Tender		
		Documents. Comprehensive user guide, Complete track record on where the		
		supplier has supplied the product,		
		Recommendation letter about the product		
		from the institutions where the supplier		
		has supplied the product. Manufactures'		
		authorization should be submitted with		
		the tender documents		
2.73	Android Phone to generic shield of	converter for Arduino	20	
	Model	Specify		
	Country of Origin	Specify		
	Version	Latest		
	Compatible	Arduino( 5V and 3.3V boards)		
	Bluetooth module	In built		
	No of shields	>=40		

	Application for smartphone	application( in Android) full version		
	Warranty	Specify		
	User manual and product	Required		
	documentation	roquirou		
	Additional Requirement	All relevant technical brochures should		
		be forwarded with Tender		
		Documents. Comprehensive user guide,		
		Complete track record on where the		
		supplier has supplied the product,		
		Recommendation letter about the product		
		from the institutions where the supplier		
		has supplied the product. Manufactures'		
		authorization should be submitted with		
		the tender documents		
2.74	Music Shield		20	
	Model	Specify		
	Country of Origin	Specify		
	Version	Latest		
	Compatible	Genuino/Arduino Uno, Genuino/Arduino		
	Internet	Mega		
	multifunction button	1		
	Supported music formats	MP3, WMA, WAV, AAC, MIDI,		
		OggVorbis		
	Supports memory reader	Micro SD card(minimum with 2GB)		
	Headphone jack	3.5mm		
	Interface breakout	MIDI		
	MIDI Latency	Low		
	Warranty	Specify		
	User manual and product	Required		
	documentation			
	Additional Requirement	All relevant technical brochures should		
		be forwarded with Tender		
		Documents. Comprehensive user guide,		
		Complete track record on where the		
		supplier has supplied the product,		
		Recommendation letter about the product		
		from the institutions where the supplier		
		has supplied the product. Manufactures'		
		authorization should be submitted with		
		the tender documents		
2.75	USB Stick DSP Development Too		20	
	Model Country of Origin	Specify Specify		
	Country of Origin	Specify TMS320C5505		
	Fixed point low power DSP Embedded emulator	XDS100		
		I2C		
	EEPROM with protocol 32-bit programmable low power	TLV320AIC3204		
	stereo codec	1 L V 320AIC 3204		
		Line In Headphone Out Connectors		
	Connectors	Line In, Headphone Out Connectors		
	Removable USB stick enclosure	Expansion connector		
	Full documentation	CD-ROM		

	Software	Included		
	Software	Should enable designer to readily target		
		the DSP board(USB Stick DSP		
		Development Tool) provided		
		A complete Integrated Development		
		Environment (IDE), an efficient		
		optimizing $C/C++$ compiler assembler,		
		linker, debugger, integrated Code Wright		
		editor with Code Sense technology for		
		faster code creation, data visualization, a		
		profiler and a flexible project manager		
		Software IDE should support windows7		
		to latest version of windows		
		DSP/BIOS real-time kernel		
		Chip Support Library		
	Warranty	Specify		
	User manual and product	Required		
	documentation	1		
	Additional Requirement	All relevant technical brochures should		
	1.	be forwarded with Tender		
		Documents. Comprehensive user guide,		
		Complete track record on where the		
		supplier has supplied the product,		
		Recommendation letter about the product		
		from the institutions where the supplier		
		has supplied the product. Manufactures'		
		authorization should be submitted with		
		the tender documents		
2.76	Advanced USB Stick DSP Develo	opment Tool	20	
	Model	Specify		
	Country of Origin	Specify		
	Fixed point low power DSP	TMS320C5515		
	Embedded emulator	XDS100		
	EEPROM with protocol	I2C		
	EEPROM with protocol 32-bit programmable low power			
	EEPROM with protocol 32-bit programmable low power stereo codec	I2C TLV320AIC3204		
	EEPROM with protocol 32-bit programmable low power	I2C         TLV320AIC3204         Line In, Headphone Out Connectors		
	EEPROM with protocol 32-bit programmable low power stereo codec	I2C         TLV320AIC3204         Line In, Headphone Out Connectors         Expansion connector		
	EEPROM with protocol 32-bit programmable low power stereo codec Connectors	I2CTLV320AIC3204Line In, Headphone Out ConnectorsExpansion connectorUSB and SD connectors		
	EEPROM with protocol 32-bit programmable low power stereo codec Connectors Flash memory	I2CTLV320AIC3204Line In, Headphone Out ConnectorsExpansion connectorUSB and SD connectorsRequired		
	EEPROM with protocol 32-bit programmable low power stereo codec Connectors Flash memory Full documentation	I2CTLV320AIC3204Line In, Headphone Out ConnectorsExpansion connectorUSB and SD connectorsRequiredCD-ROM		
	EEPROM with protocol 32-bit programmable low power stereo codec Connectors Flash memory Full documentation Software	I2C         TLV320AIC3204         Line In, Headphone Out Connectors         Expansion connector         USB and SD connectors         Required         CD-ROM         Included		
	EEPROM with protocol 32-bit programmable low power stereo codec Connectors Flash memory Full documentation	I2CTLV320AIC3204Line In, Headphone Out ConnectorsExpansion connectorUSB and SD connectorsRequiredCD-ROMIncludedShould enable designer to readily target		
	EEPROM with protocol 32-bit programmable low power stereo codec Connectors Flash memory Full documentation Software	I2CTLV320AIC3204Line In, Headphone Out ConnectorsExpansion connectorUSB and SD connectorsRequiredCD-ROMIncludedShould enable designer to readily targetthe DSP board(Advanced USB Stick		
	EEPROM with protocol 32-bit programmable low power stereo codec Connectors Flash memory Full documentation Software	I2CTLV320AIC3204Line In, Headphone Out ConnectorsExpansion connectorUSB and SD connectorsRequiredCD-ROMIncludedShould enable designer to readily targetthe DSP board(Advanced USB StickDSP Development Tool) provided		
	EEPROM with protocol 32-bit programmable low power stereo codec Connectors Flash memory Full documentation Software	I2CTLV320AIC3204Line In, Headphone Out ConnectorsExpansion connectorUSB and SD connectorsRequiredCD-ROMIncludedShould enable designer to readily targetthe DSP board(Advanced USB StickDSP Development Tool) providedA complete Integrated Development		
	EEPROM with protocol 32-bit programmable low power stereo codec Connectors Flash memory Full documentation Software	I2CTLV320AIC3204Line In, Headphone Out ConnectorsExpansion connectorUSB and SD connectorsRequiredCD-ROMIncludedShould enable designer to readily targetthe DSP board(Advanced USB StickDSP Development Tool) providedA complete Integrated DevelopmentEnvironment (IDE), an efficient		
	EEPROM with protocol 32-bit programmable low power stereo codec Connectors Flash memory Full documentation Software	I2CTLV320AIC3204Line In, Headphone Out ConnectorsExpansion connectorUSB and SD connectorsRequiredCD-ROMIncludedShould enable designer to readily targetthe DSP board(Advanced USB StickDSP Development Tool) providedA complete Integrated Development		
	EEPROM with protocol 32-bit programmable low power stereo codec Connectors Flash memory Full documentation Software	I2CTLV320AIC3204Line In, Headphone Out ConnectorsExpansion connectorUSB and SD connectorsRequiredCD-ROMIncludedShould enable designer to readily targetthe DSP board(Advanced USB StickDSP Development Tool) providedA complete Integrated DevelopmentEnvironment (IDE), an efficient		
	EEPROM with protocol 32-bit programmable low power stereo codec Connectors Flash memory Full documentation Software	I2CTLV320AIC3204Line In, Headphone Out ConnectorsExpansion connectorUSB and SD connectorsRequiredCD-ROMIncludedShould enable designer to readily targetthe DSP board(Advanced USB StickDSP Development Tool) providedA complete Integrated DevelopmentEnvironment (IDE), an efficientoptimizing C/C++ compiler assembler,		
	EEPROM with protocol 32-bit programmable low power stereo codec Connectors Flash memory Full documentation Software	I2CTLV320AIC3204Line In, Headphone Out ConnectorsExpansion connectorUSB and SD connectorsRequiredCD-ROMIncludedShould enable designer to readily targetthe DSP board(Advanced USB StickDSP Development Tool) providedA complete Integrated DevelopmentEnvironment (IDE), an efficientoptimizing C/C++ compiler assembler,linker, debugger, integrated Code Wright		

		Software IDE should support windows7		
		to newest version of windows		
		DSP/BIOS real-time kernel		
	-	Chip Support Library		
	Warranty	Specify		
	Warranty			
	User manual and product documentation	Required		
		All relevant technical brochures should		
	Additional Requirement	be forwarded with Tender		
		Documents. Comprehensive user guide,		
		Complete track record on where the		
		supplier has supplied the product, Recommendation letter about the product		
		from the institutions where the supplier		
		has supplied the product. Manufactures' authorization should be submitted with		
		the tender documents		
2 77	DSP Evaluation Module	the tender documents	15	
2.77	Model	Specify	15	
		Specify		
	Country of Origin	TMS320C5515		
	Fixed point low power DSP			
	On board embedded JTAG	plug-and-play functionality through just		
	emulation	an A-to-mini B USB cable and		
		compatibility of external JTAG emulation		
		interface		
	Stereo codec	TLV320AIC3204 or TLV320AIC23B		
	OLED color LCD display	128x128 pixels		
	Flash and mobile SDRAM	Integrated		
	EEPROMs	I2C and SPI protocols		
	USB slave port	>=2.0version		
	Interface	RS232,MMC/SD slot, CE-ATA		
		connector		
	User defined push button switches	>=10nos		
	Analog connectors	front end		
	Connectors for memory cards	Two expansion		
	Oscillator socket	External		
	Battery Holder	include		
	Dial	Jog dial		
	Universal power supply	+5V		
	Module should include	DSP Evaluation Board		
	1	Code Composer Studio™ IDE Rev. 4.0		
		Technical Reference Manual with		
		Schematics		
	1	USB Cable		
	1	AC Power Cord(s) for this module		
	Software	Included		
	Software	Should enable designer to readily target		
		the DSP board(DSP Evaluation Board)		
		provided		
	1	A complete Integrated Development		
		Environment (IDE), an efficient		
		Environment (IDE), an enifcient		

		ontimizing $C/C$ + compiler eccembler		
		optimizing C/C++ compiler assembler,		
		linker, debugger, integrated Code Wright		
		editor with Code Sense technology for		
		faster code creation, data visualization, a		
	-	profiler and a flexible project manager		
	4	DSP/BIOS real-time kernel		
	_	Chip Support Library		
		Software IDE should support windows7		
		to latest version of windows		
		Board Test Package		
	Warranty	Minimum one year		
	User manual and product	Required		
	documentation	-		
	Additional Requirement	All relevant technical brochures should		
		be forwarded with Tender		
		Documents. Comprehensive user guide,		
		Complete track record on where		
		the supplier has supplied the product,		
		Recommendation letter about the		
		product from the institutions where the		
		÷		
		supplier has supplied the product.		
		Manufactures' authorization should be		
		submitted with the tender documents	•0	
2.78	DSP Starter Kit (DSK)		20	
	Model	Specify		
	Country of Origin	Specify		
	Kit	DSP Development Board with 512K Flash		
		and 16MB SDRAM		
		Software IDE including the Fast Simulators		
		and access to Analysis Toolkit on Update		
		Advisor		
		Software IDE should support windows7 to		
		latest version of windows		
		Quick Start Guide Technical Reference		
		Quick Start Guide Technical Reference		
		Quick Start GuideTechnical ReferenceCustomer Support Guide		
		Quick Start GuideTechnical ReferenceCustomer Support GuideUSB Cable		
		Quick Start GuideTechnical ReferenceCustomer Support GuideUSB CableUniversal Power Supply		
		Quick Start GuideTechnical ReferenceCustomer Support GuideUSB CableUniversal Power SupplyAC Power Cord(s)		
	DSP Development Board's	Quick Start GuideTechnical ReferenceCustomer Support GuideUSB CableUniversal Power Supply		
	DSP platform	Quick Start GuideTechnical ReferenceCustomer Support GuideUSB CableUniversal Power SupplyAC Power Cord(s)TMS320C6000		
	DSP platform On board embedded	Quick Start GuideTechnical ReferenceCustomer Support GuideUSB CableUniversal Power SupplyAC Power Cord(s)TMS320C6000plug-and-play functionality through just an A-		
	DSP platform On board embedded (Standard IEEE) JTAG	Quick Start GuideTechnical ReferenceCustomer Support GuideUSB CableUniversal Power SupplyAC Power Cord(s)TMS320C6000plug-and-play functionality through just an A- to-mini B USB cable and compatibility of		
	DSP platform On board embedded (Standard IEEE) JTAG emulation	Quick Start GuideTechnical ReferenceCustomer Support GuideUSB CableUniversal Power SupplyAC Power Cord(s)TMS320C6000plug-and-play functionality through just an A- to-mini B USB cable and compatibility of external JTAG emulation interface		
	DSP platform On board embedded (Standard IEEE) JTAG emulation Stereo codec	Quick Start GuideTechnical ReferenceCustomer Support GuideUSB CableUniversal Power SupplyAC Power Cord(s)TMS320C6000plug-and-play functionality through just an A- to-mini B USB cable and compatibility of external JTAG emulation interface24-bit		
	DSP platform On board embedded (Standard IEEE) JTAG emulation Stereo codec 3.5mm audio jacks	Quick Start GuideTechnical ReferenceCustomer Support GuideUSB CableUniversal Power SupplyAC Power Cord(s)TMS320C6000plug-and-play functionality through just an A- to-mini B USB cable and compatibility of external JTAG emulation interface24-bit4(microphone, line in, speaker and line out)		
	DSP platform On board embedded (Standard IEEE) JTAG emulation Stereo codec	Quick Start GuideTechnical ReferenceCustomer Support GuideUSB CableUniversal Power SupplyAC Power Cord(s)TMS320C6000plug-and-play functionality through just an A- to-mini B USB cable and compatibility of external JTAG emulation interface24-bit		
	DSP platform On board embedded (Standard IEEE) JTAG emulation Stereo codec 3.5mm audio jacks	Quick Start GuideTechnical ReferenceCustomer Support GuideUSB CableUniversal Power SupplyAC Power Cord(s)TMS320C6000plug-and-play functionality through just an A- to-mini B USB cable and compatibility of external JTAG emulation interface24-bit4(microphone, line in, speaker and line out)		
	DSP platform On board embedded (Standard IEEE) JTAG emulation Stereo codec 3.5mm audio jacks Memory Plug-in modules	Quick Start GuideTechnical ReferenceCustomer Support GuideUSB CableUniversal Power SupplyAC Power Cord(s)TMS320C6000plug-and-play functionality through just an A- to-mini B USB cable and compatibility of external JTAG emulation interface24-bit4(microphone, line in, speaker and line out)512K words of Flash and 16 MB SDRAM		
	DSP platform On board embedded (Standard IEEE) JTAG emulation Stereo codec 3.5mm audio jacks Memory	Quick Start GuideTechnical ReferenceCustomer Support GuideUSB CableUniversal Power SupplyAC Power Cord(s)TMS320C6000plug-and-play functionality through just an A- to-mini B USB cable and compatibility of external JTAG emulation interface24-bit4(microphone, line in, speaker and line out)512K words of Flash and 16 MB SDRAMExpansion port connector		
	DSP platform On board embedded (Standard IEEE) JTAG emulation Stereo codec 3.5mm audio jacks Memory Plug-in modules Universal power supply Software	Quick Start GuideTechnical ReferenceCustomer Support GuideUSB CableUniversal Power SupplyAC Power Cord(s)TMS320C6000plug-and-play functionality through just an A- to-mini B USB cable and compatibility of external JTAG emulation interface24-bit4(microphone, line in, speaker and line out)512K words of Flash and 16 MB SDRAMExpansion port connector+5VIncluded		
	DSP platform On board embedded (Standard IEEE) JTAG emulation Stereo codec 3.5mm audio jacks Memory Plug-in modules Universal power supply	Quick Start GuideTechnical ReferenceCustomer Support GuideUSB CableUniversal Power SupplyAC Power Cord(s)TMS320C6000plug-and-play functionality through just an A- to-mini B USB cable and compatibility of external JTAG emulation interface24-bit4(microphone, line in, speaker and line out)512K words of Flash and 16 MB SDRAMExpansion port connector+5V		

			т — т	
	Warranty User manual and product	A complete Integrated DevelopmentEnvironment (IDE), an efficient optimizingC/C++ compiler assembler, linker, debugger,integrated Code Wright editor with CodeSense technology for faster code creation,data visualization, a profiler and a flexibleproject managerDSP/BIOS real-time kernelChip Support LibrarySoftware IDE should support windows7 tolatest version of windowsPlug-in ability for third-party software foradditional functionalityDSK diagnostic toolTarget error recovery softwareMinimum one yearRequired		
	documentation	1		
	Additional Requirement	All relevant technical brochures should be forwarded with Tender Documents. Comprehensive user guide, Complete track record on where the supplier has supplied the product, Recommendation letter about the product from the institutions where the supplier has supplied the product. Manufactures' authorization should be submitted with the		
2 70	Ductooug	tender documents	01	
2.79	Proteous	tender documents	01	
2.79	Model	tender documents Specify	01	
2.79	Model Country of Origin	tender documents Specify Specify	01	
2.79	Model Country of Origin Full package	tender documents Specify Specify Required	01	
2.79	Model Country of Origin	tender documents         Specify         Specify         Required         Proteus PCB Design Level 3	01	
2.79	Model Country of Origin Full package	tender documents         Specify         Specify         Required         Proteus PCB Design Level 3         Advanced Simulation Features	01	
2.79	Model Country of Origin Full package	tender documents         Specify         Specify         Required         Proteus PCB Design Level 3         Advanced Simulation Features         Proteus VSM for AVR	01	
2.79	Model Country of Origin Full package	tender documentsSpecifySpecifyRequiredProteus PCB Design Level 3Advanced Simulation FeaturesProteus VSM for AVRProteus VSM for 8051/52	01	
2.79	Model Country of Origin Full package	tender documentsSpecifySpecifyRequiredProteus PCB Design Level 3Advanced Simulation FeaturesProteus VSM for AVRProteus VSM for 8051/52Proteus VSM for HC11	01	
2.79	Model Country of Origin Full package	tender documentsSpecifySpecifyRequiredProteus PCB Design Level 3Advanced Simulation FeaturesProteus VSM for AVRProteus VSM for 8051/52Proteus VSM for HC11Proteus VSM for BASIC Stamp	01	
2.79	Model Country of Origin Full package	tender documentsSpecifySpecifyRequiredProteus PCB Design Level 3Advanced Simulation FeaturesProteus VSM for AVRProteus VSM for 8051/52Proteus VSM for HC11Proteus VSM for BASIC StampProteus VSM for 8086	01	
2.79	Model Country of Origin Full package	tender documentsSpecifySpecifyRequiredProteus PCB Design Level 3Advanced Simulation FeaturesProteus VSM for AVRProteus VSM for 8051/52Proteus VSM for HC11Proteus VSM for BASIC Stamp	01	
2.79	Model Country of Origin Full package	tender documentsSpecifySpecifyRequiredProteus PCB Design Level 3Advanced Simulation FeaturesProteus VSM for AVRProteus VSM for 8051/52Proteus VSM for HC11Proteus VSM for BASIC StampProteus VSM for 8086Proteus VSM for MSP430	01	
2.79	Model Country of Origin Full package	tender documentsSpecifySpecifyRequiredProteus PCB Design Level 3Advanced Simulation FeaturesProteus VSM for AVRProteus VSM for 8051/52Proteus VSM for BASIC StampProteus VSM for 8086Proteus VSM for MSP430Proteus VSM for PICCOLO		
2.79	Model Country of Origin Full package	tender documentsSpecifySpecifyRequiredProteus PCB Design Level 3Advanced Simulation FeaturesProteus VSM for AVRProteus VSM for 8051/52Proteus VSM for HC11Proteus VSM for BASIC StampProteus VSM for 8086Proteus VSM for MSP430Proteus VSM for PICCOLOProteus VSM for PIC Bundle 8/16bit		
2.79	Model Country of Origin Full package	tender documentsSpecifySpecifyRequiredProteus PCB Design Level 3Advanced Simulation FeaturesProteus VSM for AVRProteus VSM for 8051/52Proteus VSM for BASIC StampProteus VSM for BASIC StampProteus VSM for 8086Proteus VSM for MSP430Proteus VSM for PICCOLOProteus VSM for PIC Bundle 8/16bitProteus VSM for ARM Bundle		
2.79	Model Country of Origin Full package It should include	tender documentsSpecifySpecifyRequiredProteus PCB Design Level 3Advanced Simulation FeaturesProteus VSM for AVRProteus VSM for 8051/52Proteus VSM for BASIC StampProteus VSM for BASIC StampProteus VSM for 8086Proteus VSM for MSP430Proteus VSM for PICCOLOProteus VSM for PIC Bundle 8/16bitProteus VSM for ARM BundleProteus USB Transaction AnalyserExtension to 1 years USClatest		
2.79	Model Country of Origin Full package It should include	tender documentsSpecifySpecifyRequiredProteus PCB Design Level 3Advanced Simulation FeaturesProteus VSM for AVRProteus VSM for 8051/52Proteus VSM for BASIC StampProteus VSM for BASIC StampProteus VSM for 8086Proteus VSM for PICCOLOProteus VSM for PIC Bundle 8/16bitProteus VSM for ARM BundleProteus USB Transaction AnalyserExtension to 1 years USClatestWindows 7 to latest		
2.79	Model Country of Origin Full package It should include version windows support Usage	tender documentsSpecifySpecifyRequiredProteus PCB Design Level 3Advanced Simulation FeaturesProteus VSM for AVRProteus VSM for 8051/52Proteus VSM for 8051/52Proteus VSM for BASIC StampProteus VSM for 8086Proteus VSM for MSP430Proteus VSM for PICCOLOProteus VSM for PIC Bundle 8/16bitProteus VSM for ARM BundleProteus USB Transaction AnalyserExtension to 1 years USClatestWindows 7 to latestall academic purposes		
2.79	Model Country of Origin Full package It should include version version windows support Usage Warranty	tender documentsSpecifySpecifyRequiredProteus PCB Design Level 3Advanced Simulation FeaturesProteus VSM for AVRProteus VSM for 8051/52Proteus VSM for BASIC StampProteus VSM for BASIC StampProteus VSM for 8086Proteus VSM for PICCOLOProteus VSM for PIC Bundle 8/16bitProteus VSM for ARM BundleProteus USB Transaction AnalyserExtension to 1 years USClatestWindows 7 to latestall academic purposesMinimum one year		
2.79	Model Country of Origin Full package It should include version windows support Usage Warranty User manual and product documentation	tender documentsSpecifySpecifyRequiredProteus PCB Design Level 3Advanced Simulation FeaturesProteus VSM for AVRProteus VSM for 8051/52Proteus VSM for HC11Proteus VSM for BASIC StampProteus VSM for BASIC StampProteus VSM for S086Proteus VSM for MSP430Proteus VSM for PICCOLOProteus VSM for PIC Bundle 8/16bitProteus VSM for ARM BundleProteus USB Transaction AnalyserExtension to 1 years USClatestWindows 7 to latestall academic purposesMinimum one yearRequired		
2.79	Model Country of Origin Full package It should include version version windows support Usage Warranty User manual and product	tender documentsSpecifySpecifyRequiredProteus PCB Design Level 3Advanced Simulation FeaturesProteus VSM for AVRProteus VSM for 8051/52Proteus VSM for BASIC StampProteus VSM for BASIC StampProteus VSM for 8086Proteus VSM for PICCOLOProteus VSM for PIC Bundle 8/16bitProteus VSM for ARM BundleProteus USB Transaction AnalyserExtension to 1 years USClatestWindows 7 to latestall academic purposesMinimum one year		

		forwarded with Tender		
		Documents. Comprehensive user guide,		
		Complete track record on where		
		the supplier has supplied the product,		
		Recommendation letter about the product from		
		the institutions where the supplier has supplied		
		the product. Manufactures' authorization should		
		be submitted with the tender documents		
2.80	4DOF Robot Arm Kit	be submitted with the tender documents	05	
2.80	Model	Specify	05	
	Country of Origin	Specify		
	Description	4 Degrees of freedom aluminium Robotic Arm		
		which delivers fast, accurate, and repeatable		
	Electric crimeron of the force	movement.		
	Electric-gripper at the free-	required		
	end No of axis	5 - Crimmon (symiat notate)		
		5 + Gripper (wrist rotate)		
	Servo motion control	Local closed loop		
	Range of motion per axis	>=180 degrees		
	Accuracy of motion per axis	<= 0.09 degrees		
	Servo Voltage	6 V DC		
	Control Software	Required (at least for Windows 7 and above)		
	Software requirement	Graphical interface software which can create		
		reusable patterns quickly and enables variable		
		playback time		
	Load bearing with arm	up to 300g		
	extended			
	Gripper opening	>=30 mm		
	Gripping position	Two sided		
	Controller	Servo motor (only)		
	Power supply	DC adapter from mains (230 V/ 50 HZ)		
	connection	USB		
	Warranty	Minimum one year		
	User manual and product documentation	Required		
	Additional Requirement	All relevant technical brochures should be		
		forwarded with Tender		
		Documents. Comprehensive user guide,		
		Complete track record on where		
		the supplier has supplied the product,		
		Recommendation letter about the product from		
		the institutions where the supplier has supplied		
		the product. Manufactures' authorization		
		should be submitted with the tender documents		
2.81	6DOF Robot Arm		01	
	Model	Specify		
	Country of Origin	Specify		
	Construction	Standard six axis kinematic four servo joints		
		with gear motor, encoder and $\mu$ C per joint. Two		
		s mart servos.		
	Electric-gripper at the free-	required		
	end	•		
L	j			

1	Load bearing ca	pacity	~4(	)0g					
	Gripper	puolity		0	o finger	gripper			
	Reach				n (inclu				
	Communication				rnally C				
	Power supply				y via ma				
	Digital Inputs			$\frac{3x24}{3x24}$			(/////////////////////////////////////		
	Digital Outputs	Base				1			
	Digital Outputs			>= 4 relay outputs Typical: 2 digital Outputs, CAN, 5V,+12V and					
		i iunge			Gripper	ouputs	, 01 11 (, 0 ( , 1 1 <b>2</b> ) and		
	Control Softwar	e			11	east Wi	ndows 7 and above)		
		•		1	(101 001				
	Software require	ement	-31	) progr	amming	enviror	ment which allows to		
	~						oot in an intuitive way.		
							gram editors should		
				-		-	programs with ease.		
					simulat				
	Warranty				one yea				
	User manual and	d product		quired	•				
	documentation	-		-					
	Additional Requ	irement	All	releva	nt techn	ical bro	chures should be		
			for	warded	l with Te	ender			
			Do	cument	ts. Com	prehensi	ve user guide,		
			Co	mplete	track re	cord on	where		
							he product,		
				Recommendation letter about the product from					
				the institutions where the supplier has supplied					
							s' authorization should		
						the tend	ler documents		
2.82	Dual Measuren	nent Mul	timeter					10	
	Model	•		Spe					
	Country of Origi								
	Country of Origin			-	cify				
	Counts			>=5	50000				
	Counts Dual measureme	ent/Dual		>=5 Rec	50000 Juired				
	Counts	ent/Dual		>=5 Rec	50000 Juired	∕lax. >=4	40 Readings/s for DC		
	Counts Dual measureme Selectable measu Basic DC precis	ent/Dual ] urement s ion		>=5 Rec Rec V <=0	0000 uired uired; N 0.02%	∕lax. >=4	40 Readings/s for DC		
	Counts Dual measureme Selectable measu Basic DC precis Auto/Manual Ra	ent/Dual ] urement s ion anging	peed	>=5 Rec Rec V <=0 Rec	0000 uired uired; N 0.02% uired	∕lax. >=4	40 Readings/s for DC		
	Counts Dual measureme Selectable measu Basic DC precis Auto/Manual Ra True RMS meas	ent/Dual ] urement s ion anging	peed	>=5 Rec Rec V <=0 Rec	0000 uired uired; N 0.02%	∕lax. >=4	40 Readings/s for DC		
	Counts Dual measureme Selectable measu Basic DC precis Auto/Manual Ra True RMS meas AC+DC)	ent/Dual ] urement s ion anging surement(	AC,	>=5 Req V <=0 Req Req	0000 uired uired; N 0.02% uired uired	∕ax. >=4	40 Readings/s for DC		
	Counts Dual measureme Selectable measureme Basic DC preciss Auto/Manual Ra True RMS meas AC+DC) No. of measurem	ent/Dual ] urement s ion anging surement( nent func	AC,	>=5 Req V <= 0 Req Req Req >=	0000 uired uired; N 0.02% uired uired 11	/lax. >=4	40 Readings/s for DC		
	Counts Dual measureme Selectable measureme Basic DC preciss Auto/Manual Ra True RMS meass AC+DC) No. of measurem Temperature me	ent/Dual ] urement s ion anging surement( nent func	AC,	>=5 Req V <= 0 Req Req Req >=	0000 uired uired; N 0.02% uired uired	∕ax. >=4	40 Readings/s for DC		
	Counts Dual measureme Selectable measureme Basic DC preciss Auto/Manual Ra True RMS meas AC+DC) No. of measurem Temperature me <b>DC Voltage</b>	ent/Dual ] urement s ion anging surement( ment func asuremen	AC, tions	>=5 Rec V <=0 Rec Rec P= Rec	00000 Juired Juired; N 0.02% Juired Juired 11 Juired				
	Counts Dual measureme Selectable measureme Basic DC preciss Auto/Manual Ra True RMS meas AC+DC) No. of measurem Temperature me DC Voltage Range	ent/Dual l urement s ion anging surement( nent func easuremen	AC, tions tt	>=5 Rec V <= 0 Rec Rec 2 Rec 2 Rec 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	ioi000       juired       juired; N       0.02%       juired       juired       juired       11       juired       v     5	00 V	1000V		
	Counts Dual measureme Selectable measureme Basic DC preciss Auto/Manual Ra True RMS meas AC+DC) No. of measurem Temperature me <b>DC Voltage</b>	ent/Dual ] urement s ion anging surement( ment func asuremen	AC, tions t 5V 100u	>=5 Rec V <=0 Rec Rec P= Rec	ioi000       juired       juired; N       0.02%       juired       juired       juired       11       juired       v     5				
	Counts Dual measureme Selectable measureme Basic DC preciss Auto/Manual Ra True RMS meas AC+DC) No. of measurem Temperature me <b>DC Voltage</b> Range Resolution	ent/Dual l urement s ion anging surement( nent func easuremen	AC, tions tt	>=5 Rec V <= 0 Rec Rec 2 Rec 2 Rec 2 2 2 2 2 2 2 2 3 0 2 2 2 3 0 2 2 3 0 2 3 0 2 3 1 2 3 3 1 2 3 3 3 3 3 3 3 3 3 3 3 3	ioi000       juired       juired; N       0.02%       juired       juired       juired       11       juired       v     5	00 V	1000V		
	Counts Dual measureme Selectable measureme Basic DC preciss Auto/Manual Ra True RMS meas AC+DC) No. of measurem Temperature me <b>DC Voltage</b> Range Resolution <b>Resistance</b>	ent/Dual ] urement s ion anging urement( nent func asuremen 500mV 10uV	AC, tions tt 5V 100u V	>=5 Rec V <= 0 Rec Rec 2 Rec 2 Rec 3 0 1m <sup>3</sup>	50000           puired           puired; N           0.02%           puired           puired           11           puired           V           5           V           1	00 V 0mV	1000V 100mV		
	Counts Dual measureme Selectable measureme Basic DC preciss Auto/Manual Ra True RMS meas AC+DC) No. of measurem Temperature me <b>DC Voltage</b> Range Resolution <b>Resistance</b> Range	ent/Dual ] urement s ion anging surement( ment func easurement 500mV 10uV	AC, tions at 5V 100u V 5k	>=5 Req V <<=0 Req Req >= Req 50 1m	50000         puired         puired; N         0.02%         puired         puired         11         puired         V       5         V       1         500k	00 V 0mV 5M	1000V 100mV 50M		
	Counts Dual measureme Selectable measureme Basic DC preciss Auto/Manual Ra True RMS meas AC+DC) No. of measurem Temperature me <b>DC Voltage</b> Range Resolution <b>Resistance</b> Range Range Resolution	ent/Dual ] urement s ion anging urement( nent func asuremen 500mV 10uV	AC, tions tt 5V 100u V	>=5 Rec V <= 0 Rec Rec 2 Rec 2 Rec 3 0 1m <sup>3</sup>	50000           puired           puired; N           0.02%           puired           puired           11           puired           V           5           V           1	00 V 0mV	1000V 100mV		
	Counts Dual measureme Selectable measureme Basic DC precise Auto/Manual Ra True RMS meas AC+DC) No. of measurem Temperature me <b>DC Voltage</b> Range Resolution <b>Resistance</b> Range Resolution <b>DC Current</b>	ent/Dual 1 urement s ion anging surement( ment func asurement 500mV 10uV	AC, tions at 5V 100u V 5k 100m	>=5         Req         V         <=0	50000           puired           puired; N           0.02%           puired           puired           11           puired           V           5           V           10	00 V 0mV 5M 100	1000V 100mV 50M 1k		
	Counts Dual measureme Selectable measureme Basic DC preciss Auto/Manual Ra True RMS meas AC+DC) No. of measurem Temperature me <b>DC Voltage</b> Range Resolution <b>Resistance</b> Range Range Resolution	ent/Dual ] urement s ion anging surement( ment func easurement 500mV 10uV	AC, tions at 5V 100u V 5k 100m	>=5 Req V <<=0 Req Req >= Req 50 1m	50000         puired         puired; N         0.02%         puired         puired         11         puired         V       5         V       1         500k	00 V 0mV 5M	1000V 100mV 50M 1k 10A		
		A			А				
--	--------------------------------------	-------------------	-------------	------------	---------------------	-----------	----------	----	------
	Continuity	· ·				•			
	Range: 5000.0 Ω           Diode Test			olution: 1	$00 \text{m}\Omega$				
	Range: 5.0000 V		Resc	olution: 1	00µV				
	Capacitance								
	Range	$5nF(0.5\sim1nF)$		,	•	10nF)/			
		50nF(10~50n)							
	Resolution	0.001nF/0.00	$\ln F/0.0$	01nF/0.02	1nF/0.11	nF/1nF/1	10nF		
	Temperature								
	Range: <=-200 deg	C to $>=+300$	Resc	olution: <	$= 0.1 \mathrm{de}$	eg. C			
	deg C	T							
	Display	VFD, TowCo		<u> </u>					
	Interface	USB Device,		Host, GPI	В				
	Power Source	AC 230V/ 50	Hz						
	Power	Max. 15VA							
	Consumption			1					 
	Accessories	Power cord, T							
	Required	thermocouple		Cable, G	PIB Ca	ble, GPI	B-O2B-H2	5	 
	Warranty	Minimum one	e year						
	User manual and	Required							
	product documentation								
	Additional	All relevant te	chnice	al brochu	res show	uld be fo	rwarded		
	Requirement	with Tender I							
	Kequitement	Complete trac						be	
		the product, R							
		product from							
		supplied the p						ld	
		be submitted							

## **3. Bidders Response**

Item	Name and Minimum Specifications		Bido Resp		If "No" indicate the
No		Tunie and Minimum Specifications			specification Offered
2.1	Rasberry Pi Single board Li	nux platform			
	Model	Specify			
	Country of Origin	Specify			
	Architecture	Raspberry Pi 2(B)			
	CPU	A 900MHz quad-core ARM Cortex-A7			
	RAM	1GB			
	No. of USB 2.0 ports	4			
	No. of GPIO pins	40 pins with 2 EEPROM Plate			
	Evil UDML a sat	identification pins			
	Full HDMI port	required (on-board)			
	Ethernet port	required (on-board)			
	Camera interface (CSI)	required (on-board)			
	Display interface (DSI) Micro SD card slot	required (on-board)			
	Video core	required (on-board) video core IV with 3D graphics core			
	Power supply	5V			
	11 0				
	Supply protection	polarity protection 2A fuse			
	Warranty	hot-swap protection			
	Warranty User manual and product	Specify           Required			
	documentation	Kequilea			
	Additional Requirement	All relevant technical brochures should			
	Additional Requirement	be forwarded with Tender			
		Documents.			
		Comprehensive user guide, Complete			
		track record on where the supplier has			
		supplied the product, Recommendation			
		letter about the product from the			
		institutions where the supplier has			
		supplied the product.			
		Manufactures' authorization should be			
		submitted with the tender documents			
2.2	Beagle Bone Single board Li	nux platform			
	Model	Specify			
	Country of Origin	Specify			
	CPU	AM3358BZCZ100			
	Architecture	BeagleBone			
	Clock speed	1GHz			
	DRAM	512MB DDR3L 800MHZ			
	JTAG	onboard 20-pin CTI			
	Serial debug interface	Header (UART0 access via 6-pin 3.3V			

		TTL header)	
	on-board flash storage	4GB 8-bit eMMC	
	floating-point accelerator	NEON	
	32-bit microcontrollers	2 x PRU type	
	USB client for power &	required	
	communication	required	
	USB host	required (2.0)	
	10/100 RJ45 Ethernet port	required	
	HDMI port	required (on-board)	
	Pin Header	92-pin header with cape compatibility	
	Power supply	5V	
	Warranty	Specify	
	User manual and product	Required	
	documentation	1	
	Additional Requirement	All relevant technical brochures	
	1	should be forwarded with Tender	
		Documents. Comprehensive user	
		guide, Complete track record on where	
		the supplier has supplied the product,	
		Recommendation letter about the	
		product from the institutions where the	
		supplier has supplied the	
		product. Manufactures' authorization	
		should be submitted with the	
		tender documents	
2.3	Banana Pi Single board Linux		
	Model	Specify	
	Country of Origin	Specify	
	SoC	ARM Cortex-A7 dual-core, 1GHz,	
		Mali400MP2 GPU	
	Architecture	Banana Pi	
	System Memory		
	· · ·	1GB DDR3 DRAM	
	Video output	HDMI	
	· · ·	HDMI Composite	
	· · ·	HDMI	
	· · ·	HDMI Composite	
	Video output	HDMICompositeExtensible with on-board LVDS	
	Video output	HDMICompositeExtensible with on-board LVDS3.5mm stereo jack output	
	Video output Audio output	HDMI         Composite         Extensible with on-board LVDS         3.5mm stereo jack output         On-board microphone input	
	Video output       Audio output       Connectivity	HDMICompositeExtensible with on-board LVDS3.5mm stereo jack outputOn-board microphone inputGigabit Ethernet	
	Video output       Audio output       Connectivity	HDMICompositeExtensible with on-board LVDS3.5mm stereo jack outputOn-board microphone inputGigabit Ethernet2 x USB 2.0 ports1 x OTG micro USB port1 x micro USB for power supply	
	Video output       Audio output       Connectivity	HDMICompositeExtensible with on-board LVDS3.5mm stereo jack outputOn-board microphone inputGigabit Ethernet2 x USB 2.0 ports1 x OTG micro USB port	
	Video output       Audio output       Connectivity       USB	HDMICompositeExtensible with on-board LVDS3.5mm stereo jack outputOn-board microphone inputGigabit Ethernet2 x USB 2.0 ports1 x OTG micro USB port1 x micro USB for power supply	
	Video output       Audio output       Connectivity       USB	HDMICompositeExtensible with on-board LVDS3.5mm stereo jack outputOn-board microphone inputGigabit Ethernet2 x USB 2.0 ports1 x OTG micro USB port1 x micro USB for power supplyExtensible 26-pin headersCamera connector,	
	Video output       Audio output       Connectivity       USB	HDMICompositeExtensible with on-board LVDS3.5mm stereo jack outputOn-board microphone inputGigabit Ethernet2 x USB 2.0 ports1 x OTG micro USB port1 x micro USB for power supplyExtensible 26-pin headers	
	Video output       Audio output       Connectivity       USB	HDMICompositeExtensible with on-board LVDS3.5mm stereo jack outputOn-board microphone inputGigabit Ethernet2 x USB 2.0 ports1 x OTG micro USB port1 x micro USB for power supplyExtensible 26-pin headersCamera connector,Display connector for LVDS andtouch screen	
	Video output       Audio output       Connectivity       USB       Expansion	HDMICompositeExtensible with on-board LVDS3.5mm stereo jack outputOn-board microphone inputGigabit Ethernet2 x USB 2.0 ports1 x OTG micro USB port1 x micro USB for power supplyExtensible 26-pin headersCamera connector,Display connector for LVDS and	
	Video output       Audio output       Connectivity       USB       Expansion	HDMICompositeExtensible with on-board LVDS3.5mm stereo jack outputOn-board microphone inputGigabit Ethernet2 x USB 2.0 ports1 x OTG micro USB port1 x micro USB for power supplyExtensible 26-pin headersCamera connector,Display connector for LVDS andtouch screen3 x on-board buttons, (Power, Reset,	

		Required		
	documentation			
	Additional Requirement		technical brochures	
			rwarded with Tender	
			Comprehensive user	
			plete track record on where	
			has supplied the product,	
			lation letter about the	
		1	n the institutions where the	
			supplied the product.	
			es' authorization should be	
			ith the tender documents	
2.4	Programmable microcontroller dev	velopment b		
	Model	Specify		
	Country of Origin		Specify	
	Microcontrollers		Microchip PIC16F &	
			18F (40 pin)	
	Dual layered PCB with SMD compo		required	
	40 Pin ZIF socket(for microcontroller	r insertion)	required	
	LEDs (SMD)		8 (on-board)	
	Keypad		4 x 4 model	
	Real time clock		DS1307 (with battery	
			holder)	
	Temperature sensor		DS18B20 (on-board)	
	Buzzer		required (on-board)	
	EEPROM		required (on-board)	
	IR sensor		required (on-board)	
	Seven segment display		4	
	MicroSD card slot		required	
	Potentiometer			
	on-board LCD display module		2 x variable (0 - 5 V) 16x2 Blue Character	
	1 2		with separate brightness	
			control	
	RS232 Connectivity		required	
	USB connectivity		required	
	On-board 5V voltage regulator		required (LM2596)	
	On board socket to insert variable Os	cillator	required	
	audio output		required	
	Accessories		Crystal	
			oscillators(4MHz,8MHz,	
			20MHz)	
			Micro jumpers for	
			configuration	
			User manual/	
			documentation	
	Warranty		Specify	
	Additional Requirement		All relevant technical	
	1		brochures should be	
			forwarded with Tender	
			Documents.	

		T	 	
		Comprehensive user		
		guide, Complete track		
		record on where		
		the supplier has supplied		
		the product,		
		Recommendation letter		
		about the product from		
		the institutions where the		
		supplier has supplied the		
		product. Manufactures'		
		authorization should be		
		submitted with the		
		tender documents		
2.5	Micro controller programmer with universal p	programming adapter		
	seat, USB cable and 6 pin cable			
	Model	Specify		
	Country of Origin	Specify		
	Supported microcontrollers	Microship PIC16/18XX		
	(for both programmer and adapter seat)	40PIN Series devices		
		(except 16F59)		
		Microship PIC16/18XX		
		28PIN Series devices		
		(except 16F57)		
		Microship PIC16/18XX		
		18PIN Series devices		
		Microship PIC		
		8PIN/14PIN/20PIN		
		family of devices (except 10FXX)		
	Real-time clock execution	Required		
	MPLAB IDE compatible	Required		
	Built-in over-voltage/short circuit monitor	required		
	Firmware upgradeable from PC/web download	required		
	Supply voltage	2 - 6 V		
	Diagnostic LED	required		
	Required functionalities	Read/Write program in		
	Required functionalities	data memory		
		of microcontroller.		
		Erase the program		
		memory and verify it.		
	Accessories	USB cable (Full speed		
	7000500105	12 Mbits/s interface to		
		host PC)		
		6 pin cable (connects the		
		programmer and adapter seat)		
		User		
		manual/documentation		
		manual/documentation		

	Warranty	Specify	
	Additional Requirement	All relevant technical brochures should be	
		forwarded with Tender	
		Documents.	
		Comprehensive user	
		guide, Complete track record on where	
		the supplier has supplied	
		the product,	
		Recommendation letter	
		about the product from	
		the institutions where the	
		supplier has supplied the	
		product. Manufactures'	
		authorization should be	
		submitted with the	
		tender documents	
2.6	Programmable microcontroller development b included	oard with bread board	
	Model	Specify	
	Country of Origin	Specify	
	Compatible microcontroller	Microchip PIC18F4550	
	In-built power supply components	Required (on-board)	
	Internal Flash Program Memory	32 kb	
	Direct USB in-circuit programming interface	Required	
	On-board push buttons	4	
	Adjustable analog inputs	4	
	Test LEDs	4	
	Bread board (on-board)	required	
	Connectivity	RS232 and USB	
	In-circuit debugger	required with Microchip ICD2 Unit	
	Warranty	Specify	
<u> </u>	User manual/documentation	Required	
	Additional Requirement	All relevant technical	
		brochures should be	
		forwarded with Tender	
		Documents.	
		Comprehensive user	
		guide, Complete track	
		record on where	
		the supplier has supplied	
		the product,	
		Recommendation letter	
		about the	
		product from the	
		institutions where the	
		supplier has supplied the	
		product. Manufactures'	

r			1	
		authorization should be		
		submitted with the tender documents		
2.7	Microcontrollor startor bit wi	th necessary software tools (builder,		
<i>4.1</i>	simulator, emulator) and ISP			
	Model			
		Specify		
	Country of Origin	Specify		
	Device support	ATtiny series (13, 26, 2313, 45, 261, 461, 85, 861, 24, 44, 84-ISP only)		
		ATmega series (48, 8, 88, 16, 161, 162, 163, 164P, 165, 168, 169, 32, 325, 324P, 329, 644, 644P, 645, 649, 8515, 8535)		
		AT90CAN series (32, 64, 128)		
		AT90PWM series (2/3, 31)		
	Required sockets	1 x 8		
		2 x 20		
		1 x 28		
		2 x 40		
	Port Headers	0.1" (2.54mm) DIL headers for all ports,		
		including a Vcc and Ground		
		pin for external circuitry		
	8-way bar LED	required		
	Switches (on-board)	>= 8		
	On-board RS232 port with DB9 connector	required		
	LCD Interface connector	14-way connector		
	Compatible supply voltages	3.3V and 5V		
	Brownout circuitry	required		
	ADC interface with reference pin	required		
	External Memory	74HC573 address latch and Flash RAM sockets		
	UART connectivity	required (for peripherals)		
	Accessories	Necessary AVR device		
		ISP Parallel Port Programmer (USB)		
		. Programming lead, LED and Socket leads		
		Software tools and manuals:		
		- Programming software		
		- Application Builder		
		- User Manual		
		- Code Examples		
		- Board schematics		
		- Device datasheets		
		- Atmel AVR Studio3 and 4.		

		AVREdit IDE/Editor with AVRGCC 3.2 Compiler	
	Warranty   Si	pecify	
	fc D C th R pr st st st	Il relevant technical brochures should be orwarded with Tender ocuments. Comprehensive user guide, omplete track record on where the supplier has supplied the product, ecommendation letter about the roduct from the institutions where the upplier has supplied the roduct. Manufactures' authorization hould be submitted with the onder documents	
2.8	FPGA trainer board		
	Model	Specify	
	Country of Origin	Specify	
	Device (IC)	Xilinx Artix-7 FPGA (XC7A35T- 1CPG236C)	
	Connectivity	USB A	
		USB micro-B	
		Four 12-pin Pmod connectors	
		VGA	
	No. of logical cells	>=33,280	
	RAM	>=1800 kb	
	clock management tiles	5 (each with a PLL)	
	DSP slices	>=90	
	Internal clock speed	450 MHz	
	On-chip analog-to-digital converte	required	
	USB-JTAG port	required	
	Required on-board items.	Serial Flash	
	1	USB-UART Bridge	
		12-bit VGA output	
		USB HID Host for mice, keyboards	
		and memory sticks	
		>=16 user switches	
		>=16 user LEDs	
		>=5 user pushbuttons	
		4-digit 7-segment display	
		4 Pmod connectors	
		3 Standard 12-pin Pmod connectors	
	Accessories	-	
	Accessories	User manual/ Required documents	
		documents       Standard USB A to     2.0 and above	
		Sit (liedily)	
	Warranty	Minimum one year	
	Additional Requirement	All relevant technical brochures	

		should be for	warded with Tender			
			Comprehensive user			
			ete track record on where			
			as supplied the product, tion letter about the			
		supplier has s	the institutions where the			
			ufactures' authorization			
			mitted with the			
		tender docum				
2.9	Transistor based voltage regulator					
2.)	Model		Specify			
	Country of Origin		Specify			
-	Demonstration circuit for Zener volt	000	required			
	regulation circuit					
	Demonstration circuit for Zener volt	age regulator	required			
	with series and parallel					
	transistor					
	Demonstration circuit for Voltage re variable output	gulator with	required			
	Demonstration circuit for voltage re	gulator with	required		1	
	short-circuit protection and	-				
	Darlington transistor					
	Training manual		required			
	Power supply		15 Vdc, 750 mA			
	Warranty		Minimum one year			
	Additional Requirement		All relevant technical			
	-		brochures should be			
			forwarded with Tender			
			Documents.			
			Comprehensive user			
			guide, Complete track			
			record on where			
			the supplier has			
			supplied the product,			
			Recommendation letter			
			about the			
			product from the			
			institutions where the			
			supplier has supplied			
			the product.			
			Manufactures'			
			authorization should be			
			submitted with the			
			tender documents			
2.10	Digital combinatory logic training					
	Model	Specify				
	Country of Origin	Specify				
	Required operations	adders				
	(with isolated circuit for each	subtractors				
L	L			· · · · ·		

	operation)	multipliers		
	operation)	code converters		
		Multiplexers		
		demultiplexers		
	Minimum no. Of logic gates	-4 AND (2-input)		
		-3 AND (3-input)		
		-12 NAND (2-input)		
		-4 NAND (4-input)		
		-2 NAND TRIGGER (4-input)		
		-4 OR (2-input)		
		-2 OR (3-input)		
		-1 OR (4-input)		
		-4 NOR (2-input)		
		-2 NOR (4-input)		
		-4 XOR (2-input)		
		-6 inverters		
		-2 AOI (2 and 3 input)		
		-12 silicon diodes		
		-1 dual-in-line 16-pin socket		
	Power supply	5Vdc, 5W		
	Accessories	Instruction manual/ teaching		
		material		
	Warranty	Minimum one year		
	Additional Requirement	All relevant technical brochures		
		should be forwarded with Tender		
		Documents. Comprehensive user		
		guide, Complete track record on		
		where the supplier has supplied the		
		product, Recommendation letter		
		about the product from the		
		institutions where the supplier has		
		supplied the product. Manufactures'		
		authorization should be submitted		
		with the tender documents		
2.11	Digital sequential logic trainer kit			
	Model	Specify		
	Country of Origin	Specify		
	Required operations (with isolated	MSI circuits in TTL logic		
	circuit for each operation)			
		synchronous and asynchronous counters		
		shift registers		
		astable and		
		monostablemultivibrators		
		seven segment displays		
	Minimum no. Of components (used	• 4 JK/MS flip-flop		
	in the circuits)	• 2 D flip-flop		
		• a BCD synchronous counter		

1			 	
		• a binary 4-bit synchronous counter		
		• a BCD asynchronous counter		
		• a binary 4-bit asynchronous		
		counter		
		• 2 monostablemultivibrators		
		• a shift register, 8-bit SI-SO		
		• 2 BCD 7-segment decoders		
		• 2 7-segment displays		
		• 2 BCD rotating switches		
		• 8 capacitors		
		• 2 linear potentiometers		
	Power supply	5Vdc, 5W		
	Accessories	Instruction manual/ teaching		
	XX7 /	material	 	
	Warranty	Minimum one year	 	
	Additional Requirement	All relevant technical brochures		
		should be forwarded with Tender		
		Documents. Comprehensive user		
		guide, Complete track record on where the supplier has supplied the		
		product, Recommendation letter		
		about the product from the		
		institutions where the supplier has		
		supplied the product. Manufactures'		
		authorization should be submitted		
		with the tender documents		
2.12	Digital Electronic trainer kit			
	Model	Specify		
	Country of Origin	Specify		
	Required operations	Basic logic circuits		
	Required operations			
	Required operations	Schmitt triggers	 	
		Schmitt triggers Bistablemultivibrators		
	Required operations	Schmitt triggersBistablemultivibratorsMonostablemultivibrators	 	
		Schmitt triggersBistablemultivibratorsMonostablemultivibratorsCode converters, coders		
		Schmitt triggersBistablemultivibratorsMonostablemultivibrators		
	Required operations	Schmitt triggersBistablemultivibratorsMonostablemultivibratorsCode converters, coders		
		Schmitt triggersBistablemultivibratorsMonostablemultivibratorsCode converters, codersArithmetic circuitsCounting circuits		
		Schmitt triggersBistablemultivibratorsMonostablemultivibratorsCode converters, codersArithmetic circuitsCounting circuitsRegister circuits		
		Schmitt triggersBistablemultivibratorsMonostablemultivibratorsCode converters, codersArithmetic circuitsCounting circuits		
		Schmitt triggersBistablemultivibratorsMonostablemultivibratorsCode converters, codersArithmetic circuitsCounting circuitsRegister circuitsMultiplex mode Arithmetic Logic		
		Schmitt triggersBistablemultivibratorsMonostablemultivibratorsCode converters, codersArithmetic circuitsCounting circuitsRegister circuitsMultiplex mode Arithmetic LogicUnitMemory circuits		
		Schmitt triggersBistablemultivibratorsMonostablemultivibratorsCode converters, codersArithmetic circuitsCounting circuitsRegister circuitsMultiplex mode Arithmetic LogicUnitMemory circuitsAnalog-Digital converters		
		Schmitt triggersBistablemultivibratorsMonostablemultivibratorsCode converters, codersArithmetic circuitsCounting circuitsRegister circuitsMultiplex mode Arithmetic LogicUnitMemory circuitsAnalog-Digital convertersDigital-Analog converters		
	Minimum no. Of components	Schmitt triggersBistablemultivibratorsMonostablemultivibratorsCode converters, codersArithmetic circuitsCounting circuitsRegister circuitsMultiplex mode Arithmetic LogicUnitMemory circuitsAnalog-Digital convertersDigital-Analog converters-4-bit comparator		
		Schmitt triggersBistablemultivibratorsMonostablemultivibratorsCode converters, codersArithmetic circuitsCounting circuitsRegister circuitsMultiplex mode Arithmetic LogicUnitMemory circuitsAnalog-Digital convertersDigital-Analog converters-4-bit comparator-4 JK-flip flops / RS flip flops		
	Minimum no. Of components	Schmitt triggersBistablemultivibratorsMonostablemultivibratorsCode converters, codersArithmetic circuitsCounting circuitsRegister circuitsMultiplex mode Arithmetic LogicUnitMemory circuitsAnalog-Digital convertersDigital-Analog converters-4-bit comparator-4 JK-flip flops / RS flip flops-4 D-flip flops		
	Minimum no. Of components	Schmitt triggersBistablemultivibratorsMonostablemultivibratorsCode converters, codersArithmetic circuitsCounting circuitsRegister circuitsMultiplex mode Arithmetic LogicUnitMemory circuitsAnalog-Digital convertersDigital-Analog converters-4-bit comparator-4 JK-flip flops / RS flip flops-4 D-flip flops-2 adders (4-bit), with input and		
	Minimum no. Of components	Schmitt triggersBistablemultivibratorsMonostablemultivibratorsCode converters, codersArithmetic circuitsCounting circuitsRegister circuitsMultiplex mode Arithmetic LogicUnitMemory circuitsAnalog-Digital convertersDigital-Analog converters-4-bit comparator-4 JK-flip flops / RS flip flops-4 D-flip flops		

	Auxiliary section (on board)	<ul> <li>-Demultiplexer (4 channels)</li> <li>-Shift register (4-bit, parallel and serial operation possible, bi-directional )</li> <li>-ALU (for conducting 16 arithmetic and 16 logical computing operations with 4-bit dual numbers)</li> <li>-Binary counter (4-bit, up/down counter)</li> <li>-2 inverters</li> <li>-2 Schmitt triggers( inverting )</li> <li>-Units complements for negating a</li> <li>4-bit binary number</li> <li>-Antivalence and equivalence gates EEPROM</li> <li>-AD/DA converter 8-bit</li> <li>8 logic probes with led for high and low level</li> <li>8 switches with led to generate logic level</li> </ul>		
	Accessories	B192 seven segment led displays         with BCD decoder         Instruction manual/ teaching		
		material		
	Warranty Additional Requirement	Minimum one yearAll relevant technical brochuresshould be forwarded with TenderDocuments. Comprehensive userguide, Complete track record onwhere the supplier has supplied theproduct, Recommendation letterabout the product from theinstitutions where the supplier hassupplied the product. Manufactures'authorization should be submittedwith the tender documents		
2.13	Stepper Motor Control kit	0		
	Model	Specify		
	Country of Origin	Specify		
	Required operations	Analysis of the operation of a stepper motorAnalysis of the control criteria and of the power modulesFull step or half stepVariable speed rotation controlInversion of the rotation direction		
	Power supply	230 Vac, 50 Hz		

	Technical features	Step angle: 1.8°		
		Number of phases: 4		
		Max. power: 16 W		
		Sense of rotation: reversible		
		Current/phase max: 1.5 A		
		Variable frequency from 20 Hz to		
	Accessories	500 Hz through potentiometerInstruction manual/ teaching		
	Accessories	material		
	Warranty	Minimum one year		
	Additional Requirement	All relevant technical brochures		
	1	should be forwarded with Tender		
		Documents. Comprehensive user		
		guide, Complete track record on		
		where the supplier has supplied the		
		product, Recommendation letter		
		about the product from the		
		institutions where the supplier has supplied the product. Manufactures'		
		authorization should be submitted		
		with the tender documents		
2.14	Universal motor control board		03	
	Model	Specify		
	Country of Origin	Specify		
	Required features	Integrated four-quadrant display		
	(operational)	Variable centrifugal mass		
		Dual-channel encoder		
1		Built-in four-quadrant amplifier		
	Technical features	Linear H bridge to have full motor		
		control		
		Dual optical sensor for speed and		
		direction		
		Main Motor/Generator 12 V		
		(around), 3000 rpm (around), 1.2 A		
		(around), 3.2 Ncm (around)		
		Load to be connected to the		
		secondary Motor/Generator	<u> </u>	
		Shunt to limit and measure the		
	Accessories	current Instruction manual/ teaching		
		material		
	Warranty	Minimum one year		
	Additional Requirement	All relevant technical brochures	1	
	1	should be forwarded with Tender		
		Documents. Comprehensive user		
		guide, Complete track record on		i

$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	
$\begin{tabular}{ c c c c c c } \hline Light receiving element & Silicon photo diode & & & & & & & & & & & & & & & & & & &$	
$\begin{tabular}{ c c c c c c c } \hline Display & Display: 4 digit, 2000 count LCD & & & & & & & & & & & & & & & & & & &$	
Display unit: $lx (lux) Display updaterate: 500 ms ±20 msPreferred measurementrangesRangeMeasurement rangeDisplaystep20 lx0.00 lx to 20.00 lx200 lx0.00 lx to 200.0 lx2000 lx0 lx to 2000 lx2000 lx0 lx to 2000 lx2000 lx0 lx to 2000 lx2000 lx0 lx to 20000 lx20000 lx00 lx to 20000 lx20000 lx00 lx to 20000 lx20000 lx000 lx to 20000 lx20000 lx000 lx to 20000 lx20000 lx000 lx to 200000 lx20000 lx000 lx to 20000 lx100count/step20000 lx000 lx20000 lx000 lx20000 lx000 lx20000 lx000 lx20000 lx000 lx$	
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	
ranges $20 \text{ lx}$ $0.00 \text{ lx to } 20.00 \text{ lx}$ $1 \text{ step}$ $20 \text{ lx}$ $0.00 \text{ lx to } 20.00 \text{ lx}$ $1 \text{ count/step}$ $200 \text{ lx}$ $0.0 \text{ lx to } 2000 \text{ lx}$ $0 \text{ lx to } 2000 \text{ lx}$ $2000 \text{ lx}$ $0 \text{ lx to } 2000 \text{ lx}$ $10 \text{ count/step}$ $20000 \text{ lx}$ $00 \text{ lx to } 20000 \text{ lx}$ $10 \text{ count/step}$ $200000 \text{ lx}$ $000 \text{ lx to } 20000 \text{ lx}$ $100 \text{ count/step}$ $200000 \text{ lx}$ $000 \text{ lx to } 200000 \text{ lx}$ $100 \text{ count/step}$ $200000 \text{ lx}$ $000 \text{ lx to } 200000 \text{ lx}$ $100 \text{ count/step}$ $200000 \text{ lx}$ $000 \text{ lx to } 200000 \text{ lx}$ $100 \text{ count/step}$ $200000 \text{ lx}$ $000 \text{ lx to } 200000 \text{ lx}$ $100 \text{ count/step}$ $200000 \text{ lx}$ $000 \text{ lx to } 200000 \text{ lx}$ $100 \text{ count/step}$ $100  co$	
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	
$\begin{tabular}{ c c c c c c } \hline & & & & & & & & & & & & & & & & & & $	
$\begin{tabular}{ c c c c c c } \hline & & & & & & & & & & & & & & & & & & $	
Range selectionAuto/ManualLinearity<= $\pm 2\%$ rdgTemperature characteristics<= $\pm 3\%$ rdgHumidity<= $\pm 3\%$ rdg	
Linearity $<= \pm 2\%$ rdgTemperature characteristics $<= \pm 3\%$ rdgHumidity $<= \pm 3\%$ rdg	
Temperature characteristics $<= \pm 3\%$ rdgHumidity $<= \pm 3\%$ rdg	
characteristics       Humidity       <= ±3% rdg	
characteristics	
Response time     Auto range: within 5 seconds	
Manual range: within 2 seconds	
Power supply $AA/LR6$ alkaline battery $\times 2$	
R6 Manganese battery × 2	
USB bus power 5V DC	
Operating temperature and humidity -10°C to 40°C (14°F to 104°F), 80% RH or less (non-condensing)	
and humidity(non-condensing)Storage temperature-20°C to 50°C (-4°F to 122°F), 80% RH or less	
and humidity (non-condensing)	
Applicable standards     Safety: EN61010, EMC: EN61326	
Dustproof and waterproof     IP40 (EN60529)	
Accessories Instruction Manual ×1	
$A = \frac{1}{A + A}$	
$\frac{1400 \text{ Ereo alkaline battery } \times 2}{\text{Sensor cap (with strap)} \times 1}$	
$\frac{\text{Carrying case (soft)} \times 1}{\text{Carrying case (soft)} \times 1}$	
$\frac{\text{Strap \times 1, USB cable (0.9 m) \times 1}}{\text{Strap \times 1, USB cable (0.9 m) \times 1}}$	
CD-R (USB driver)	

		dedicated computer a	pplication software		
		communications spec			
	Warranty	Minimum one year	,		
	Additional Requirement	All relevant technical	l brochures should be		
		forwarded with Tend			
		Documents. Compreh	hensive user guide,		
		Complete track recor	-		
		the supplier has supplied			
		Recommendation lett	ter about the		
		product from the inst	itutions where the supplier		
		has supplied the prod			
		authorization should	be submitted with the		
		tender documents			
2.16	Power Pack				
	Model	Specify			
	Country of Origin	Specify	\		
	Supply voltage	380-400/220-230	)V	<b></b>	
	Frequency	50Hz. 3-ph.		<u> </u>	
	Output voltage	DC fixed	220 V 3.5 A	<b></b>	
	4	DC variable	0-220 V 16 A		
	_	AC fixed	230/133 V 10 A 3-ph		
		AC variable	AC variable 3 x 0-230 V 10 A 3- ph 230 V 10 A		
	Standard Fixed AC				
	Physical requirements	Mobile unit			
	Warranty	Minimum one ye	Minimum one year Required		
	User manual and product documentation	Required			
	Additional Requirement	All relevant tech	nical brochures should be		
	-	forwarded with T	Fender		
		Documents. Con	nprehensive user guide,		
		Complete track r	ecord on where the supplier		
		has supplied the	product, Recommendation		
			roduct from the institutions		
			er has supplied the product.		
			uthorization should be		
			ne tender documents		
2.17	Power Factor Control U				
	Model	Specify			
	Country of Origin	Specify			
	Number of 3-ph groups	>= 6		<b></b>	
	Power factor setting		0.7 inductive to 0.7 capacitive		
L	Nominal voltage		3 x 400 V,50 Hz		
	Nominal power	0-2 kVAr cap.			
	PF-Controller	Automatic or man			
			times, switching sequences		
		and strategies			
	Monitoring and	Voltage			
	Measurement on the	Current			
	controller	Power factor			

	Switching modes	Linear and circu	lar	
	Indication lamps		s for the capacitor groups	
	<b>F</b>	which are conne		
	Power supply	1-ph 220 - 240 V		
	Warranty	Minimum one y		
	User manual and product	Required		
	documentation	1		
	Additional Requirement		nnical brochures should be	
		forwarded with		
			nprehensive user guide,	
			record on where	
			supplied the product,	
			on letter about the	
			e institutions where the	
			plied the product.	
			he tender documents	
2.18	A supervised Wind Mill			
2.10	Asynchronous Wind Mill Model	System menualing		
	Country of Origin		Specify Specify	
	Minimum/maximum power	by design	<= 0.5 and $>= 2.0$ kVA	
	winning maximum power	by design	input	
	Magnetising capacitors		3-step selector (switch)	
	Compensating inductors		3-step selector (switch)	
	Resistiveloadbank onDC-sid	۵	continuously controlled by	
	Resistiveroadbalik oliDC-sid		PWM-unit	
	3-phase rectifier block		Required	
	V-meter for AC-input		250 V AC	
-	V-meter for DC-output		400 V DC	
	A-meter for AC-input		6 A AC	
	A-meter for capacitive curre	nt	6 A AC	
	A-meter for inductive current		4 A AC	
	A-meter for DC-output		6 A DC	
	Short- and long HVDC cable	e model	Required	
-	Suitable induction machine	std	~ 0.75 – 1.5 kW	
	Advanced 4Q-converter incl		>1.5 kW	
	External alternative inputs fr		3x230 V generator, ind. or	
	1		synchr.	
	-		3x230 V power supply	
			max 300 V DC	
	Power supply		3x400V AC,16A,50Hz	
	Warranty		Minimum one year	
	User manual and product do	cumentation	Required	
	Additional Requirement		All relevant technical	
			brochures should be	
			forwarded with Tender	
			Documents.	
			Comprehensive user	
			guide, Complete track	
			record on where	

2.19	Flex Stand         Model         Country of Origin         Height         Weight         No. of slots         Warranty         User manual and product documenta         Additional Requirement	ation	the pro- Recom about t institut supplie produc authori submit tender Specify 1-1.5 <=10k >=12 Minim Require All rele brochu forward Docum Comple wherett supplie Recom about t institut supplie	mendation letter he product from the ions where the r has supplied the t. Manufactures' zation should be ted with the documents m g um one year ed vant technical res should be led with Tender	
2.20	Flex set		tender	locuments	
	Model	Specify			
	Country of Origin	Specify			
	No. of Leads	100			
	Area	$2.5 \text{ mm}^2$	11 5		
	No. colours	5 (Red, Yellow, Blue, Black, Yellow/Green) 25 cm		ue, Black,	
	Paguirad Langths				
	Required Lengths	25 cm 50 cm			
		100 cm			
		100 cm 200 cm			
	Quantity	Red		5 in each length	
		Yellow		5 in each length	
	4	Blue		5 in each length	
	4	Black		5 in each length	
	4	Yellow/gr	een	5 in each length	

	Warranty	Minimum one year		
	User manual and product	Required		
	documentation	•		
	Additional Requirement	All relevant technical b	orochures	
	1	should be forwarded w	ith Tender	
		Documents. Comprehe	ensive user	
		guide, Complete track		
		where the supplier has		
		product, Recommenda		
		the product from the in		
		where the supplier has		
		product. Manufactures		
		should be submitted w		
		documents		
2.21	Flywheel			
	Model	Specify		
	Country of Origin	Specify		
	Moment of inertia	~0.4kgm2		
	Dimensions	400*300*300mm	(Aprox)	
	Weight	50 - 60kg	(1. prom)	
	Balancing	Dynamic		
	protective casing	Required		
	Couplings	2		
	Required foundation material	Aluminium		
	Warranty			
		Minimum one yea	al	
	User manual and product documentation	Required		
		All relevant techn	i aal haa ahumaa	
	Additional Requirement	should be forward		
		Documents. Com	-	
		guide, Complete t where the supplie		
		the product, Reco		
		letter about the pr		
		institutions where		
		has supplied the p		
		Manufactures' au		
		should be submitt		
2.22	TECNEL. Unit	tender documents		
	Model	Specify Specify Required Steel Box		
	Country of Origin			
	Diagram in the front panel with			
	similar distribution of elements like			
	in the real unit.			
	Enclosure			
		Diode modules	>= 6 diodes	
	Front panel contents:		-	
		Thyristors module	>= 6	
			thyristors	
		IGBTS Module	>= 6 IGBTS	

	Snubber net	Required	
	Sensors module:	Voltage	
	Sensors module.	sensors >= 4	
		Current	
		sensors $\geq 2$	
	Dowor gupply	$\frac{\text{Sensors} >= 2}{\text{For Vr, Vs,}}$	
	Power supply connections :		
	connections.	Vt, Neutral and Ground	
	Drastica ach arras		
	Practice schemes	Required	
Back panel contents:	Data Acquisition	Required	
	Board Connector		
	(SCSI connector)		
	Tachodynamo	Required	
	connector		
	Main fuses (Vr,	Required	
	Vs, Vt) and LEDs		
	Circuit breaker	Required	
	(main switch)		
Single-phase driver and Three-phase	Required		
driver			
IGBT driver	Required		
TSI board	Required		
PIC board	Required		
SKHI61 board	Required		
Relays board	>= 4		
Three-phase relays	>= 2		
Commuted power supply	Required		
Three-phase magnetothermal	Required		
Control Interface	Required		
DAB(Data Acquisition Board)	-PCI Data acquisiti	ion boond	
Requirements:	(National Instrumen	its) to be placed	
	in a computer slot		
	-Bus PCI		
	Analog input:	$1 \rightarrow 1 - 1 - 1$	
	- Number of channe	U U	
	ended or $>= 8$ diffe		
	-Resolution =16 bit	s, 1 in 65536.	
	- Sampling rate up		
	(Kilo samples per s		
	- Input range (V) =		
	-Data transfers=DN	IA, interrupts,	
	programmed I/0		
	Number of DMA cl	hannels >=6.	
	Analog output:		
	-Number of channe		
	-Resolution =16 bit		
	-Maximum output 1	rate up to: 833	

I		I	
	KS/s -Output range (V) = $\pm 10V$		
	-Data transfers=DMA, interrupts,		
	programmed I/0		
	Digital Input/Output:		
	-Number of channels >=24		
	inputs/outputs.		
	-D0 or DI Sample Clock frequency:		
	0 to 1 MHz		
	- Timing: Counter/timers = 2		
	-Resolution $\geq 32$ bits		
TECNEL/CCSOF.ComputerControl+	- Compatible with Windows		
DataAcquisition+Data Management	operating system. Graphic and		
Software:	intuitive simulation of the process		
	in screen. Compatible with the		
	industry standards.		
	- Registration and visualization of		
	all process variables in an		
	automatic and simultaneous way.		
	automatic and omatuneous way.		
	- Flexible, open and multicontrol		
	software developed with		
	actual windows graphic systems,		
	acting simultaneously on all		
	process parameters.		
	- Management, processing,		
	comparison and storage of data.		
	- Sampling rate up to 250,000 data		
	per second.		
	- Comparative analysis of the		
	obtained data, after the process and		
	modification of the conditions		
	during the process.		
Cables and Accessories	Required (for normal operation)		
Warranty	Minimum one year		
Set of manuals should include:	Required Services, Assembly and		
	Installation, Interface and Control		
	Software, Starting-up, Safety,		
	Maintenance, Calibration &		
	Practices Manuals		
 Additional Requirement	All relevant technical brochures		
A	should be forwarded with Tender		
	Documents. Comprehensive user		
	guide, Complete track record on		
	where the supplier has supplied the		
	product, Recommendation letter		
	about the product from the		
	institutions where the supplier has		
	supplied the product. Manufactures'		
	authorization should be submitted		
	with the tender documents		

2.23	Pulse Generator (1)		
		Specify	
		Specify	
		mHz to 150 MHz	
		digits ,10ps best case	
	· · · · · · · · · · · · · · · · · · ·	0.003%+20ps	
		5.65ns to 999s	
	-	Accuracy +0.1%	
		$\leq 2$ ns	
	Output 1	10 Vpp (20 Vpp) into 50 Ω	
		<= 10 ps	
		<= 0.1%	
		ł kbit	
	· · ·	Required	
	Output Channels     2	1	
	1	SCPI	
	<u> </u>	Required	
		Vinimum one year	
	5	Required	
	documentation		
		All relevant technical brochures	
	1	should be forwarded with Tender	
		Documents. Comprehensive user	
		guide, Complete track record on	
		where the supplier has supplied the	
		product, Recommendation letter	
	a	bout the product from the	
		nstitutions where the supplier has	
		supplied the product.	
	N 1	Manufactures' authorization should	
		be submitted with the tender	
		locuments	
2.24	Power factor meter		
	Model	Specify	
	Country of Origin	Specify	
	Three-phase instrument, symmetric load.		
	Measuring range	cap. 0.5 1 0.5 ind.	
	Current range	0-5 A	
	Voltage range	380 V ± 20 % 3-phase	
	Frequency range	40-65 Hz	
	Accuracy class	1.5	
	Warranty	Minimum one year	
	User manual and product documentation		
	Additional Requirement	All relevant technical	
		brochures should be forwarded	
		with Tender	
		Documents. Comprehensive	
		user guide, Complete track	
		record on where the supplier	

		has supplied the product,			
		Recommendation letter about			
		the product from the			
		institutions where the supplier			
		has supplied the product.			
		Manufactures' authorization			
		should be submitted with the			
		tender documents			
2.25	Frequency meter				
	Model	Specify			
	Country of Origin	Specify			
	Measuring range	~46-54 Hz			
	Accuracy class	0.5			
-	Warranty	Minimum one year			
	User manual and product documentation	Required			
	Additional Requirement	All relevant technical			
		brochures should be forwarded			
		with Tender			
		Documents. Comprehensive			
		user guide, Complete track			
		record on where the supplier			
		has supplied the product,			
		Recommendation letter about			
		the product from the			
		institutions where the supplier			
		has supplied the product.			
		Manufactures' authorization			
		should be submitted with the			
		tender documents			
2.26	Current Transformer				
	Model	Specify			
	Country of Origin	Specify			
	Primary	20-10-5 A			
	Secondary	1 A			
	Accuracy class	1			
	Warranty	Minimum one year			
	User manual and product documentation	Required		Ī	
	Additional Requirement	All relevant technical			
	· ·	brochures should be forwarded			
		with Tender			
		Documents. Comprehensive			
		user guide, Complete track			
		record on where the supplier			
		has supplied the product,			
		Recommendation letter about			
		the product from the			
		institutions where the supplier			
		has supplied the product.			
		Manufactures' authorization			
		should be submitted with the			
		should be sublimited with the			

		tender documents	
2.27	PWM DC-Machine Control Module		
	Model	Specify	
	Country of Origin	Specify	
	Functional principle	1-quadrant	
	max current	6Å	
-	Terminal for excitation	190V/2A	
	Duty cycle	0-100%	
	Frequency	~200-1300Hz	
	Current limit	0-100%	
	Loads	R/L active and passive	
-	Control signal	0-10V	
	Power supply	220-240V 1-phase AC,50Hz	
		3*230V 3-phase AC,50HZ	
	Warranty	Minimum one year	
	User manual and product documentation	Required	
	Additional Requirement	All relevant technical	
	1	brochures should be forwarded	
		with Tender	
		Documents. Comprehensive	
		user guide, Complete track	
		record on where the supplier	
		has supplied the product,	
		Recommendation letter about	
		the product from the	
		institutions where the supplier	
		has supplied the product.	
		Manufactures' authorization	
		should be submitted with the	
		tender documents	
2.28	Drill Bench		
	Model	Specify	
	Country of Origin	Specify	
	Power source:	Electrical	
	Control type	manually-controlled	
	Structure	column type	
	bench-top model	Required	
	Diameter:	Min.<= 0.8 mm	
		Max.>= 3.2 mm	
	Voltage	230 V AC 50 Hz	 
	Rotational speed	Min<=11000 rpm (69115.04	
		rad/min)	
		Max>=33000 rpm (207345.12	
		rad/min)	 
	Drilling depth	>=260 mm	 
	Accessories	Set of drill bits – <b>3</b> Sets	 
	Warranty	Minimum one year	 
	User manual and product documentation	Required	

	Additional Requirement		should be forv Tender Documents. C user guide, Co record on whe has supplied t Recommenda the product fro	Comprehensive omplete track ere the supplier he product, tion letter about om the institutions plier has supplied Manufactures' should be			
2.29	PCB shears						
	Model		Specify				
	Country of Origin		Specify				
	Cutting Capacity		Max >= 305mn	n			
	Aluminium Cutting Capacity:		>= 1.5mm				
	External Depth:		~440mm				
	External Width:		>= 245mm				
	Cut Width Max:			>= 305mm			
	Cut Thickness for Aluminium		Max >= 1.5mn				
	Cut Thickness for PCBs		Max >= 2mm				
	Warranty		Minimum one	vear			
	User manual and product docu	mentation					
	Additional Requirement	All relevant technical brochures					
	1	should be forwarded with T		arded with Tender			
			Documents. Co	omprehensive user			
			guide, Complete track record on				
				olier has supplied			
				ecommendation			
			letter about the	product from the			
			institutions wh	ere the supplier			
			has supplied th	e product.			
			Manufactures'	authorization			
			should be subm	nitted with the			
			tender docume	nts			
2.30	Electric hand driller						
	Model	SpecifySpecify230V AC 50 Hz500W~0-2800 rpm					
	Country of Origin						
	Input voltage						
	Power input						
	No load speed				L		
	Max drilling capacity:	Steel/cond	crete	>=12 mm			
		Wood		>=20 mm			
	Weight	~2kg					
	Accessories		lrill bits suitable	for Steel (1),			
		Concrete(	1) and Wood(1)	containing at least			

		50 bits ea	ch			
	Warranty	Specify				
	User manual and product	Required				
	documentation	nequirea				
	Additional Requirement	All releva	nt technical brochures should be			
		forwarded	forwarded with Tender			
		Documen	ts. Comprehensive user guide,			
		Complete	Complete track record on where the supplier			
			ed the product, Recommendation			
			It the product from the institutions			
			supplier has supplied the product.			
			ures' authorization should be			
		submitted	with the tender documents			
2.31	Rheostat (4)					
	Model	Specify				
	Country of Origin	Specify	101			
	Rating	5 kOhms,	10A	-		
	Tolerance	10%				
	Temperature		maximum			
	Туре	Linear or	Rotary			
	Warranty	Specify Required				
	User manual and product documentation					
	Additional Requirement	All releva	nt technical brochures should be			
		forwarded	l with Tender			
			ts. Comprehensive user guide,			
		-	track record on where the supplier			
			ed the product, Recommendation			
			at the product from the institutions			
			supplier has supplied the product.			
			ures' authorization should be			
0.00		submitted	with the tender documents			
2.32	Rheostat           Madal		Que e sifere			
-	Model		Specify			
	Country of Origin		Specify			
	Resistance		1000 Ohms			
	Current Rating		1 or 2 A			
	Adjustable Type Resistive Element		Screwdriver slot Wire Wound			
	Warranty		Specify			
	User manual and product doo	cumentation	Required			
	Additional Requirement		All relevant technical brochures should be forwarded with Tender			
			Documents. Comprehensive user			
			guide, Complete track record on			
			where the supplier has supplied			
			the product, Recommendation			
			letter about the product from the			
			institutions where the supplier has			
			supplied the product.			
			supplied the product.	I		

		Manufactures' authorization		
		should be submitted with the		
		tender documents		
2.33	Rheostat	1		
	Model	Specify		
	Country of Origin	Specify		
	Value	1 ohm		
	Current Rating	10 A		
	Adjustable Type	Screwdriver slot		
	Resistive Element	Wire Wound		
	Warranty	Specify		
	User manual and product documentation	Required		
	Additional Requirement	All relevant technical brochures should be forwarded with Tender Documents. Comprehensive user guide, Complete track record on where the supplier has supplied the product, Recommendation letter about the product from the institutions where the supplier has supplied the product. Manufactures' authorization should be submitted with the		
		tender documents		
2.34	Digital and Analog Communication Tr	ainer kit with jumper wire		
	Model	Specify		
	Country of Origin	Specify		
	Experiments covered with the trainer:	RF Oscillator Circuits Design		
		Second Order Filter Circuits Design AM, FM modulation and Demodulation Circuit Design		
		A/D, D/A converter circuit design		
		Pulse Width Modulation/ Demodulation Circuit Design		
		ASK, FSK, PSK QPSK modulation and demodulation circuit design		
		ASK Coherent Detection Circuit		
	Accessories	Cables: Signal Cables – 200 Nos. , Power Cables -100 Nos., Jumper cables – 40 Nos.		
	Warranty	Minimum one year		
	User manual and product documentation	Required		
	Additional Requirement	All relevant technical brochures should be forwarded with Tender		

2.35	Digital St	orage Oscil	lloscope	Documents. Co guide, Comple where the supp product, Recor about the produ- institutions wh supplied the pr Manufactures' should be subm tender docume	te trac lier ha nmeno act fro ere the oduct, autho nitted	k record on as supplied the dation letter om the e supplier has rization	
	Model		Specify				
	Country of	f Origin	Specify				
	Quantity		1	4		5	
	Vertical						
	Channels		2	2		2	
	Bandwidtl	h	DC-500MHz	DC-70MHz	]	DC-150MHz	
			(- 3dB)	(- 3dB)		(- 3dB)	
	Rise time		<= 700ps	<= 5ns Approx	ζ.	<=2.5 ns	
			Approx.			Approx.	
	Input coup	oling		AC, DC & Grou	nd		
	Input Imp	edance		1MΩ±2%, -15	οF		
	Polarity			Normal &Inve	rt		
	Maximum	Input	>= 300	OV (DC+AC pea	k), C/	ATI	
	Waveform	n Signal		+, -, FFT			
	Process						
	EXT Trig	ger					
	Range			±15V			
	Input Imp	edance		1MΩ±2%, ~16	эF		
	Signal Aq	uisition					
	Samplin	Real-	>= 4GSa/s	>= 2GSa/	5	>= 1GSa/s	
	g rate	Time					
		Equivale	>= 100GSa/s	>= 100GSa	/s	>= 25GSa/s	
		nt-Time					
	Vertical R			8 Bits			
	Memory I	Length per	>= 25k poir	nts	>= 21	M points	
	Channel						
	Acquisitio			al, Peak Detect,	Avera	0	
	Peak Dete	ct		2ns		<=10ns	
	Voltage		V pp , V amp , V				
	Measurem	nent		ise-Preshoot/Ov		ot, Fall-	
				Preshoot/Oversh			 
	Time Mea	surement	-	riod, Rise Time,			
				Vidth, Negative,		•	
			· · · · ·	le, delay measur			 
	Cursors	4	0	ference betweer			
	Measurem		I ime diff	erence between	cursor	$rs(\Delta 1)$	
	Control Pa	anel					
	Functions	-		of	4	I I.e. 4 - 1 6	
	Save Setu	þ	Up to 20 sets	of measuremen	ι	Up to 15	

		conditions	sets.		
	Save Waveform	24 sets of waveform	15 sets.		
	USB Port for PC	Required			
	Connection				
	Data Logger	Required			
	GPIB	Required	No		
	Power Source	240 V/ 50 Hz			
	Warranty	Minimum one year			
	User manual and	Required			
	product	1			
	documentation				
	Additional	All relevant technical brochures show	uld be forwarded		
	Requirement	with Tender Documents. Comprehen	nsive user guide,		
	1	Complete track record on where the			
		supplied the product, Recommendati			
		the product from the institutions whe			
		has supplied the product. Manufactur			
		should be submitted with the tender			
2.36	Inductor bank	·			
	Model	Specify			
	Country of Origin	Specify			
	Description	This is a (300j) Inductive Loa	This is a (300j) Inductive Load Module fitted		
		with 9 inductors in three ident			
		realise balanced or unbalance	d 3-phase loads		
			(star and delta) and single phase loads. Each		
		phase shall be independently	changed in 7		
		uniform steps from 0 to max of			
		full load. Single phase connect	ction provides 21		
		regulation steps.			
	Power variation:	0-100%			
	Duty cycle:	100%			
	Input/Outputs:	4 mm CE safety sockets			
	Unit type	Table top / frame unit			
	Warranty	Minimum one year			
	User manual and prod	•			
	documentation	_			
	Additional Requireme	ent All relevant technical brochur	res should be		
		forwarded with Tender			
		Documents. Comprehensive u	ıser guide,		
		Complete track record on whe	ere		
		the supplier has supplied the p	product,		
		Recommendation letter about	the		
		product from the institutions	where the		
		supplier has supplied the			
		product. Manufactures' autho	rization should		
		be submitted with the			
		tender documents			
2.37	Resistor bank				
	Model	Specify			

	Country of Origin	Specify	
		This is a (300, 600,1200 ohms) Resistive	
		Load Module fitted with 9 resistors in three	
		identical groups to realise balanced or	
		unbalanced 3-phase loads (star and delta) and	
	Description	single phase loads.	
	Description	Each phase can be independently varied in 7	
		uniform steps from 0 to max current value for	
		full power. Single phase connection provides	
		21 regulation steps.	
	Power variation:	0-100%	
	Duty cycle:	100%	
	Input/Outputs:	4 mm CE safety sockets	
	Unit type:	Table top / frame unit	
	Warranty	Minimum one year	
	User manual and product	Required	
	documentation		
	Additional Requirement	All relevant technical brochures should be	
		forwarded with Tender	
		Documents. Comprehensive user guide,	
		Complete track record on where	
		the supplier has supplied the product,	
		Recommendation letter about the	
		product from the institutions where the	
		supplier has supplied the	
		product. Manufactures' authorization should	
		be submitted with the	
		tender documents	
2.38	Capacitor bank		
	Model	Specify	
	Country of Origin	Specify	
	Bank	Capacitor 30 P.F 300j 50V plate	
	Capacitance	0.8 ~ 1.2 uF. +/-3%	
	Rated Voltage	2,100 VAC	
	Frequency	50/60 Hz.	
	Dissipation Factor	0.0035 maximum	
	Operating Temperature	-10 to +85 degC	
	Insulation Resistance : T- C	1,000 MOhms	
	Test Voltage: T – T	T - T: 9,030 VDC for 60 seconds	
	Test Voltage: T – C	T – C: 9000 VAC 10seconds	
	Warranty	Minimum one year	
	User manual and product	Required	
	documentation		
	Additional Requirement	All relevant technical brochures should be	
		forwarded with Tender	
		Documents. Comprehensive user guide,	
1		Complete track record on where	
1		±	
		the supplier has supplied the product,	
		±	

		1.	h	41		
			has supplied			
				ization should be		
		submitte	d with the ter	nder documents	10	
2.39	Glue gun and sticks				10	
	Model	Specify				
	Country of Origin	Specify			_	
	Description		ndard hot me	lt glue sticks	_	
	Power Supply	230V 50				
	Fold out stand for safety	Required				
	Trigger feed mechanism	Required				
	Compatible glue sticks		/25DT, GS2			
	Included glue stick sizes	GS20DT		20		
		GS25DT	1	20		
		GS260		20		
		GS500		20		
	Warranty	Specify				
	User manual and product	Required				
	documentation					
	Additional Requirement	All relev	ant technical	brochures should be		
		forwarde	d with Tende	er		
		Documen	nts. Compreh	ensive user guide,		
		Complete	e track record	l on where the		
			has supplied			
				er about the product		
				where the supplier		
				uct. Manufactures'		
				be submitted with the		
		tender do	ocuments			
2.40	Wireless Microphone se	et				
	Model	Specify				
	Country of Origin	Specify				
	Features	Automatic frequ	ency and inte	erference		
		management				
		Secure 256 bit A				
			ed condenser	microphone capsule		
		(MME 865)				
		Remote controll				
		Long operation				
		AF frequency re	sponse	20 to 20,000 Hz		
					4	
		Signal-to-noise	ratio	> 90  dB(A)		
					4	
		Modulation		GFSK with back		
			.1 1	channel	4	
		Transmission me	ethod	TDMA, space		
				diversity		
	TT 1 1 -1	RF output power	r	adaptive, up to		
	Handheld				1 1	1
	Handneid	1 1		250 mW		
	Handneid	AF frequency re	sponse	250 mW 50 to 20,000 Hz	-	

1	Receiver	RF sensitivity		< -90 dBm		
		RF output power b	pack	adaptive, up to		
		channel		250 mW		
		Network socket		available		
	Accessories	Handheld transmit	ter	3		
		MME 865 microp		3		
		capsule				
		BA 10 accupack		3		
		Rack Receiver (in	cluding	1		
		power supply)	8			
		Rack mount kit		available		
	Warranty	Minimum one yea	r			
	User manual and	Required				
	product documentation					
	Additional Requirement	All relevant techni	ical brochur	es should be		
	1	forwarded with Te				
		Documents. Comp	orehensive u	ser guide, Complete		
		track record on wh	here the sup	olier has supplied		
		the product, Record	nmendation	letter about the		
		product from the i	nstitutions v	where the supplier		
		has supplied the pr				
		authorization shou	ıld be submi	tted with the		
		tender documents				
2.41	Wheatstone Bridge					
	Model	Specify				
	Country of Origin	Specify				
	Description			ance bridge, three		
				cision resistors and		
		a zero point Gal				
	Resistance Bridge	Scale	0-1000mn	1		
	Resistance Bridge	Scale Scale divisions		1		
	Resistance Bridge			n ~1m		
	Resistance Bridge	Scale divisions Resistance wire	mm			
	Resistance Bridge	Scale divisions Resistance wire Connection	mm Length Material 4mm safet	~1m NiCr		
	Resistance Bridge	Scale divisions Resistance wire Connection Maximum	mm Length Material	~1m NiCr		
	Resistance Bridge	Scale divisions Resistance wire Connection Maximum voltage	mm Length Material 4mm safet ~8V	~1m NiCr		
	Resistance Bridge	Scale divisions Resistance wire Connection Maximum voltage Maximum	mm Length Material 4mm safet	~1m NiCr		
		Scale divisions Resistance wire Connection Maximum voltage Maximum Current	mm Length Material 4mm safet ~8V ~1.5A	~1m NiCr y jacks		
	Resistance Bridge Resistance decade -1	Scale divisionsResistancewireConnectionMaximumvoltageMaximumCurrentMeasurement	mm Length Material 4mm safet ~8V	~1m NiCr y jacks		
		Scale divisionsResistancewireConnectionMaximumvoltageMaximumCurrentMeasurementRange	mm Length Material 4mm safet ~8V ~1.5A 0.1 Ω to 1	~1m NiCr y jacks		
		Scale divisions Resistance wire Connection Maximum voltage Maximum Current Measurement Range Step Size	mm Length Material 4mm safet ~8V ~1.5A 0.1 Ω to 1 0.1 Ω	~1m NiCr y jacks		
		Scale divisionsResistancewireConnectionMaximumvoltageMaximumCurrentMeasurementRangeStep SizeMax. Current	$\begin{array}{c} \text{mm} \\ \text{Length} \\ \text{Material} \\ 4\text{mm safet} \\ \text{~8V} \\ \text{~1.5A} \\ 0.1 \Omega \text{ to } 1 \\ 0.1 \Omega \\ \text{~1A} \end{array}$	~1m NiCr y jacks		
	Resistance decade -1	Scale divisionsResistancewireConnectionMaximumvoltageMaximumCurrentMeasurementRangeStep SizeMax. CurrentAccuracy	$\begin{array}{c c} mm \\ \hline Length \\ Material \\ 4mm safet \\ \sim 8V \\ \hline \sim 1.5A \\ 0.1 \ \Omega \text{ to } 1 \\ 0.1 \ \Omega \\ \sim 1A \\ <= 1\% \end{array}$	~1m NiCr y jacks		
		Scale divisionsResistancewireConnectionMaximumvoltageMaximumCurrentMeasurementRangeStep SizeMax. CurrentAccuracyMeasurement	$\begin{array}{c} \text{mm} \\ \text{Length} \\ \text{Material} \\ 4\text{mm safet} \\ \text{~8V} \\ \text{~1.5A} \\ 0.1 \Omega \text{ to } 1 \\ 0.1 \Omega \\ \text{~1A} \end{array}$	~1m NiCr y jacks		
	Resistance decade -1	Scale divisionsResistancewireConnectionMaximumvoltageMaximumCurrentMeasurementRangeStep SizeMax. CurrentAccuracyMeasurementRange	$\begin{array}{c} \text{mm} \\ \text{Length} \\ \text{Material} \\ 4\text{mm safe} \\ \sim 8 \text{V} \\ \sim 1.5 \text{A} \\ 0.1 \ \Omega \text{ to } 1 \\ 0.1 \ \Omega \\ \sim 1 \text{A} \\ <= 1\% \\ 1 \ \Omega \text{ to } 10 \\ \end{array}$	~1m NiCr y jacks		
	Resistance decade -1	Scale divisionsResistancewireConnectionMaximumvoltageMaximumCurrentMeasurementRangeStep SizeMax. CurrentAccuracyMeasurementRangeStep SizeMax. CurrentAccuracyMeasurementRangeStep Size	$\begin{array}{c} \text{mm} \\ \text{Length} \\ \text{Material} \\ 4\text{mm safet} \\ \sim 8\text{V} \\ \sim 1.5\text{A} \\ 0.1 \ \Omega \text{ to } 1 \\ 0.1 \ \Omega \\ \sim 1\text{A} \\ <= 1\% \\ 1 \ \Omega \text{ to } 10 \\ 1 \ \Omega \end{array}$	~1m NiCr y jacks		
	Resistance decade -1	Scale divisionsResistancewireConnectionMaximumvoltageMaximumcurrentMeasurementRangeStep SizeMax. CurrentAccuracyMeasurementRangeStep SizeMax. CurrentAccuracyMeasurementRangeStep SizeMax. CurrentRangeStep SizeMax. CurrentRangeStep SizeMax. Current	$\begin{array}{c} \text{mm} \\ \text{Length} \\ \text{Material} \\ 4\text{mm safet} \\ \sim 8\text{V} \\ \sim 1.5\text{A} \\ 0.1 \ \Omega \text{ to } 1 \\ 0.1 \ \Omega \\ \sim 1.5\text{A} \\ 0.1 \ \Omega \text{ to } 1 \\ 0.1 \ \Omega \\ \sim 1.5\text{A} \\ 1 \ \Omega \\ \sim 750 \text{ mA} \end{array}$	~1m NiCr y jacks		
	Resistance decade -1	Scale divisionsResistancewireConnectionMaximumvoltageMaximumCurrentMeasurementRangeStep SizeMax. CurrentAccuracyMeasurementRangeStep SizeMax. CurrentAccuracyMeasurementRangeStep Size	$\begin{array}{c} \text{mm} \\ \text{Length} \\ \text{Material} \\ 4\text{mm safet} \\ \sim 8\text{V} \\ \sim 1.5\text{A} \\ 0.1 \ \Omega \text{ to } 1 \\ 0.1 \ \Omega \\ \sim 1\text{A} \\ <= 1\% \\ 1 \ \Omega \text{ to } 10 \\ 1 \ \Omega \end{array}$	~1m NiCr y jacks Ω		

	1	Dana			1	
	-	Range	10.0			
	-	Step Size	10 Ω	_		
	-	Max. Current	~250 mA	_		
		Accuracy	<= 0.5%			
	Precision resistor-1	Resistance	10 Ω			
		Tolerance	<= 1%	_		
		Load rating	~4W			
	Precision resistor-2	Resistance	1 Ω	_		
		Tolerance	<= 1%	_		
		Load rating	~4W			
	Zero Point Galvanometer	Measurement	100mV DC, 30µA DC, 3 mA			
	-	ranges	DC			
		Integrated	3333 Ohm, 460 Ohm, 500			
		resistance	Ohm			
		Accuracy	± 1.5%			
		Zero point	center			
		Mirrored scale	yes	-		
		Connection	4-mm-security sockets	-		
		Fuse	0.315 A HBC 380 V 50 kA			
	Accessories	Connecting lead	ls			
	Warranty	Minimum one y	vear			
	User manual and product documentation	Required				
	Additional Requirement	forwarded with				
			mprehensive user guide,			
		-	record on where the supplier			
			product, Recommendation			
			product from the institutions			
			ier has supplied the product.			
			uthorization should be			
10			the tender documents			
42	NI ELVIS II+ for LabView	1				
	Model	Specify				
	Country of Origin	Specify				
	Included items in system	NI ELVIS II+				
	configuration	NI ELVISmx d				
		Detachable pro				
		USB cable and				
	NI ELVIS II+ Oscilloscope	Maximum	100 MS/s			
		sampling rate				
	Accessories- Optional		robes (2), Courseware			
		(Electronics an				
	Warranty	Minimum one	year			
	User manual and product	Required				

	documentation			
	Additional Requirement	All relevant technical brochures should be		
		forwarded with Tender		
		Documents. Comprehensive user guide,		
		Complete track record on where		
		the supplier has supplied the product,		
		Recommendation letter about the		
		product from the institutions where the		
		supplier has supplied the product.		
		Manufactures' authorization should be		
		submitted with the tender documents		
2.43	Multisim Education 25 Use			
2010	Model	Specify		
	Country of Origin	Specify		
	License Type	25 Users		
	Warranty	Specify		
	User manual and product	Required		
	documentation	Kyuncu		
	Additional Requirement	All relevant technical brochures should be		
		forwarded with Tender		
		Documents. Comprehensive user guide,		
		Complete track record on where the supplier		
		has supplied the product, Recommendation		
		letter about the product from the institutions		
		where the supplier has supplied the product.		
		Manufactures' authorization should be		
		submitted with the tender documents		
2.44	Duplo machine			
	Model	Specify		
	Country of Origin	Specify		
	Resolution	600 X 600 dpi		
	Document Size	4" x 6" (100 mm x 148 mm) to 11" x 17" (297		
		mm x 432 mm)		
	Image Mode	Text, Photo, Text/Photo, Pencil, Screen		
	Paper Weight	46gsm - 210 gsm		
			<b> </b>	
	Colour duplication	available	<b> </b>	
	LAN network interface	Available to print directly from computers		
	Paper supply capacity	Minimum 1000 sheets (64g/m2)		
	Print speed	60ppm – 150ppm		
		Five steps variable from the control panel (60,		
		80, 100, 110, 120ppm), 150ppm: Selectable		
		from the touch panel		
	User interface	LCD Touch Panel with Progress Arrow		
		indicators		
	Input port	USB2.0, 3.0, Ethernet		
	Sound level (100ppm at	Less than 65dB		
	operating position)			

	Power source	220V – 240V AC, 50Hz	
	duplex	available	
	Warranty	Minimum one year	
	User manual and product documentation	Required	
	Additional Requirement	All relevant technical brochures should be	
		forwarded with Tender	
		Documents. Comprehensive user guide,	
		Complete track record on where	
		the supplier has supplied the product,	
		Recommendation letter about the	
		product from the institutions where the	
		supplier has supplied the product.	
		Manufactures' authorization should be	
		submitted with the tender documents	
2.45	Colour Laser Printer	Constant Con	
	Model	Specify	
	Country of Origin	Specify	
	Processor speed	minimum 800 MHz	
	Print Speed Black	Minimum 14 ppm	
	Print Speed Colour	Minimum 14 ppm	
	Print Resolution, Black	Minimum to 600 x 600 dpi	
	Print Resolution, Colour	Minimum to 600 x 600 dpi	
	Maximum Number Of Copies	Up to 99 copies	
-	Connectivity, Standard	Wireless, Ethernet direct printing	
	Connectivity, Standard	USB printing	
	Compatible Operating	Full software installs supported on: Microsoft	
	Systems	Windows 7 32 bit and 64 bit or above and	
		Windows server 2008 or above	
	Power Supply	Input voltage: 220 to 240 VAC (+/- 10%), 50 Hz (+/- 2 Hz)	
	Warranty	Minimum one year	
	User manual and product documentation	Required	
	Additional Requirement	All relevant technical brochures should be	
		forwarded with Tender	
		Documents. Comprehensive user guide,	
		Complete track record on where the supplier	
		has supplied the product, Recommendation	
		letter about the product from the institutions	
		where the supplier has supplied the product.	
		Manufactures' authorization should be	
2.46	Hat aim at the	submitted with the tender documents	
2.46	Hot air station	Specify	
	Model	Specify Specify	
	Country of Origin	Specify	
	Description	Includes soldering iron, desoldering gun and hot air with mechanical arm	
	Dower	230 V 50 Hz	
	Power	230 V 30 HZ	

	1		1			
	Hot air gun	Power	Up to 500 watts			
		Consumption				
		Temperature	100 deg to 480 deg C			
	_	Range				
		Heating	Metal Heating Core			
		Element				
	Soldering iron	Power	60 watts max			
		Consumption				
		Heating	Ceramic			
		Element				
	-		200 deg-480 deg C			
		Temp Range	200 deg-480 deg C			
	Desoldering gun	Power	70 watts max			
	2	Consumption				
		Temp Range	200-480 deg C			
		Number of	3 (1.2mm, 1.5mm, 1.8mm)	1		
		nozzles	,			
	accessories		eating element for hot air gun			
		Six nozzles for				
		Cleaning pin 3 nozzles for de-soldering pistol				
	And neces					
	Warranty	Minimum one year           roduct         Required				
	User manual and product					
	documentation					
	Additional Requirement	All relevant tec	chnical brochures should be			
		forwarded with	n Tender			
		Documents. Co	omprehensive user guide,			
		Complete track	c record on where the supplier			
			e product, Recommendation			
			product from the institutions			
		11	lier has supplied the product.			
			authorization should be			
		submitted with	the tender documents			
2.47	Quadcopter for developers					
	Model	Specify				
	Country of Origin	Specify				
	Features	Universal po	ower and communication ports	1	1	
1		-	*			
		Expansion b	ays			
		Expansion b Customizabl	ays le mounting and balancing	-		
		Expansion b Customizabl Adjustable a	ays le mounting and balancing rm angle for greater torque	-		
		Expansion b Customizabl Adjustable a 50% less vib	ays le mounting and balancing rm angle for greater torque prations, rigid, strong system			
		Expansion b Customizabl Adjustable a 50% less vib Responsive,	ays le mounting and balancing rm angle for greater torque prations, rigid, strong system quick release landing pads			
		Expansion b Customizabl Adjustable a 50% less vib Responsive, Dedicated re	ays le mounting and balancing rm angle for greater torque prations, rigid, strong system	-		
		Expansion b Customizabl Adjustable a 50% less vib Responsive, Dedicated re range(5km)	ays le mounting and balancing rm angle for greater torque prations, rigid, strong system quick release landing pads emote controller 3.1 miles			
		Expansion b Customizabl Adjustable a 50% less vib Responsive, Dedicated re range(5km) Full mobile	ays le mounting and balancing rm angle for greater torque prations, rigid, strong system quick release landing pads emote controller 3.1 miles app support			
	Performance	Expansion b Customizabl Adjustable a 50% less vib Responsive, Dedicated re range(5km)	ays le mounting and balancing rm angle for greater torque prations, rigid, strong system quick release landing pads emote controller 3.1 miles app support			

		Accuracy	2.5 m			
		Tilt Angle	~ 35°			
		Speed	20 m/s			
	Remote controller	Transmission	~ 5km			
		Distance				
		Video	USB, Mini-HDMI			
		Output				
		Power	Built-in battery			
		Supply				
		Output	9 W			
		Power				
	Battery	Capacity	~ 4500 mAh			
	-	Voltage	~ 20 V			
	Guidance	sensors	ultrasonic sensors, images	-	-	
	Surdanice	5015015	and IMU readings.			
			0~16 m/s	-	$\vdash$	
		Velocity	0 10 11/3			
		Detection				
		Range				
		Velocity	0.04 m/s	-	┝	
		Detection	0.04 m/s			
		Accuracy				
		Effective	0.20 m ~ 20 m	-	-	
		Sensor	0.20 m × 20 m			
		Range				
	Warranty	Minimum one	Vear			
	User manual and product	Required	year			
	documentation	Required				
	Additional Requirement	All relevant te	echnical brochures should be			
		forwarded wit	h Tender			
		Documents. C	Comprehensive user guide,			
		Complete trac	k record on where			
		the supplier ha	as supplied the product,			
		Recommenda	tion letter about the product			
		from the instit	tutions where the supplier has			
		supplied the p	roduct. Manufactures'			
			should be submitted with the			
		tender docum	ents			
2.48	humanoid robot					
	Model	Specify				
	Country of Origin	Specify				
	Description	It has a humanoi	d shape that enables it to			
	_	move and adapt	to the world around it. It has			
			s for natural interaction. It is			
		designed to be p	ersonalised.			
	Motherboard		ATOM Z350 1.6 GHz or			
			better			
		RAM	>= 1GB	1	F	
		<b>F1</b> 1-	2CD			
------	-----------------------------	------------------	----------------------------------	---	--	
		Flash	>= 2GB			
		memory	> 9CD	-		
		Micro SDHC	>=8GB			
	Sensors		e Resistors, Inertial			
			rometers with an			
		angular speed of				
		Sonars, Joint p				
	Contact and tactile sensors		Chest Button, Tactile			
		Hands, Feet Bu	-			
	Connectivity		neras with high resolution to			
	~ .	recognise shap				
	Connecting	Ethernet, WiFi	*			
	Interactions		microphones, video			
		cameras, LEDs				
	Battery	Nominal	21.6 V / 2.25 Ah			
		voltage/capacit	*			
		Charging	<= 3 hrs			
		duration				
		Autonomy	~ 1hr use			
	Warranty	5 Years				
	User manual and product	Required				
	documentation					
	Additional Requirement		chnical brochures should be			
		forwarded with				
			omprehensive user guide,			
		-	record on where			
			s supplied the product,			
			on letter about the product			
			tions where the supplier has			
		11 1	oduct. Manufactures'			
			hould be submitted with the			
		tender docume	nts			
2.49	Three phase synchronous g					
	Model	Specify				
	Country of Origin	Specify				
	salient pole rotor	Required				
	Motor/ Generator dual mode	Required				
	Nominal voltage	230 V (ph	ase)			
	Nominal frequency	50 Hz				
	Excitation voltage	220 V DC				
	Nominal speed	~ 3000 rpi				
	Nominal power		enerator) / 1 kW (motor)			
		The same	size or a different size of this			
	Parallel operation		rnator can be operated in			
			eactive power sharing conform			
		the standa	rds and technical conditions			
	Excitation System		ended excitation with thyristor			
	-	voltage re				
	Required Accessories	Direct cou	pling of motor and generator			

		shafts	
	Warranty	Minimum one year	
	User manual and product	Required	
	documentation		
	Additional Requirement	All relevant technical brochures should	
		be forwarded with Tender	
		Documents. Comprehensive user guide,	
		Complete track record on where	
		the supplier has supplied the product,	
		Recommendation letter about the	
		product from the institutions where the	
		supplier has supplied the product.	
		Manufactures' authorization should be	
		submitted with the tender documents	
2.50	Three phase induction motor		
	Model	Specify	
	Country of Origin	Specify	
	Output Power	175 W	
	Stator Voltage (3 phase)	240/415 V - 50 Hz	
	Rotor Voltage (3 phase)	120/208 V - 50 Hz	
	Full Load Speed	1315 rpm	
	Full load current	0.48 A	
		Should permit delta or star configuration	
	Faceplate		
	1 aceptate	Rotor winding terminals should be	
		brought out to the faceplate	
		Wound rotor induction motor, phase	
	Possible Operations	shifter, Single phase variable coupling	
		motor, Asynchronous generator,	
		frequency converter	
	Warranty	Minimum one year	
	User manual and product	Required	
	documentation		
	Additional Requirement	All relevant technical brochures should	
		be forwarded with Tender	
		Documents. Comprehensive user guide,	
		Complete track record on where	
		the supplier has supplied the product,	
		Recommendation letter about the	
		product from the institutions where the	
		supplier has supplied the product.	
		Manufactures' authorization should be	
0.54	<u><u><u></u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u></u>	submitted with the tender documents	
2.51	Single phase motor	Creatify	
	Model	Specify	
	Country of Origin	Specify	
	Motor/ Generator dual mode	Required	
	Nominal voltage	220 V	
	Excitation voltage	220 V DC	
	Nominal speed	3000 rpm	

	Nominal power	2 kW		
	Warranty	Minimum one year		
	User manual and product documentation	Required		
	Additional Requirement	All relevant technical brochures should be forwarded with Tender Documents. Comprehensive user guide, Complete track record on where the supplier has supplied the product, Recommendation letter about the product from the institutions where the supplier has supplied the product. Manufactures' authorization should be submitted with the tender documents		
2.52	Synchronizing module			
	Model	Specify		
	Country of Origin	Specify		
	Power supply	12/24Vdc (9.5 to 32 Vdc)		
	Consumption	max. 20W		
	Ambient temperature (storage)	~20 to 80 °C		
	Ambient temperature (operation)	~20 to 70 °C		
	Ambient humidity	RH 95 %, non-condensing		
	Voltage AC input	480Vac true RMS		
	Accuracy	Class 1		
	Current AC input	1A or 5A true RMS, isolated		
	Accuracy Iac	Class 1		
	Discrete inputs (isolated)	Range: 12/24Vdc (6 to 32Vdc)		
	Relay outputs	Relays, dry contacts		
	Load (resistive)	2A@24Vdc and 250Vac		
	Analog inputs	0/4 to 20mA		
	Analog outputs (isolated)	0/4 to 20 mA (freely scalable)		
	Housing			
	Front panel mounting	Plastic housing		
	Sealing (front/back)	IP42/IP21		
	Warranty	Minimum one year		 
	User manual and product documentation	Required		
	Additional Requirement	All relevant technical brochures should be forwarded with Tender Documents. Comprehensive user guide, Complete track record on where the supplier has supplied the product, Recommendation letter about the product from the institutions where the supplier has supplied the product. Manufactures' authorization should be submitted with the tender documents		

2.53	Optical fibre training kit			
2.00	Model	Specify		
	Country of Origin	Specify		
	Fibre cleaver			
	Cladding diameter	125µm		
	Fiber count/Size	Single fiber (for fiber coating Ø0.25~Ø0.9mm)		
	Cleave length	5~20mm (for fiber coating ø0.25mm)		
		10~20mm (for fiber coating Ø0.9mm)		
	Off-cut collector	Required		
	Automatic blade rotation	Required		
	Blade life	>= 60,000 fibers		
	Fusion splicer			
	Material	Silica glass		
	Fiber count / Profile types	Single/SMF(G.652), MMF(G.651),		
		DSF(G.653), NZDSF(G.655), BIF(G.657),		
		EDF		
	Fiber diameter	Cladding diameter: ~80 - 150um, Coating		
		diameter : ~100 - 1,000um		
	Cleave length	5 - 16mm with coating clamp		
	Splice loss (typical)	SMF : ~0.01dB, MMF : ~0.01dB, DSF :~		
		0.05dB, NZDSF : ~0.03dB		
	Return loss (typical)	6OdB or greater		
	Splice time (typical)	6sec(SM G652), 7sec(SM G652 Std. Mode)		
	Heating time (typical)	14sec (Slim 60mm - Quick Mode)		
	Splice & Heat cycles per	Approx. 250		
	battery full charge"	11		
	Fiber view & magnification	2 CMOS cameras preferred,		
		~ 52OX (zoom : 7OOX) for X or Y single		
		axis view,		
		~88X for both X & Y dual axis view		
	Splice programs	Max. >= 300		
	Heating programs	Max. >= 100		
	Splice image capture /	>= 200 images / 10,000 splice data internal		
	splice data storage	memory,		
		>= 50,200/20,000 (with 8GB SD card)		
	Attenuation splicing	O.1dB to 15dB in O.1dB increments		
	Universal clamps	Required,( 250um, 900um tight & loose		
		buffer fiber)		
	Reversible coating clamps	Required	ļ	
	Automatic fiber	Required		
	identification		ļ	
	USB port	Required	ļ	
	Battery pack and charger	Required	ļ	
	Power Supply	230V, 50 Hz	ļ	
	Required Accessories	AC adapter (1), AC power cord(1), Cooling		
		tray(1), Spare electrode(1), Carrying case with		
		worktable(1), Hand strap (1), USB Cable (1),		
		V-groove cleaning brush (1), Loose tube		
		cutter (1), Alcohol dispenser (1), Fibre		

	Warranty User manual and product documentation Additional Requirement	eacl Ren strip fibe buff typ. typ. Mir Req	tection sleeve(60mm,40mm,61mm) (100 h), Jacket Remover(1), Hot Jacket nover(1), Handheld fiber cleaver (1), Cable pper(1), Fiber Holders(For 0.25mm single er, 0.9mmsingle fiber, 0.9mm loose fered single fiber, fro drop/indoor cabl- 2.0x3.1 or 2.6mm, indoor cable- 1.6x2.0mm , 3mm cable) nimum one year puired relevant technical brochures should be	
		forv Doc Cor has lette Whe Subr	varded with Tender cuments. Comprehensive user guide, nplete track record on where the supplier supplied the product, Recommendation er about the product from the institutions ere the supplier has supplied the product. nufactures' authorization should be mitted with the tender documents	
2.54	UV Laser based PCB machi	ne		
	Purpose		Multipurpose rapid prototyping (ex: structuring, engraving, and depaneling in one pass)	
	Technical specifications			
	Model		Specify	
	Country of Origin		Specify	
	Laser		Ultraviolet	
	accuracy		2 um	
	Laser power		~5W	
	diameter of focused LASER beam		~20 um	
	LASER wavelength		355 nm	
	LASER pulse frequency		~25 - 200 kHz	
	allowable PCB board size		L 230 mm W 300 mm H 10 mm	
	Software		Required (at least compatible with	
			Windows 7 and above) Efficient CAM software which can	
			import existing CAD data and converts them into laser process.	
	Additional tools		tioni into iasci piocess.	
	Dust extraction unit		Required (compatible unit)	
	Compressor system compresso	ed	Required (compatible unit)	
	air supply		1 r · · · · · · · · · · · · · · · · · ·	
	Adjustment tool		Required (compatible unit)	
	Measuring microscope		Required (~x60)	
	Warranty		Minimum three year	
	User manual and product documentation		Required	
	Additional Requirement		All relevant technical brochures should	
	Auditional Requirement		An relevant technical brochures should	

	1		I I	I	1
		be forwarded with Tender			
		Documents. Comprehensive user guide,			
		Complete track record on where			
		the supplier has supplied the product,			
		Recommendation letter about the			
		product from the institutions where the			
		supplier has supplied the product.			
		Manufactures' authorization should be			
		submitted with the tender documents			
2.55	Reflow oven				
	Purpose	RoHS compliant lead-free reflow			
	_	soldering			
	Technical specifications				
	Model	Specify			
	Country of Origin	Specify			
	allowable PCB board size	~ L 230mm W 300mm			
	maximum preheat temperature/	220 deg. C / ~999 s			
	time				
	maximum reflow	320 deg. C/ ~600 s			
	temperature/time	520 deg. e/ 1000 s			
	Long thermal treatment:	220 deg. C/ ~64 hours			
	temperature/time	$220 \text{ deg. } C/ \sim 04 \text{ hours}$			
	L	less than 5 min.			
	temperature stabilizing time				
	PCB cooling method	Required: Two fans with adjustable			
		speed			
	Power Supply	230V, 50Hz			
	Max. Power consumption	<= 3.2 kW			
	Operating conditions	Temp ~15-30 deg.C, Humidity:~ 30-80%			
	Software	Required (at least compatible with			
		Windows 7 and above)			
		-Process control and analysis			
	USB interface	Required			
	Required accessories	Temperature indicating device			
	Warranty	Minimum one year			
	User manual and product	Required			
	documentation	Required			
	Additional Requirement	All relevant technical brochures should			
		be forwarded with Tender			
		Documents. Comprehensive user guide,			
		Complete track record on where			
		the supplier has supplied the product,			
		Recommendation letter about the			
		product from the institutions where the			
		supplier has supplied the			
		product. Manufactures' authorization should be submitted with the			
250	Alterra EDCA Start D	tender documents			
2.56	Altera FPGA Starter Developm				
	Model	Specify			

	Country of Origin	Specify			
	Configuration	USB-BlasterTM download cable			
		(embedded)			
	1	EPCS4 serial configuration device			
	Memory	8-Mbyte SDRAM			
		512-Kb SRAM			
		1- to 4-Mbyte flash			
	Clocking	SMA connector (external clock input)			
	Audio	24-bit coder/decoder (CODEC)			
	Switches and indicators	Ten switch and four push buttons			
		Four, 7-segment displays			
		Ten red and eight green LEDs			
	Connectors	VGA, RS-232, and PS/2 ports			
		Two 40-pin expansion ports			
		SD/MMC socket			
	Cables/power	USB cable			
	·	External power supply			
	HDL design software	Quartus II			
	Other required accessories	Reference guide, User manual, Reference			
	1	designs and demo for FPGA Starter Kit			
	Warranty	Minimum one year			
	User manual and product	Required			
	documentation	1			
	Additional Requirement	All relevant technical brochures should			
	-	be forwarded with Tender			
		Documents. Comprehensive user guide,			
		Complete track record on where			
		the supplier has supplied the product,			
		Recommendation letter about the			
		product from the institutions where the			
		supplier has supplied the product.			
		Manufactures' authorization should be			
		submitted with the tender documents		_	
2.57	Signal Generators				
	Model	Specify			
	Country of Origin	Specify			
	Frequency Range	0.5Hz ~ 5MHz			
	Amplitude	$>10$ Vpp (into 50 $\Omega$ load)	⊢		
	Impedance	50Ω±10%	├─────		
	Attenuator	-20dB±1dBx2			
	DC Offset	$<-5V \sim >5V$ (into 50 $\Omega$ load)			
	Duty Control	80% ~ 20%, maximum 1MHz			
		(continuously adjustable)			
	Sine wave				
	Distortion	<1%, 0.5Hz ~ 100kHz			
	THD (Total Harmonic	< 30dB, below fundamental in all			
	Distortion)	ranges, from Max to 1/10 level			
	Flatness	< 0.3dB, below 500kHz			
		< 1dB, below 5MHz			

Triangle Wave			
Linear	> 98%, 0.5Hz ~ 100kHz		
	> 95%, 100kHz ~ 5MHz		
SQUARE WAVE			
Symmetry	±2%, 1Hz ~ 100kHz		
Rise or Fall Time	$< 50$ nS at maximum output (into 50 $\Omega$		
	load)		
CMOS OUTPUT			
Level	4Vpp±1Vpp ~ 14.5Vpp±0.5Vpp		
	adjustable		
Rise or Fall Time	< 120nS		
TTL OUTPUT			
Level	> 3Vpp		
Fan Out	20 TTL load		
Rise or Fall Time	< 25nS		
VCF (Voltage Controlled Fre	equency)		
Input Voltage	$0V \sim 10V \pm 1V (100:1)$		
input + onuge			
Input Impedance	10kΩ±10%		
GCV (Generator Controlled	Voltage)		
Output Voltage	Sets the voltage between $0V \sim 2V$		
	according to the frequency		
SWEEP OPERATION			
Sweep Selection	Switch selector		
Sweep Rate	Maximum 100 : 1, adjustable		
Sweep Time	0.5sec ~ 30sec, adjustable		
Sweep Mode	Lin/Log switch selector		
AMPLITUDE MODULATIO			
Depth	0 ~ 100%		
MOD. Frequency	400Hz (INT), DC ~ 1MHz(EXT)		
Carrier Bandwidth	100Hz ~ 5MHz (-3dB)		
EXT Sensitivity	< 10Vpp for 100% modulation		
FREQUENCY COUNTER			
INT/EXT	Switch selector		
Range	0.5Hz ~ 5MHz (5Hz ~ 150MHz EXT)		
Accuracy	Time base accuracy±1 count		
Time Base	$\pm 20$ ppm(23° C $\pm$ 5° C)after 30 minutes		
	warm up OR better		
Resolution	100nHz for 1Hz, 1Hz for 100MHz OR		
	better		
 Input Impedance	1MΩ // 150pF		
 Sensitivity	< 35mVrms (5Hz ~ 100MHz)		
	< 45mVrms (100MHz ~ 150MHz)		
POWER SOURCE	AC 230V, 50Hz		
Warranty	Minimum one year		
User manual and product	Required		
documentation		<u> </u>	
Additional Requirement	All relevant technical brochures should		

		he fermer de l'and d' T	
		be forwarded with Tender	
		Documents. Comprehensive user guide,	
		Complete track record on where	
		the supplier has supplied the product, Recommendation letter about the	
		product from the institutions where the	
		supplier has supplied the product. Manufactures' authorization should be	
		submitted with the tender documents	
2.58	Spectrum Analyzer	submitted with the tender documents	
	Model	Specify	
		Specify	 
	Country of Origin	9 kHz to 3.0 GHz	
	Frequency Range		
	Resolution	1 Hz	
	Frequency Reference:		
	Aging Rate	$<=\pm 2 \text{ ppm max}.$	
	Frequency Stability over	$<= \pm 0.025 \text{ ppm} (0 \text{ to } 50 ^{\circ}\text{C} )$	
	Temperature	0.02	 
	Supply Voltage Stability	<=±0.02 ppm	 
	Frequency Readout Accuracy :		
	Sweep points	$Span \ge 100 \text{ Hz} \qquad (601)$	
		Span = $0 \text{ Hz}$ (6 to 601)	
	Marker Frequency Counter :		
	Resolution	1 Hz, 10 Hz, 100 Hz, 1 kHz	
	Accuracy related	RBW/Span >=0.02	
		Mkr level to DNL>30 dB	
	Frequency Span :		
	Range	0 Hz (zero span), 100 Hz to 3 GHz	
	Resolution	1 Hz	
	Phase Noise :		
	Offset from Carrier	Fc = 1 GHz; RBW = 1 kHz, VBW = 10	
		Hz;Average $\geq 40$	
	10 kHz	<-88 dBc/Hz	
	100 kHz	<-95 dBc/Hz	
	1 MHz	<-113 dBc/Hz	
	Resolution Bandwidth (RBW) F	ilter :	
	Filter Bandwidth	1 Hz to 1 MHz in 1-3-10 sequence (-3dB	
		bandwidth )	
		200 Hz, 9 kHz, 120 kHz, 1 MHz (-6dB	
		bandwidth )	
	Accuracy:	$\langle = \pm 8\%, RBW = 1 MHz$	
		<= ± 5%, RBW < 1 MHz	
	Shape Factor	< 4.5:1	
	Video Bandwidth (VBW) Filter	1 Hz to 1 MHz in 1-3-10 sequence	
		(-3dB bandwidth )	
	Amplitude Range:		
	100 kHz to 1 MHz	Displayed Average Noise Level (DANL)	
		to 18 dBm	
	1 MHz to 10 MHz	DANL to 21 dBm	

1	0 MHz to 3 GHz	DANL to 30 dBm		
I	nput Attenuator Range :	0 to 50 dB, in 1 dB step		
		(Auto or manual setup)		
N	/Iaximum Safe Input Level :			
A	Average Total Power	>= 33 dBm		
Ľ	DC Voltage	$\pm 50 \text{ V}$		
1	dB Gain Compression :			
Т	Total Power at 1st Mixer	> 0 dBm		
Γ	Total Power at the Preamp	> -22 dBm		
Γ	Displayed Average Noise Level (l	DANL):		
P	Preamp off	(@Setting: 0 dB attenuation; RF Input is terminated with a 50 Ohm load. RBW 10 Hz; VBW 10 Hz; span 500 Hz; reference level = $-60$ dBm; trace average $\ge 40$ ) 9 kHz to 100 kHz, < $-93$ dBm 100 kHz to 1 MHz, < $-90$ dBm - 3 x (f/100 kHz) dB 1 MHz to 10 MHz, < $-122$ dBm 10 MHz to 3 GHz, < $-122$ dBm		
P	Preamp on	$(@Setting: 0 dB attenuation; RF Input is terminated with a 50 Ohm load. RBW 10 Hz; VBW 10Hz; span 500 Hz; reference level = -60dBm; trace average \geq 40)100 kHz to 1 MHz, < -108 dBm - 3 x (f/100 kHz) dB1 MHz to 10 MHz, < -142 dBm10 MHz to 3 GHz, < -142 dBm + 3 x (f/1 GHz) dB$		
I	nternal Data storage	>= 16  MB nominal		
	Varm-up Time	< 30 minutes		
	Cemperature Range	+5 °C to +45 °C (Operating) or better -20 °C to + 70 °C (Storage ) or better		
Г	Tracking Generator:			
	Frequency Range	100 kHz to 3 GHz		
	Dutput Power	-50 dBm to 0 dBm in 0.5 dB steps		
	Absolute Accuracy	$\pm 0.5 \text{ dB}$		
	Dutput Flatness	Referenced to 160 MHz, -10 dBm 100 kHz to 2 GHz : $\pm$ 1.5 dB 2 GHz to 3 GHz: $\pm$ 2.0 dB		
τ	Dutput Level Switching Incertainty	± 0.8 dB		
	Iarmonics	< -30 dBc		
R	Reverse Power	+30 dBm max.		

	Connector type	N-type female		
	Impedance	50 ohm		
	Output VSWR	< 1.6:1 (when source attenuation is		
	1	12dB)		
	Front Panel Input/output	RF Input		
		Power for Option		
		USB Host		
		MicroSD Socket		
	Rear Panel Input/output	Reference Output		
		Reference Input		
		Alarm Output		
		Trigger Input/ Gated Sweep Input		
		LAN TCP/IP Interface		
		USB Device		
		IF Output		
		Earphone Output		
		RS232 Interface		
		GPIB Interface		
		AC Power Input		
		Battery Pack (Optional)		
	Warranty	Minimum one year		
	User manual and product	Required		
	documentation			
	Additional Requirement	All relevant technical brochures should		
	_	be forwarded with Tender		
		Documents. Comprehensive user guide,		
		Complete track record on where		
		the supplier has supplied the product,		
		Recommendation letter about the		
		product from the institutions where the		
		supplier has supplied the product.		
		Manufactures' authorization should be		
		submitted with the tender documents		
2.59	Arbitrary Waveform Generat	or	02	
	Model	Specify		
	Country of Origin	Specify		
	Maximum frequency	120MHz		
	Channels	2		
	Memory	Volatile: >=64 MSa/Channel, Non-		
		Volatile: >=950 MB in file system		
	Waveforms	Standard(Sine, Square, Ramp, Pulse,		
		Triangle, Gaussian Noise, PRBS		
		(Pseudorandom Binary Sequence), DC),		
		Built-in arbitrary(Cardiac, Exponential		
		Fall, Exponential Rise, Gaussian Pulse,		
		Haversine, Lorentz, D-Lorentz, Negative		
		Ramp, Sinc), User-defined arbitrary (with		
		muti-segment sequencing)		
	Operating Modes	Continuous, Modulate, Frequency Sweep,		
		Counted Burst, Gated Burst	1	

	Modulation Types	AM FM P	M, FSK, BPSK, PWM, Sum	
	Woddhation Types	(carrier + m)		
	Interfaces	· ·	-T (Sockets & VXI-11	
	Interfaces		USB 2.0 (USB-TMC488	
		1 / /	PIB/IEEE-488.1, IEEE-488.2	
	Web user interface for remote	Required	1 ID/ILLL-400.1, ILLL-400.2	
	operation and monitoring	Required		
	Display	Color TFT	at least WQVGA (480x272)	
	Display	with LED ba	- , , ,	
	Waveform Characteristics	Resolution:	0	
	(Sine)		istortion( for freq>10MHz and	
	(bline)		p): $\leq -39$ dBc	
	-		e (@100kHz offset and freq	
		120MHz): <		
	Waveform Characteristics	,	0.01% to 99.99%, resolution:	
	(Square and pulse)	0.01%	0.0170 to 99.9970, resolution.	
	Waveform output		Front-panel BNC, shell and pin	
	characteristics		n chassis (±42 V maximum);	
			On, Off, or Inverted;	
			edance (nom:) 50 $\Omega$ ;	
			otection: required	
	Two channel characteristics	Operating	Independent, Coupled	
	1 wo channel characteristics	modes	parameter(s), Combined (Ch 1	
		models	+ Ch 2), Equal (Ch $1 = Ch 2$ ),	
			or Differential (Ch $1 = -Ch 2$ ),	
	-	IQ Player	Required	
	Output characteristics		Rear-panel BNC, chassis-	
	Output characteristics	referenced ;	Real-parter BINC, chassis-	
		,	nom): 10 MHz ;	
		1 .	$0 \text{ dBm} (632 \text{ mVpp}) \text{ into } 50 \Omega;$	
		Impedance(		
	Power source	230 V AC, 5		
	Warranty	Minimum o		
	User manual and product	Required		
	documentation	Required		
	Additional Requirement	All relevant	technical brochures should be	
	Additional Requirement	forwarded w		
			Comprehensive user guide,	
			ack record on where the	
		-	supplied the product,	
			lation letter about the product	
			titutions where the supplier has	
			product. Manufactures'	
			n should be submitted with the	
		tender documents		
2.60	Transmission Line trainer			
	Model	Specify		
	Country of Origin	Specify		
	Display		mns indicating positive and	
	2 ioping		voltages at 13 positions.	
L	L	negutive	· studes at 15 positions.	I

	Propagation time	Switch 0.25, 0.5, 2 s at zero attenuation,		
	Propagation time			
		representing line lengths L, 2L, 8L		
		respectively.		
	Attenuation	Simulates attenuation due to the lines		
		series resistance. Continuously		
		variable.		
	Step input	A centre-stable 2-way switch applies a		
		signal to either end of the line.		
	Line impedance	$\sim 600\Omega$		
	Plugin terminations	short-circuit link (2)		
	Matched load :			
		Resistive loads (unmatched: low $\sim 50\Omega$ ,		
		medium ~200 $\Omega$ , high ~1.8k $\Omega$ , large ~		
		100kΩ		
		Capacitive Load ~100µF nominal		
		(reversible electrolytic)		
	Hold	Signals on the line are held at the instant		
		of switching		
	Power supply	240V 50Hz		
		Fuse : Required		
	Additional materials	Manual of practical demonstrations and		
		assignments, covering all the important		
		aspects of these characteristics		
	Warranty	Minimum one year		
	User manual and product	Required		
	documentation	Required		
	Additional Requirement	All relevant technical brochures should		
	Aduitional Requirement	be forwarded with Tender		
		Documents. Comprehensive user guide,		
		Complete track record on where		
		the supplier has supplied the product, Recommendation letter about the		
		product from the institutions where the		
		supplier has supplied the		
		product. Manufactures' authorization		
		should be submitted with the		
(1		tender documents	_	
.61	Analog Multimeter			
	Model	Specify		
	Country of Origin	Specify		
	DCV (Range selection)	0.1/0.5/2.5/10/50/250/1000V		
	ACV(Range selection)	10/50/250/1000V		
	DCA(Range selection)	50µ/ 2.5m/ 25m/250mA		
	$\Omega$ (Range selection)	$2k/20k/200k/2M(\times 1/\times 10/\times 1k)/200M$		
		(x100k)		
	LI- Load Current(Range	1.5µ/150µ/1.5m/15m/150mA		
	selection)			
	Decibel (Range)	<=-10dB to >=+22dB for 10VAC		
		upto >= +62dB		
	DC high voltage	>=25kV		

	hFE	1000 at x10 range or better		
	Fuse	Required (250V/0.5A)		
	Operating conditions	0deg C-40 deg C, 25%-80%RH		
	Power source	R6(IEC) or UM-3 (1.5V)x2		
	Drop shock proof	Required		
	Protective body cover	Required		
	Required Accessories	High voltage probe, hFE probe, Clip		
		adapters		
	Warranty	Specify		
	User manual and product documentation	Required		
	Additional Requirement	All relevant technical brochures should		
	1	be forwarded with Tender Documents.		
		Comprehensive user guide, Complete		
		track record on wherethe supplier has		
		supplied the product, Recommendation		
		letter about the product from the		
		institutions where the supplier has		
		supplied the product. Manufactures'		
		authorization should be submitted with		
		the tender documents		
2.62	Genuino Starter Kit (Original			
	Model	Specify		
	Country of Origin	Specify		
	Each Kit should include	<ul> <li>Arduino Projects Book (170 pages) (1 No)</li> <li>Arduino / GenuinoUnoboard(latest version)(1 No)</li> <li>USB cable (1 No)</li> <li>Breadboard 400 points (1 No)</li> <li>Easy-to-assemble wooden base (1 No)</li> <li>9v battery snap (1 No)</li> <li>Solid core jumper wires (70 Nos)</li> <li>Stranded jumper wires (2 Nos)</li> <li>Photoresistor [VT90N2 LDR] (6 Nos)</li> <li>Potentiometer 10kilohm (3 Nos)</li> <li>Pushbuttons (10 Nos)</li> <li>Temperature sensor [TMP36] (1 No)</li> </ul>		

	1			I	
		- LEDs (blue) (3 Nos)			
		- Small DC motor $6/9V$ (1 No)			
		- Small servo motor (1 No)			
		- Piezo capsule [PKM17EPP-			
		4001-B0] (1 No)			
		- H-bridge motor driver [L293D]			
		(1  No)			
		- Optocouplers [4N35] (2 Nos)			
		<ul> <li>Transistor [BC547] (5 Nos)</li> <li>Mosfet transistors [IRF520] (2</li> </ul>			
		Nos)			
		- Capacitors 100nF (5 Nos)			
		- Capacitors 100µF (3 Nos)			
		- Capacitor 100pF (5 Nos)			
		- Diodes [1N4007] (5 Nos)			
		- Transparent gels (red, green,			
		blue) 3 Nos)			
		- Male pins strip (40x1) (1 No)			
		- Resistors 220 ohm (20 Nos)			
		- Resistors 560 ohm (5 Nos)			
		- Resistors 1 kilohm (5 Nos)			
		- Resistors 4.7 kilohm (5 Nos)			
		- Resistors 10 kilohm (20 Nos)			
		- Resistors 1 megohm (5 Nos)			
		- Resistors 10 megohm (5 Nos)			
		- 9V Rechargeable battery (1 No)			
	User manual and product	Required			
	documentation				
	Warranty	Specify			
	Additional Requirement	All relevant technical brochures should			
		be forwarded with Tender			
		Documents. Comprehensive user guide,			
		Complete track record on where			
		the supplier has supplied the product,			
		Recommendation letter about the			
		product from the institutions where the			
		supplier has supplied the			
		product. Manufactures' authorization			
		should be submitted with the			
2 (2		tender documents			
2.63	Arduino MEGA 2560 / Genuino Model				
	Model Country of Origin	Specify Specify			
	Country of Origin	Specify Latast			
	Version	Latest			
	Microcontroller	ATmega2560			
	Operating Voltage	5V 7.12V			
	Input Voltage (recommended)	7-12V			
	Input Voltage (limit)	6-20V			
	Digital I/O Pins Analog Input Pins	54 (of which 15 provide PWM output) 16			

	DC Current per I/O Pin	20 mA		
	DC Current for 3.3V Pin	50 mA		
	Flash Memory	256 KB of which 8 KB used by		
		bootloader		
-	SRAM	8 KB		
	EEPROM	4 KB		
	Clock Speed	16 MHz		
	Warranty	Specify		
	User manual and product	Required		
	documentation	Required		
	Additional Requirement	All relevant technical brochures should be forwarded with Tender Documents. Comprehensive user guide, Complete track record on wherethe supplier has supplied the product, Recommendation letter about the product from the institutions where the		
		supplier has supplied the product.		
		Manufactures' authorization should be		
		submitted with the tender documents		
2.64	Arduino Due(Original)			
	Model	Specify Specify		
-	Country of Origin	Specify		
	Version	Latest		
	Microcontroller	AT91SAM3X8E		
	Operating Voltage	3.3V		
	Input Voltage	7-12V		
	Input Voltage (limits)	6-16V		
	Digital I/O Pins	54 (of which 12 provide PWM output)		
	Analog Input Pins	12		
	Analog Output Pins	2 (DAC)		
	Total DC Output Current on all I/O lines	130 mA		
	DC Current for 3.3V Pin	800 mA		
	DC Current for 5V Pin	800 mA		
	Flash Memory	512 KB all available for the user applications		
	SRAM	96 KB (two banks: 64KB and 32KB)		
	Clock Speed	84 MHz		
	Length	~100 mm		
	Width	~55 mm		
	Weight	<40 g		
	Warranty	Specify		
	User manual and product documentation	Required		
	Additional Requirement	All relevant technical brochures should be forwarded with Tender Documents. Comprehensive user guide,		
		Complete track record on where the		

	1		<u> </u>	
		supplier has supplied the product,		
		Recommendation letter about the		
		product from the institutions where the		
		supplier has supplied the product.		
		Manufactures' authorization should be		
		submitted with the		
		tender documents		
2.65	Arduino ZERO/ Genuino ZER	O(Original)		
	Model	Specify		
	Country of Origin	Specify		
	Version	Latest		
	Microcontroller	ATSAMD21G18, 32-Bit ARM Cortex		
		M0+		
	Operating Voltage	3.3V		
	PWM Pins	All but pins 2 and 7		
	UART	2 (Native and Programming)		
	Digital I/O Pins	20 20	+	
	6	-	+	
	Analog Input Pins	6, 12- bit ADC channels	+	
	Analog Output Pins	1, 10-bit (DAC)	<u> </u>	
	Flash Memory	256 kB	┥───┤	
	SRAM	32 kB		
	Clock Speed	48 MHz		
	Warranty	Specify		
	User manual and product	Required		
	documentation			
	Additional Requirement	All relevant technical brochures should		
	-	be forwarded with Tender		
		Documents. Comprehensive user guide,		
		Complete track record on where the		
		supplier has supplied the product,		
		Recommendation letter about the		
		product from the institutions where the		
		supplier has supplied the product.		
		Manufactures' authorization should be		
		submitted with the tender documents		
2.66	ArduinoYún(Original)	submitted with the tender documents		
2.00	Model	Specify		
	Country of Origin	Specify	++	
	Version	Latest	+	
		Latest	┼───┼	
	AVR Arduino microcontroller		┥──┤	
	Microcontroller	ATmega32U4	<u> </u>	
ļ	Operating Voltage	5V	╡───┤	
	Input Voltage	5		
	Digital I/O Pins	20		
	PWM Channels	7		
	Analog Input Pins	12		
	DC Current per I/O Pin	40 mA		ĺ
	DC Current for 3.3V Pin	50 mA	+ +	
	Flash Memory	32 KB (of which 4 KB used by	+ +	
L			L	1

		bootloader)		
	SRAM	2.5 KB		
	EEPROM	1 KB		
	Clock Speed	16 MHz		
	Linux Microprocessor	TO MILE		
	Processor	Atheros AR9331		
	Architecture	MIPS @400MHz		
	Operating Voltage	3.3V		
	Ethernet	IEEE 802.3 10/100Mbit/s		
	WiFi	IEEE 802.11b/g/n		
	USB Type-A	2.0 Host		
	Card Reader	Micro-SD only		
	RAM	64 MB DDR2		
	Flash Memory	16 MB		
	SRAM	2.5 KB		
	EEPROM	1 KB		
	Clock Speed	16 MHz		
	Warranty	Specify	+	
	User manual and product	Required		
	documentation	Required		
	Additional Requirement	All relevant technical brochures should		
	Ruditional Requirement	be forwarded with Tender		
		Documents. Comprehensive user guide,		
		Complete track record on where the		
		supplier has supplied the product,		
		Recommendation letter about the		
		product from the institutions where the		
		supplier has supplied the product.		
		Manufactures' authorization should be		
		submitted with the tender documents		
2.67	ArduinoWiFi Shield(Origina	al)		
	Model	Specify		
	Country of Origin	Specify		
	Version	Latest		
	On board indicators	The shield contains a number of		
		informational LEDs as stated below		
		LINK (green) : indicates a connection to a		
		network		
		ERROR (red): indicates when there is a		
		communication error		
		DATA (blue): indicates data being		
		transmitted/received		
	Operating voltage	5V (supplied from the Arduino Board)		
	Compatibility	Arduino Due		
	Connection	802.11b/g networks		
	Encryption types	WEP and WPA2 Personal		
	Interface	SPI port		
	Additional memory slot	on-board micro SD slot		
	Programmer	ICSP headers		

	serial debugging	FTDI connection for serial debugging of WiFi shield	
	Update	Mini-USB for updating WiFi shield firmware	
	Warranty	Specify	
	User manual and product	Required	
	documentation	Required	
	Additional Requirement	All relevant technical brochures should be forwarded with Tender Documents. Comprehensive user guide, Complete track record on where the supplier has supplied the product, Recommendation letter about the product from the institutions where the supplier has supplied the product. Manufactures' authorization should be submitted with the tender documents	
2.68	Arduino Ethernet Shield WI		
	Model	Specify	
	Country of Origin	Specify	
	Version	Latest	
	Technical specifications		
	Length	~70 mm	
	Width	~55 mm	
	Operating voltage	5V (supplied from the ArduinoBoard)	
	Ethernet Controller	W5100 with internal 16K buffer	
	Connection speed	10/100Mb	
	communicate with controller	SPI port	
	Power over Ethernet (PoE) n power from a conventional ty		
	IEEE802.3af compliance	Required	
	Maximum output ripple and noise	100mVpp	
	Input voltage range	36V to 57V	
	protection	Overload and short-circuit	
	Output	9V	
	Efficiency of DC/DC converter	Typ 75% @ 50% load	
	Isolation (input to output)	>=1500V	
	Warranty	Specify	
	User manual and product documentation	Required	
	Additional Requirement	All relevant technical brochures should be forwarded with Tender Documents. Comprehensive user guide, Complete track record on where the supplier has supplied the product, Recommendation letter about the product from the institutions where the supplier has supplied the product. Manufactures' authorization should be	

		submitted with the tender documents		
2.69	Arduino GSM Shield			
	Model	Specify		
	Country of Origin	Specify		
	Version	Latest		
	Board support	Arduino Uno		
		ArduinoMega		
		Arduino Mega ADK		
		Leonardo.		
	On	board Indicators		
	On	shows the Shield gets power		
	Status	Turns on to when the modem is		
		powered and data is being transferred		
		to/from the GSM/GPRS network.		
	Net	Blinks when the modem is		
		communicating with the radio network.	 	
	Warranty	Specify	 	
	User manual and product	Required		
	documentation			
	Additional Requirement	All relevant technical brochures should		
		be forwarded with Tender		
		Documents. Comprehensive user guide,		
		Complete track record on where		
		the supplier has supplied the product,		
		Recommendation letter about the		
		product from the institutions where the		
		supplier has supplied the		
		product. Manufactures' authorization		
		should be submitted with the		
2 70	Andrine Meter Shield	tender documents		
2.70	Arduino Motor Shield	Specify		
	Model Country of Origin	Specify	 	
	Version		 	
		Latest	 	
	Operating Voltage Motor controller	5V to 12V	 	
		L298P, Drives 2 DC motors or 1 stepper motor		
	Max current		 	
		2A per channel or 4A max (with external power supply)		
	Current sensing	1.65V/A	 	
	Warranty	Specify	 	
	User manual and product	Required	 	
	documentation	Required		
	Additional Requirement	All relevant technical brochures should	 	
		be forwarded with Tender		
		Documents. Comprehensive user guide,		
		Complete track record on wherethe		
		supplier has supplied the product,		
		Recommendation letter about the		
		product from the institutions where the		

		Manufactures submitted wit	supplied the product. s' authorization should be th the tender documents	
2.71	Motor/Stepper/Servo Shield for	-		
ļ	Model	Specify		
	Country of Origin	Specify		
	Version	Latest		
	Connections for high precision servo-motor	2 (5V)		
	H bridges	Nos	4	
		Current per bridge	1.2 A	
		Voltage range	4.5 V DC to 13.5 V DC	
	DC bidirectional motors velocity selection (Arduino PWM) with resolution	8 bit		
	stepper motors [unipolar or bipolar,Pulldown resistors to take the motors off at startup, Header for polar cables]	2		
	No of stackable shields	32 ~70mm x 55mm x 10mm		
	Dimensions			
L	Warranty	Specify		
	User manual and product documentation	Required		
	Additional Requirement	All relevant technical brochures should be forwarded with Tender Documents. Comprehensive user guide, Complete track record on where the supplier has supplied the product, Recommendation letter about the product from the institutions where the supplier has supplied the product. Manufactures' authorization should be submitted with the tender documents		
2.72	Assembled Data Logging shield f	or Arduino		
	Model	Specify		
	Country of Origin	Specify		
ļ	Version	Latest		
	Features	1		
	SD card interface should support	FAT16 forma FAT32 forma		
	Real Time	Clock keeps t the Arduino i	the time going even when	
	Prototyping area soldering connectors, circuitry or sensors.	Required		
ł				

	Support	Arduino UNO, Duemilanove, Diecimila,		
	Support	Leonardo or ADK/Mega R3 or higher.		
	Dimensions	~70mm x 55mm x 18mm		
	Weight	<=25g		
	This board/chip interface	I2C 7-bit		
	Warranty	Specify Bogwind		
	User manual and product documentation	Required		
	Additional Requirement	All relevant technical brochures should		
		be forwarded with Tender		
		Documents. Comprehensive user guide,		
		Complete track record on where the		
		supplier has supplied the product,		
		Recommendation letter about the		
		product from the institutions where the		
		supplier has supplied the product.		
		Manufactures' authorization should be		
177	Android Dhana ta ganaria shia	submitted with the tender documents		
2.73	Android Phone to generic shie Model			
	Country of Origin	Specify Specify	 	
	Version			
		Latest		
	Compatible Bluetooth module	Arduino( 5V and 3.3V boards) In built		
	No of shields			
		>=40		
	Application for smartphone	application( in Android) full version		
	Warranty	Specify Description		
	User manual and product documentation	Required		
	Additional Requirement	All relevant technical brochures should		
	Additional Requirement	be forwarded with Tender		
		Documents. Comprehensive user guide,		
		Complete track record on where the		
		supplier has supplied the product,		
		Recommendation letter about the		
		product from the institutions where the		
		supplier has supplied the product.		
		Manufactures' authorization should be		
		submitted with the tender documents		
2.74	Music Shield			
	Model	Specify		
	Country of Origin	Specify		
	Version	Latest		
	Compatible	Genuino/Arduino Uno,		
	r	Genuino/Arduino Mega		
	multifunction button	1		
	Supported music formats	MP3, WMA, WAV, AAC, MIDI,		
	rr rr	OggVorbis		
	Supports memory reader	Micro SD card(minimum with 2GB)		
		(		

	Interface breakout	MIDI		
	MIDI Latency	Low		
	Warranty	Specify		
	User manual and product documentation	Required		
	Additional Requirement	All relevant technical brochures should be forwarded with Tender Documents. Comprehensive user guide, Complete track record on where the supplier has supplied the product, Recommendation letter about the product from the institutions where the supplier has supplied the product. Manufactures' authorization should be submitted with the		
2.75	USB Stick DSP Development To	tender documents		
2.13	Model	Specify		
	Country of Origin	Specify		
	Fixed point low power DSP	TMS320C5505		
	Embedded emulator	XDS100		
	EEPROM with protocol	I2C		
	32-bit programmable low power	TLV320AIC3204		
	stereo codec			
	Connectors	Line In, Headphone Out Connectors		
		Expansion connector		
	Removable USB stick enclosure			
	Full documentation	CD-ROM		
	Software	Included		
	Software	Should enable designer to readily target the DSP board(USB Stick DSP Development Tool) provided		
		A complete Integrated Development Environment (IDE), an efficient optimizing C/C++ compiler assembler, linker, debugger, integrated Code Wright		
		editor with Code Sense technology for faster code creation, data visualization, a profiler and a flexible project manager		
		Software IDE should support windows7 to latest version of windows		
	4	DSP/BIOS real-time kernel	 	
	Womenty	Chip Support Library	 	
	Warranty	Specify Dequired	 	
	User manual and product documentation	Required	 	
	Additional Requirement	All relevant technical brochures should be forwarded with Tender Documents. Comprehensive user guide,		
		Complete track record on where the		

r	1		 1 1	
		supplier has supplied the product,		
		Recommendation letter about the		
		product from the institutions where the		
		supplier has supplied the product.		
		Manufactures' authorization should be		
		submitted with the tender documents		
2.76	Advanced USB Stick DSP Develo	opment Tool		
	Model	Specify		
	Country of Origin	Specify		
	Fixed point low power DSP	TMS320C5515		
	Embedded emulator	XDS100		
	EEPROM with protocol	I2C		
	32-bit programmable low power	TLV320AIC3204		
	stereo codec			
	Connectors	Line In, Headphone Out Connectors		
	1	Expansion connector		
	1	USB and SD connectors		
	Flash memory	Required		
	Full documentation	CD-ROM		
	Software	Included		
	Software	Should enable designer to readily target		
	Software	the DSP board(Advanced USB Stick		
		DSP Development Tool) provided		
		A complete Integrated Development		
		Environment (IDE), an efficient		
		optimizing C/C++ compiler assembler,		
		linker, debugger, integrated Code Wright		
		editor with Code Sense technology for		
		faster code creation, data visualization, a		
	-	profiler and a flexible project manager		
		Software IDE should support windows7		
	-	to newest version of windows		
	4	DSP/BIOS real-time kernel		
		Chip Support Library		
	Warranty	Specify		
	User manual and product documentation	Required		
	Additional Requirement	All relevant technical brochures should		
	-	be forwarded with Tender		
		Documents. Comprehensive user guide,		
		Complete track record on where the		
		supplier has supplied the product,		
		Recommendation letter about the		
		product from the institutions where the		
		supplier has supplied the product.		
		Manufactures' authorization should be		
		submitted with the tender documents		
2.77	DSP Evaluation Module			
<b>20</b> 011	Model	Specify		
	Country of Origin	Specify		
	Country of Origin	specify	1	

Fixed point low power DSP	TMS320C5515	
On board embedded JTAG	plug-and-play functionality through just	
emulation	an A-to-mini B USB cable and	
	compatibility of external JTAG	
	emulation interface	
Stereo codec	TLV320AIC3204 or TLV320AIC23B	
OLED color LCD display	128x128 pixels	
Flash and mobile SDRAM	Integrated	
EEPROMs	I2C and SPI protocols	
USB slave port	>=2.0version	
Interface	RS232,MMC/SD slot, CE-ATA	
	connector	
User defined push button	>=10nos	
switches		
Analog connectors	front end	
Connectors for memory cards	Two expansion	
Oscillator socket	External	
Battery Holder	include	
Dial	Jog dial	
Universal power supply	+5V	
Module should include	DSP Evaluation Board	
	Code Composer Studio™ IDE Rev. 4.0	
-	Technical Reference Manual with	
	Schematics	
-	USB Cable	
-	AC Power Cord(s) for this module	
Software	Included	
Software	Should enable designer to readily target	
Software	the DSP board(DSP Evaluation Board)	
_	provided	
	A complete Integrated Development	
	Environment (IDE), an efficient	
	optimizing C/C++ compiler assembler,	
	linker, debugger, integrated CodeWright	
	editor with CodeSense technology for	
	faster code creation, data visualization, a	
_	profiler and a flexible project manager	
_	DSP/BIOS real-time kernel	
_	Chip Support Library	
	Software IDE should support windows7	
_	to latest version of windows	
	Board Test Package	
Warranty	Minimum one year	 
User manual and product documentation	Required	
Additional Requirement	All relevant technical brochures should	
	be forwarded with Tender	
	Documents. Comprehensive user guide,	

		Complete track record on where		
		the supplier has supplied the product,		
		Recommendation letter about the		
	product from the institutions where the			
		supplier has supplied the product. Manufactures' authorization should be		
		submitted with the tender documents		
2.78	DSP Starter Kit (DSK)			
	Model	Specify		
	Country of Origin	Specify		
	Kit	DSP Development Board with 512K Flash		
	- Kit	and 16MB SDRAM		
		Software IDE including the Fast Simulators		
		and access to Analysis Toolkit on Update Advisor		
		Software IDE should support windows7 to		
		latest version of windows		
		Quick Start Guide		
		Technical Reference		
		Customer Support Guide		
		USB Cable		
		Universal Power Supply		
		AC Power Cord(s)		
	DSP Development Board's	TMS320C6000		
	DSP platform			
	On board embedded	plug-and-play functionality through just an		
	(Standard IEEE) JTAG	A-to-mini B USB cable and compatibility of		
-	emulation	external JTAG emulation interface		
	Stereo codec	24-bit		
	3.5mm audio jacks	4(microphone, line in, speaker and line out)		
	Memory	512K words of Flash and 16 MB SDRAM		
	Plug-in modules	Expansion port connector		
	Universal power supply	+5V		
	Software	Included		
	Software:	Should enable designer to readily target the		
		DSPStarter Kit(DSK) provided.		
		A complete Integrated Development		
		Environment (IDE), an efficient optimizing		
		C/C++ compiler assembler, linker,		
		debugger, integrated Code Wright editor		
		with Code Sense technology for faster code		
		creation, data visualization, a profiler and a		
		flexible project manager		
		DSP/BIOS real-time kernel		
	1	Chip Support Library		
		Software IDE should support windows7 to		
		latest version of windows		
		Plug-in ability for third-party software for		
		additional functionality		
		DSK diagnostic tool		
		Dor utagnostic 1001		

		Target error recovery software		
	Warranty	Minimum one year		
	User manual and product	Required		
	documentation	Kequired		
	Additional Requirement	All relevant technical brochures should be		
	-	forwarded with Tender		
		Documents. Comprehensive user guide,		
		Complete track record on where		
		the supplier has supplied the product,		
		Recommendation letter about the product		
		from the institutions where the supplier has		
		supplied the product. Manufactures'		
		authorization should be submitted with the		
		tender documents		
2.79	Proteous			
	Model	Specify	<b>_</b>	
	Country of Origin	Specify		
	Full package	Required	<b>_</b>	
	It should include	Proteus PCB Design Level 3		
		Advanced Simulation Features		
		Proteus VSM for AVR		
		Proteus VSM for 8051/52		
		Proteus VSM for HC11		
		Proteus VSM for BASIC Stamp		
		Proteus VSM for 8086		
		Proteus VSM for MSP430		
		Proteus VSM for PICCOLO		
		Proteus VSM for PIC Bundle 8/16bit		
		Proteus VSM for ARM Bundle		
		Proteus USB Transaction Analyser		
		Extension to 1 years USC		
	version	latest		
	windows support	Windows 7 to latest		
	Usage	all academic purposes		
	Warranty	Minimum one year		
	User manual and product documentation	Required		
	Additional Requirement	All relevant technical brochures should be		
		forwarded with Tender		
		Documents. Comprehensive user guide,		
		Complete track record on where		
		the supplier has supplied the product,		
		Recommendation letter about the product		
		from the institutions where the supplier has		
		supplied the product. Manufactures'		
		authorization should be submitted with the		
_		tender documents		
2.80	4DOF Robot Arm Kit			
	Model	Specify		
	Country of Origin	Specify		

	Description	4 Degrees of freedom aluminium		
		Robotic Arm which delivers fast,		
		accurate, and repeatable movement.		
	Electric-gripper at the free-end	required		
	No of axis	5 + Gripper (wrist rotate)		
	Servo motion control	Local closed loop		
	Range of motion per axis	>=180 degrees		
	Accuracy of motion per axis	<= 0.09 degrees		
	Servo Voltage	6 V DC		
	Control Software	Required (at least for Windows 7 and		
		above)		
	Software requirement	Graphical interface software which can		
	1	create reusable patterns quickly and		
		enables variable playback time		
	Load bearing with arm extended	up to 300g		
	Gripper opening	>=30 mm		
	Gripping position	Two sided		
	Controller	Servo motor (only)		
	Power supply	DC adapter from mains (230 V/ 50 HZ)		
	connection	USB		
	Warranty	Minimum one year		
	User manual and product	Required		
	documentation			
	Additional Requirement	All relevant technical brochures should		
		be forwarded with Tender		
		Documents. Comprehensive user guide,		
		Complete track record on where		
		the supplier has supplied the product,		
		Recommendation letter about the		
		product from the institutions where the		
		supplier has supplied the product.		
		Manufactures' authorization should be		
		submitted with the tender documents		
.81	6DOF Robot Arm			
	Model	Specify		
	Country of Origin	Specify		
	Construction	Standard six axis kinematic four servo		
		joints with gear motor, encoder and $\mu C$		
		per joint. Two s mart servos.		
	Electric crimper at the free and	required		
	Electric-gripper at the free-end			
	Electric-gripper at the free-end Load bearing capacity	1		
	Load bearing capacity	~400g		
	<b>V i</b> i	~400g Digital two finger gripper		
	Load bearing capacity Gripper Reach	~400g Digital two finger gripper >= 600mm (including gripper)		
	Load bearing capacity Gripper Reach Communication	<ul> <li>~400g</li> <li>Digital two finger gripper</li> <li>&gt;= 600mm (including gripper)</li> <li>USB, internally CAN at 20 Hz</li> </ul>		
	Load bearing capacity Gripper Reach	<ul> <li>~400g</li> <li>Digital two finger gripper</li> <li>&gt;= 600mm (including gripper)</li> <li>USB, internally CAN at 20 Hz</li> <li>DC supply via mains(230V/50Hz)</li> </ul>		
	Load bearing capacity Gripper Reach Communication Power supply	<ul> <li>~400g</li> <li>Digital two finger gripper</li> <li>&gt;= 600mm (including gripper)</li> <li>USB, internally CAN at 20 Hz</li> <li>DC supply via mains(230V/50Hz) adapter,</li> </ul>		
	Load bearing capacity Gripper Reach Communication Power supply Digital Inputs	<ul> <li>~400g</li> <li>Digital two finger gripper</li> <li>&gt;= 600mm (including gripper)</li> <li>USB, internally CAN at 20 Hz</li> <li>DC supply via mains(230V/50Hz) adapter,</li> <li>&gt;= 3x24 V</li> </ul>		
	Load bearing capacity Gripper Reach Communication Power supply	<ul> <li>~400g</li> <li>Digital two finger gripper</li> <li>&gt;= 600mm (including gripper)</li> <li>USB, internally CAN at 20 Hz</li> <li>DC supply via mains(230V/50Hz) adapter,</li> </ul>		

	Control Softwar	re			-		( for at lea	ist	Windows 7 and								
					abov												
	Software requir	ement			-3D programming environment which												
						pr	ogram the robot in										
							ve way.		1.								
									program editors								
									or adapting								
								. A	bility to simulate								
						notioi											
	Warranty						n one year										
	User manual an documentation	d produc	t		Requ	uired											
	Additional Requ	uirement			All r	eleva	nt technic	al	brochures should								
							ded with 7										
									ensive user guide,								
							track reco		-								
						-			ed the product,								
									er about the								
									utions where the								
					1		as supplie										
									s' authorization								
							submitted										
					tender documents												
2.82	Dual Measurer	ment Mı	ıltimete														
	Model				Specify												
	Country of Orig	zin			Specify												
	Counts				>=50000												
	Dual measurem	ent/Dual	Display		Required												
	Selectable meas			<i>'</i>	Required Required; Max. >=40 Readings/s for DC V <= 0.02% Required												
	Sciectable meas	surement	speed														
	Basic DC precis	sion															
	Auto/Manual R	anging															
	True RMS measured	surement	t(AC,		Required												
	AC+DC)				1												
	No. of measure	ment fun	ctions		>= 1	1											
	Temperature me	easureme	ent		Requ	uired											
	DC Voltage																
	Range	500mV	′ 5V		50 V	7	500 V	1	000V								
	Resolution	10uV	100ι		1mV		10mV	1	00mV								
			V														
	Resistance	1		1			1	-									
	Range	500	5k	50	k	5001		_	50M								
	Resolution	10m	100m	1		10	100		lk								
	DC Current																
	Range	500u	5mA	50	m	500	m 5A	Ţ	10A								
		А		Α	А												
	Resolution	10nA	100n	1u	A	10u	A 100u	ιT	1mA								
			А				А										
	Continuity																
	Range: 5000.0 9	Ω			Reso	olutio	n: 100mΩ										

Diode Test		[	
Range: 5.0000 V	Resolution: 100µV		
Capacitance			
Range	5nF(0.5~1nF)/5nF(1~5nF)/ 50nF(5~10nF)/ 50nF(10~50nF)/500nF/5uF/50uF		
Resolution	0.001nF/0.001nF/0.01nF/0.01nF/0.1nF/1nF/10nF		
Temperature			
Range: <=-200 deg deg C	g C to $>=+300$ Resolution: $<= 0.1$ deg. C		
Display	VFD, TowColors Display		
Interface	USB Device, USB Host, GPIB		
Power Source	AC 230V/ 50Hz		
Power	Max. 15VA		
Consumption			
Accessories	Power cord, Test lead, Temperature probe adaptor with		
Required	thermocouple, USB Cable, GPIB Cable, GPIB-USB-HS		
Warranty	Minimum one year		
User manual and product documentation	Required		
Additional	All relevant technical brochures should be forwarded		
Requirement	with Tender Documents. Comprehensive user guide, Complete track record on where the supplier has supplied the product, Recommendation letter about the product from the institutions where the supplier has supplied the product. Manufactures' authorization should be submitted with the tender documents		

## Section VII.

## **Contract Data**

The following Contract Data shall supplement and / or amend the Conditions of Contract (CC). Whenever there is a conflict, the provisions herein shall prevail over those in the CC.

CC 1.1(i)	The Purchaser is: University of Jaffna
CC 1.1 (m)	The Project Site(s)/Final Destination(s) is/are: University of Jaffna
CC 8.1	For notices, the Purchaser's address shall be: Bursar
	Attention: Bursar
	Address: University of Jaffna, P.O Box 57, Thirunelvely, Jaffna.
	Telephone:021-2222644
CC 11	Goods shall be supplies in compliance with the quality and the specification given.
CC 15.1	CC 15.1—The method and conditions of payment to be made to the Supplier under this Contract shall be as follows:
	A: For Goods offered within Sri Lanka
	Payment shall be made in Sri Lanka Rupees within thirty (30) days of presentation of claim supported by a certificate from the Purchaser declaring that the Goods have been delivered and that all other contracted Services have been performed.
	i) On Delivery: up to a maximum of ninety (90) percentage of the Contract Price, shall be paid on receipt of the Goods.
	(ii) On Acceptance: the remaining ten (10) percentage of the Contract Price shall be paid to the Supplier within ninety (90) days. After the certification of acceptance.
CC 17.1	A Performance Security – 10%
CC 26.1	The liquidated damage shall be: 2% per week
CC 26.1	The maximum amount of liquidated damages shall be:10 %



## UNIVERSITY OF JAFFNA INVITATION FOR BIDS Supply of Computer, Electrical, Electronic & Lab Equipment to the Faculty of Engineering, University of Jaffna. UJ/F/PO/T/04/2016

Chairperson, Department Procurement Committee, University of Jaffna, Jaffna, Sri Lanka, invites sealed bids from eligible bidders for supply of following items to the University of Jaffna.

- 1. Bidding will be conducted through the National Competitive Bidding (NCB) procedure.
- 2. Bidder should have at least three years experience in the relevant field in Sri Lanka.
- 3. Interested eligible bidders may obtain further information from the Senior Assistant Bursar / Supplies of the University of Jaffna, and inspect the bidding documents at the Supplies Branch of the University between 9.00 am to 3.00 pm from 10.06.2016 to 12.07.2016.
- 4. A complete set of bidding documents in English may be purchased by interested bidders on submission of a written application to the Senior Assistant Bursar / Supplies, University of Jaffna and upon payment of a non-refundable fee of Rupees 2,000/=per package in cash at the Shroff Counter of the University of Jaffna. The bidder can also download the bidding documents from the University website <u>www.jfn.ac.lk</u>. Those who are obtaining bidding documents from the University website should submit the complete documents along with a Bank Draft drawn in favour of the "Bursar, University of Jaffna, Sri Lanka" for Rs. 2,000/=per package as non-refundable fee or the payments could be made to Peoples Bank, Jaffna University Branch, account no: 162-1-001-6-0000880, and the cash receipt/deposit slip to be attached with the bidding documents. The documents may be purchased until 2.30 p.m from10.06.2016 to 12.07.2016.
- Bids must be delivered in duplicate to be addressed Bursar, University of Jaffna, Thirunelvely, on or before 2. 00p.m on 13.07.2016. Please indicate the "Supply of Computer, Electrical, Electronic & Lab Equipment- UJ/F/PO/T/04/2016 13.07.2016" on the left hand corner of the envelope.
- 6. All bids must be accompanied by a Bid Security addressed to the **Chairperson**, **Department Procurement Committee**, **University of Jaffna**, valid for 120 days from the date of the bid opening as specified in the following Table.

Serial No	Description of Items	Bid Security	
Package	170,000.00		
1.1	Accelerometer	20	
1.2	Bluetooth Transceiver module	20	
1.3	Compass module	10	
1.4	12V Gear Motor	30	
1.5	6V gear motor	30	
1.6	GPS module	10	

1.7	GSM/GPRS Development boards	10	
1.7	Long Distance Ultrasonic module	10	
1.0	Short Distance Ultrasonic module	40	
1.10	Servo motor	20	
1.10	Arduino Nano / Genuino Nano(Original)	20	
1.11	Arduino MEGA / Genuino MEGA (Original)	20	
1.12	Motion sensors	40	
1.13	Motor driver kit	20	
1.14	Pulse sensors	5	
1.16	Relay module	20	
1.17	Tamiya Tracked Vehicle Chassis	10	
1.18	Robot chassis	10	
1.19	Robot wheel	25	
1.20	Rubber tire wheel	80	
1.21	Step motor	20	
1.22	Temperature and Humidity sensor	40	
1.23	Long Rang Video transmitter + receiver	5	
1.24	WiFi development kit	10	
1.25	WiFi module	10	
1.26	Wireless Transceiver module	20	
1.27	Long Rang Wireless module + Antenna	20	
1.28	High performance Computing node (Two processors each with16 core, 512 GB RAM, 3TB hard disk with multiple Ethernet interface.)	1	
1.29	High performance computing node(Two processors each with 8 core, 256 GB RAM, 3TB hard disk)	2	
1.30	Tower Model Computer	40	
1.31	Online UPS 6kVA	2	
1.32	Interactive Ultra Short Throw Multimedia Projector with Wall Mounting Accessory	2	
Pack	age 2 - Supply of Electrical & Electronic Engineering Equ	ipment	360,000.00
2.1	Rasberry Pi Single board Linux platform	10	
2.2	Beagle Bone Single board Linux platform	4	
2.3	Banana Pi Single board Linux platform	5	
2.4	Programable microcontroller development board	15	
2.5	Micro controller programmer with universal programing adapter seat, USB cable and 6 pin cable	5	
2.6	Programmable microcontroller development board with bread board included	15	
2.7	Microcontroller starter kit with necessary software tools (builder, simulator ,emulator) and ISP programmer(USB).	15	
2.8	FPGA trainer board	15	
2.9	Transistor based voltage regulator trainer kit	4	

2.10	Digital combinatory logic training kit	4	
2.10	Digital sequential logic trainer kit	2	
2.11		4	
	Digital Electronic trainer kit		
2.13	Step Motor Control kit	4	
2.14	Universal motor control board	3	
2.15	Digital Lux meter	1	
2.16	3 Phase Power Pack	1	
2.17	Power Factor Control Unit	1	
2.18	Asynchronous Wind Mill System including HVDC Light Line	1	
2.19	Flex Stand	6	
2.20	Flex set	1	
2.21	Flywheel	1	
2.22	TECNEL. Unit	1	
2.23	Pulse Generator	1	
2.24	Power factor meter	2	
2.25	Frequency meter	2	
2.26	Current Transformer	3	
2.27	PWM DC-Machine Control Module	2	
2.28	Drill Bench	1	
2.29	PCB shears	1	
2.30	Electrical hand driller	1	
2.31	Rheostat	4	
2.32	Rheostat	4	
2.33	Rheostat	4	
2.34	Digital and Analog Communication Trainer kit with jumper wire	1	
2.35	Digital Storage Oscilloscope	10	
2.36	Inductor bank	2	
2.37	Resistor bank	3	
2.38	Capacitor bank	2	
2.39	Glue gun and sticks	10	
2.40	Wireless Microphone set	2	
2.41	Wheatstone Bridge	5	
2.42	NI ELVIS II+ for Labview	2	
2.43	Multisim Education 25 user	1	
2.44	Digital Duplicator Machine	1	
2.45	Colour Laser Printer	1	
2.46	Hot air gun	3	
2.47	QUADCOPTER FOR DEVELOPERS	1	
2.48	humanoid robot	1	

2.49	Three phase synchronous generator	2	
2.50	Three phase induction motor	2	
2.50	Single phase motor	2	
2.51	Synchronizing module	3	
2.53	Optical fibre training kit UV Laser based PCB machine	1	
2.54		1	
2.55	Reflow oven	1	
2.56	Altera FPGA Starter Development Kit	20	
2.57	Signal Generators	10	
2.58	Spectrum Analyzer	5	
2.59	Arbitrary Waveform Generator	2	
2.60	Transmission Line trainer	1	
2.61	Analog Multimeter	10	
2.62	Genuino Starter Kit (Original)	20	
2.63	Arduino MEGA 2560 / Genuino MEGA 2560 (Original)	20	
2.64	Arduino Due(Original)	20	
2.65	Arduino ZERO/ Genuino ZERO(Original)	10	
2.66	ArduinoYún(Original)	10	
2.67	ArduinoWiFi Shield(Original)	5	
2.68	Arduino Ethernet Shield WITH PoE Module(Original)	5	
2.69	Arduino GSM Shield (integrated antenna)(Original)	5	
2.70	Arduino Motor Shield (Original)	15	
2.71	Motor/Stepper/Servo Shield for Arduino Kit(Original)	20	
2.72	Assembled Data Logging shield for Arduino(Original)	20	
2.73	Android Phone to generic shield converter for Arduino(Original)	20	
2.74	Music Shield(Original)	20	
2.75	USB Stick DSP Development Tool(Original)	20	
2.76	Advanced USB Stick DSP Development Tool(Original)	20	
2.77	DSP Evaluation Module(Original)	15	
2.78	DSP Starter Kit (DSK)(Original)	20	
2.79	Proteous	1	
2.80	4DOF Robot Arm Kit	5	
2.81	6DOF Robot Arm	1	
2.82	Dual measurement multimeter digital	10	
	2 3 – Supply of Lab Furniture		10,000.00
3.1	Computer Table	40	
3.2	Computer Chair	60	
3.3	Laboratory Table	8	

> For Bid Documents & Details visit University website <u>www.jfn.ac.lk</u>

- 7. Pre Bid meeting will be held on **01<sup>st</sup> July at 10.00 a.m**.in the Board Room of University of Jaffna
- 8. The bids shall be deposited in the 'Tender Box' available in the Bursar's Office of the University, or sent under Registered Cover to be received before the deadline to the address given Clause No.5.
- 9. Late bids will be rejected.
- 10. The bids will be opened at **2. 00p.m on 13.07.2016**, in presence of the bidders or their authorized representatives who choose to attend the bid opening at the board room of the University.

The Chairperson, Department Procurement Committee, University of Jaffna, Jaffna.

TP. / Fax No: 021-2220962, 021-2222644

M. G. L. Maveekumbura Senior Assistant Bursar (Supplies) University of Jaffna Jaffna