PHILIPPINE BIDDING DOCUMENTS

BIDDING DOCUMENTS FOR THE PURCHASE OF LABORATORY EQUIPMENT CHARGED TO GAA 2024 LABORATORIES MODERNIZATION AT BICOL UNIVERSITY EAST CAMPUS

021-24-PB

Government of the Republic of the Philippines

AUGUST 2024

Preface

These Philippine Bidding Documents (PBDs) for the procurement of Goods through Competitive Bidding have been prepared by the Government of the Philippines for use by any branch, constitutional commission or office, agency, department, bureau, office, or instrumentality of the Government of the Philippines, National Government Agencies, including Government-Owned and/or Controlled Corporations, Government Financing Institutions, State Universities and Colleges, and Local Government Unit. The procedures and practices presented in this document have been developed through broad experience, and are for mandatory use in projects that are financed in whole or in part by the Government of the Philippines or any foreign government/foreign or international financing institution in accordance with the provisions of the 2016 revised Implementing Rules and Regulations of Republic Act No. 9184.

The Bidding Documents shall clearly and adequately define, among others: (i) the objectives, scope, and expected outputs and/or results of the proposed contract or Framework Agreement, as the case may be; (ii) the eligibility requirements of Bidders; (iii) the expected contract or Framework Agreement duration, the estimated quantity in the case of procurement of goods, delivery schedule and/or time frame; and (iv) the obligations, duties, and/or functions of the winning bidder.

Care should be taken to check the relevance of the provisions of the PBDs against the requirements of the specific Goods to be procured. If duplication of a subject is inevitable in other sections of the document prepared by the Procuring Entity, care must be exercised to avoid contradictions between clauses dealing with the same matter.

Moreover, each section is prepared with notes intended only as information for the Procuring Entity or the person drafting the Bidding Documents. They shall not be included in the final documents. The following general directions should be observed when using the documents:

a. All the documents listed in the Table of Contents are normally required for the procurement of Goods. However, they should be adapted as necessary to the circumstances of the particular Procurement Project.

b. Specific details, such as the "*name of the Procuring Entity*" and "*address for bid submission*," should be furnished in the Instructions to Bidders, Bid Data Sheet, and Special Conditions of Contract. The final documents should contain neither blank spaces nor options.

c. This Preface and the footnotes or notes in italics included in the Invitation to Bid, Bid Data Sheet, General Conditions of Contract, Special Conditions of Contract, Schedule of Requirements, and Specifications are not part of the text of the final document, although they contain instructions that the Procuring Entity should strictly follow.

d. The cover should be modified as required to identify the Bidding Documents as to the Procurement Project, Project Identification Number, and Procuring Entity, in addition to the date of issue.

e. Modifications for specific Procurement Project details should be provided in the Special Conditions of Contract as amendments to the Conditions of Contract. For easy completion, whenever reference has to be made to specific clauses in the Bid Data Sheet or Special Conditions of Contract, these terms shall be printed in bold typeface on Sections I (Instructions to Bidders) and III (General Conditions of Contract), respectively.

f. For guidelines on the use of Bidding Forms and the procurement of Foreign-Assisted Projects, these will be covered by a separate issuance of the Government Procurement Policy Board.

Table of Contents

Glossary of Acronyms, Terms, and Abbreviations

ABC – Approved Budget for the Contract.

BAC – Bids and Awards Committee.

Bid – A signed offer or proposal to undertake a contract submitted by a bidder in response to and in consonance with the requirements of the bidding documents. Also referred to as *Proposal* and *Tender.* (2016 revised IRR, Section 5[c])

Bidder – Refers to a contractor, manufacturer, supplier, distributor and/or consultant who submits a bid in response to the requirements of the Bidding Documents. (2016 revised IRR, Section 5[d])

Bidding Documents – The documents issued by the Procuring Entity as the bases for bids, furnishing all information necessary for a prospective bidder to prepare a bid for the Goods, Infrastructure Projects, and/or Consulting Services required by the Procuring Entity. (2016 revised IRR, Section 5[e])

BIR – Bureau of Internal Revenue.

BSP – Bangko Sentral ng Pilipinas.

Consulting Services – Refer to services for Infrastructure Projects and other types of projects or activities of the GOP requiring adequate external technical and professional expertise that are beyond the capability and/or capacity of the GOP to undertake such as, but not limited to: (i) advisory and review services; (ii) pre-investment or feasibility studies; (iii) design; (iv) construction supervision; (v) management and related services; and (vi) other technical services or special studies. (2016 revised IRR, Section 5[i])

CDA - Cooperative Development Authority.

Contract – Refers to the agreement entered into between the Procuring Entity and the Supplier or Manufacturer or Distributor or Service Provider for procurement of Goods and Services; Contractor for Procurement of Infrastructure Projects; or Consultant or Consulting Firm for Procurement of Consulting Services; as the case may be, as recorded in the Contract Form signed by the parties, including all attachments and appendices thereto and all documents incorporated by reference therein.

CIF – Cost Insurance and Freight.

CIP – Carriage and Insurance Paid.

CPI – Consumer Price Index.

DDP – Refers to the quoted price of the Goods, which means "delivered duty paid."

DTI – Department of Trade and Industry.

EXW – Ex works.

FCA – "Free Carrier" shipping point.

FOB – "Free on Board" shipping point.

Foreign-funded Procurement or Foreign-Assisted Project– Refers to procurement whose funding source is from a foreign government, foreign or international financing institution as specified in the Treaty or International or Executive Agreement. (2016 revised IRR, Section 5[b]).

Framework Agreement – Refers to a written agreement between a procuring entity and a supplier or service provider that identifies the terms and conditions, under which specific purchases, otherwise known as "Call-Offs," are made for the duration of the agreement. It is in the nature of an option contract between the procuring entity and the bidder(s) granting the procuring entity the option to either place an order for any of the goods or services identified in the Framework Agreement List or not buy at all, within a minimum period of one (1) year to a maximum period of three (3) years. (GPPB Resolution No. 27-2019)

GFI – Government Financial Institution.

GOCC – Government-owned and/or –controlled corporation.

Goods – Refer to all items, supplies, materials and general support services, except Consulting Services and Infrastructure Projects, which may be needed in the transaction of public businesses or in the pursuit of any government undertaking, project or activity, whether in the nature of equipment, furniture, stationery, materials for construction, or personal property of any kind, including non-personal or contractual services such as the repair and maintenance of equipment and furniture, as well as trucking, hauling, janitorial, security, and related or analogous services, as well as procurement of materials and supplies provided by the Procuring Entity for such services. The term "related" or "analogous services" shall include, but is not limited to, lease or purchase of office space, media advertisements, health maintenance services, and other services essential to the operation of the Procuring Entity. (2016 revised IRR, Section 5[r])

GOP – Government of the Philippines.

GPPB – Government Procurement Policy Board.

INCOTERMS – International Commercial Terms.

Infrastructure Projects – Include the construction, improvement, rehabilitation, demolition, repair, restoration or maintenance of roads and bridges, railways, airports, seaports, communication facilities, civil works components of information technology projects, irrigation, flood control and drainage, water supply, sanitation, sewerage and solid waste management systems, shore protection, energy/power and electrification facilities, national

buildings, school buildings, hospital buildings, and other related construction projects of the government. Also referred to as *civil works or works*. (2016 revised IRR, Section 5[u])

LGUs – Local Government Units.

NFCC – Net Financial Contracting Capacity.

NGA – National Government Agency.

PhilGEPS - Philippine Government Electronic Procurement System.

Procurement Project – refers to a specific or identified procurement covering goods, infrastructure project or consulting services. A Procurement Project shall be described, detailed, and scheduled in the Project Procurement Management Plan prepared by the agency which shall be consolidated in the procuring entity's Annual Procurement Plan. (GPPB Circular No. 06-2019 dated 17 July 2019)

PSA – Philippine Statistics Authority.

SEC – Securities and Exchange Commission.

SLCC – Single Largest Completed Contract.

Supplier – refers to a citizen, or any corporate body or commercial company duly organized and registered under the laws where it is established, habitually established in business and engaged in the manufacture or sale of the merchandise or performance of the general services covered by his bid. (Item 3.8 of GPPB Resolution No. 13-2019, dated 23 May 2019). Supplier as used in these Bidding Documents may likewise refer to a distributor, manufacturer, contractor, or consultant.

UN – United Nations.

Section I. Invitation to Bid

Notes on the Invitation to Bid

The Invitation to Bid (IB) provides information that enables potential Bidders to decide whether to participate in the procurement at hand. The IB shall be posted in accordance with Section 21.2 of the 2016 revised IRR of RA No. 9184.

Apart from the essential items listed in the Bidding Documents, the IB should also indicate the following:

a. The date of availability of the Bidding Documents, which shall be from the time the IB is first advertised/posted until the deadline for the submission and receipt of bids;

b. The place where the Bidding Documents may be acquired or the website where it may be downloaded;

c. The deadline for the submission and receipt of bids; and

d. Any important bid evaluation criteria (*e.g.*, the application of a margin of preference in bid evaluation).

The IB should be incorporated in the Bidding Documents. The information contained in the IB must conform to the Bidding Documents and in particular to the relevant information in the Bid Data Sheet.

INVITATION TO BID
Purchase of Laboratory Equipment Charged to GAA 2024 Laboratories Modernization at Bicol University East Campus

1. The *Bicol University*, through Corporate Budget for approved by the Board of Regents *(C.O. Fund 01)* intends to apply the sum of *Two Hundred Twenty Million Pesos (Php220,000,000.00)* being the ABC to payments under the contract for ***Purchase of Laboratory Equipment Charged to GAA 2024 Laboratories Modernization at Bicol University East Campus.*** Bids received in excess of the ABC shall be automatically rejected at bid opening.

   The *Bicol University* now invites bids for the above Procurement Project. Delivery of the Goods is required by *300 Calendar Days*. Bidders should have completed, within *5 Years,* from the date of bid submission and receipt of bids, a contract similar to the Project. The description of an eligible bidder is contained in the Bidding Documents, particularly, in Section II (Instructions to Bidders).

2. Bidding will be conducted through open competitive bidding procedures using a non-discretionary "*pass/fail*" criterion as specified in the 2016 revised Implementing Rules and Regulations (IRR) of Republic Act (RA) No. 9184.

   a. Bidding is restricted to Filipino citizens/sole proprietorships, partnerships, or organizations with at least sixty percent (60%) interest or outstanding capital stock belonging to citizens of the Philippines, and to citizens or organizations of a country the laws or regulations of which grant similar rights or privileges to Filipino citizens, pursuant to RA No. 5183.

3. Prospective Bidders may obtain further information from *Bicol University* and inspect the Bidding Documents at the address given below during *8:00AM-5:00PM.*

4. A complete set of Bidding Documents may be acquired by interested Bidders on *September 6, 2024 to October 1, 2024* from the given address and website(s) below *and upon payment of Fifty Thousand Pesos only (Php50,000.00) or the amount as above stated. The Procuring Entity shall allow the bidder to present its proof of payment for the fees through electronic means by depositing payments for the bidding documents directly to the Bicol University LBP Account, and transmittal of scanned bank verified deposit slip for the issuance of Official Receipt: Bank Account details are as follows:*

Account Name	BU-STF (F-164)
Account Number	0132-0265-48

5. The *Bicol University* will hold a Pre-Bid Conference on September 17, 2024, 9:00 AM at *2/F A.P Bonto Building, BU Main Campus, Rizal St., Legazpi City and online via Zoom with the following credentials:*

https://bicol-u-edu-ph.zoom.us/j/2859577212?pwd=VXV2YnAxNmU2UXowZzlUd05xckE4UT09

Meeting ID: 285 957 7212
Passcode: 219746

6. Bids must be duly received by the BAC Secretariat at the address below on or before *October 1, 2024, 8:30 AM.* All Bids must be accompanied by a bid security in any of the acceptable forms and in the amount stated in **ITB** Clause.

7. All Bids must be accompanied by a bid security in any of the acceptable forms and in the amount stated in **ITB** Clause 14.

8. Bid opening shall be on *October 1, 2024, 9:00AM* at the given address below. Bids will be opened in the presence of the bidders' representatives who choose to attend the activity.

9. Authorization document/s with copy of ID shall be required for the bidders' representative who shall purchase bidding documents and submit bid proposals for the project.

10. The *Bicol University* reserves the right to reject any and all bids, declare a failure of bidding, or not award the contract at any time prior to contract award in accordance with Sections 35.6 and 41 of the 2016 revised IRR of RA No. 9184, without thereby incurring any liability to the affected bidder or bidders.

11. For further information, please refer to:

BAC Secretariat
Bicol University
2/F A. P Bonto Buiding
BU Main Campus, Legazpi City
university-bac@bicol-u.edu.ph
Mobile no. 09171874046

12. You may visit the following websites:

a. For downloading of Bidding Documents: *Bicol University Website*

(Originally Signed)
SONNIE A. RAMOS, CPA, MBA
BAC Chairperson

Section II. Instructions to Bidders

Notes on the Instructions to Bidders

This Section on the Instruction to Bidders (ITB) provides the information necessary for bidders to prepare responsive bids, in accordance with the requirements of the Procuring Entity. It also provides information on bid submission, eligibility check, opening and evaluation of bids, post-qualification, and on the award of contract.

1. Scope of Bid

1. The Procuring Entity, *Bicol University* wishes to receive Bids for the ***Purchase of Laboratory Equipment Charged to GAA 2024 Laboratories Modernization at Bicol University East Campus.***

2. The Procurement Project "***Purchase of Laboratory Equipment Charged to GAA 2024 Laboratories Modernization at Bicol University East Campus"*** is composed of [*see items in the VII - Technical Specifications]* the details of which are described in Section VII (Technical Specifications).

2. Funding Information

2.1. The GOP through the source of funding as indicated below for *2024* in the amount of *Two Hundred Twenty Million Pesos (Php220,000,000.00).*

2.2. The source of funding is C.O. Fund 01.

a. GOCC and GFIs, the proposed Corporate Operating Budget.

3. Bidding Requirements

The Bidding for the Project shall be governed by all the provisions of RA No. 9184 and its 2016 revised IRR, including its Generic Procurement Manuals and associated policies, rules and regulations as the primary source thereof, while the herein clauses shall serve as the secondary source thereof.

Any amendments made to the IRR and other GPPB issuances shall be applicable only to the ongoing posting, advertisement, or **IB** by the BAC through the issuance of a supplemental or bid bulletin.

The Bidder, by the act of submitting its Bid, shall be deemed to have verified and accepted the general requirements of this Project, including other factors that may affect the cost, duration and execution or implementation of the contract, project, or work and examine all instructions, forms, terms, and project requirements in the Bidding Documents.

4. Corrupt, Fraudulent, Collusive, and Coercive Practices

The Procuring Entity, as well as the Bidders and Suppliers, shall observe the highest standard of ethics during the procurement and execution of the contract. They or through an agent shall not engage in corrupt, fraudulent, collusive, coercive, and obstructive practices defined under Annex "I" of the 2016 revised IRR of RA No. 9184 or other integrity violations in competing for the Project.

5. Eligible Bidders

5.1. Only Bids of Bidders found to be legally, technically, and financially capable will be evaluated.

5.2. *[Select one, delete other/s]*

a. Foreign ownership exceeding those allowed under the rules may participate pursuant to:

i. When a Treaty or International or Executive Agreement as provided in Section 4 of the RA No. 9184 and its 2016 revised IRR allow foreign bidders to participate;

ii. Citizens, corporations, or associations of a country, included in the list issued by the GPPB, the laws or regulations of which grant reciprocal rights or privileges to citizens, corporations, or associations of the Philippines;

iii. When the Goods sought to be procured are not available from local suppliers; or

iv. When there is a need to prevent situations that defeat competition or restrain trade.

b. Foreign ownership limited to those allowed under the rules may participate in this Project.

5.3. Pursuant to Section 23.4.1.3 of the 2016 revised IRR of RA No.9184, the Bidder shall have an SLCC that is at least one (1) contract similar to the Project the value of which, adjusted to current prices using the PSA's CPI, must be at least equivalent to:

a. For the procurement of Non-expendable Supplies and Services: The Bidder must have completed a single contract that is similar to this Project, equivalent to at least fifty percent (50%) of the ABC.

b. For procurement where the Procuring Entity has determined, after the conduct of market research, that imposition of either (a) or (b) will likely result to failure of bidding or monopoly that will defeat the purpose of public bidding: the Bidder should comply with the following requirements: [*Select either failure or monopoly of bidding based on market research conducted*]

i. Completed at least two (2) similar contracts, the aggregate amount of which should be equivalent to at least *fifty percent (50%) in the case of non-expendable supplies and services or twenty-five percent*

(25%) in the case of expendable supplies] of the ABC for this Project; and

ii. The largest of these similar contracts must be equivalent to at least half of the percentage of the ABC as required above.

5.4. The Bidders shall comply with the eligibility criteria under Section 23.4.1 of the 2016 IRR of RA No. 9184.

6. Origin of Goods

There is no restriction on the origin of goods other than those prohibited by a decision of the UN Security Council taken under Chapter VII of the Charter of the UN, subject to Domestic Preference requirements under **ITB** Clause 18.

7. Subcontracts

7.1. The Bidder may subcontract portions of the Project to the extent allowed by the Procuring Entity as stated herein, but in no case more than twenty percent (20%) of the Project.

The Procuring Entity has prescribed that:

a. Subcontracting is not allowed.

8. Pre-Bid Conference

The Procuring Entity will hold a pre-bid conference for this Project on the specified date and time and either at its physical address on September 17, 2024 at 2/F A.P Bonto, *BU Main Campus, Rizal St., Legazpi City.*

9. Clarification and Amendment of Bidding Documents

Prospective bidders may request for clarification on and/or interpretation of any part of the Bidding Documents. Such requests must be in writing and received by the Procuring Entity, either at its given address or through electronic mail indicated in the **IB**, at least ten (10) calendar days before the deadline set for the submission and receipt of Bids.

10. Documents comprising the Bid: Eligibility and Technical Components

10.1. The first envelope shall contain the eligibility and technical documents of the Bid as specified in **Section VIII (Checklist of Technical and Financial Documents)**.

10.2. The Bidder's SLCC as indicated in **ITB** Clause 5.3 should have been completed within *[state relevant period as provided in paragraph 2 of the **IB**]* prior to the deadline for the submission and receipt of bids.

10.3. If the eligibility requirements or statements, the bids, and all other documents for submission to the BAC are in foreign language other than English, it must be accompanied by a translation in English, which shall be authenticated by the appropriate Philippine foreign service establishment, post, or the equivalent office having jurisdiction over the foreign bidder's affairs in the Philippines. Similar to the required authentication above, for Contracting Parties to the Apostille Convention, only the translated documents shall be authenticated through an apostille pursuant to GPPB Resolution No. 13-2019 dated 23 May 2019. The English translation shall govern, for purposes of interpretation of the bid.

11. Documents comprising the Bid: Financial Component

11.1. The second bid envelope shall contain the financial documents for the Bid as specified in **Section VIII (Checklist of Technical and Financial Documents)**.

11.2. If the Bidder claims preference as a Domestic Bidder or Domestic Entity, a certification issued by DTI shall be provided by the Bidder in accordance with Section 43.1.3 of the 2016 revised IRR of RA No. 9184.

11.3. Any bid exceeding the ABC indicated in paragraph 1 of the **IB** shall not be accepted.

12. Bid Prices

12.1. Prices indicated on the Price Schedule shall be entered separately in the following manner:

a. For Goods offered from within the Procuring Entity's country:

i. The price of the Goods quoted EXW (ex-works, ex-factory, ex-warehouse, ex-showroom, or off-the-shelf, as applicable);

ii. The cost of all customs duties and sales and other taxes already paid or payable;

iii. The cost of transportation, insurance, and other costs incidental to delivery of the Goods to their final destination; and

iv. The price of other (incidental) services, if any, listed in the **BDS.**

b. For Goods offered from abroad:

i. Unless otherwise stated in the **BDS**, the price of the Goods shall be quoted delivered duty paid (DDP) with the place of destination in the Philippines as specified in the **BDS**. In quoting the price, the Bidder shall be free to use transportation through carriers registered in any eligible country. Similarly, the Bidder may obtain insurance services from any eligible source country.

ii. The price of other (incidental) services, if any, as listed in the **BDS.**

13. Bid and Payment Currencies

13.1. For Goods that the Bidder will supply from outside the Philippines, the bid prices may be quoted in the local currency or tradeable currency accepted by the BSP at the discretion of the Bidder. However, for purposes of bid evaluation, Bids denominated in foreign currencies, shall be converted to Philippine currency based on the exchange rate as published in the BSP reference rate bulletin on the day of the bid opening.

13.2. Payment of the contract price shall be made in:

a. Philippine Peso.

14. Bid Security

14.1. The Bidder shall submit a Bid Securing Declaration[1] or any form of Bid Security in the amount indicated in the **BDS**, which shall be not less than the percentage of the ABC in accordance with the schedule in the **BDS**.

14.2. The Bid and bid security shall be valid until January 29, 2025. Any Bid not accompanied by an acceptable bid security shall be rejected by the Procuring Entity as non-responsive.

15. Sealing and Marking of Bids

Each Bidder shall submit one copy of the first and second components of its Bid.

The Procuring Entity may request additional hard copies and/or electronic copies of the Bid. However, failure of the Bidders to comply with the said request shall not be a ground for disqualification.

If the Procuring Entity allows the submission of bids through online submission or any other electronic means, the Bidder shall submit an electronic copy of its Bid, which must be digitally signed. An electronic copy that cannot be opened or is corrupted shall be considered non-responsive and, thus, automatically disqualified.

16. Deadline for Submission of Bids

16.1. The Bidders shall submit on the specified date and time and either at its physical address or through online submission as indicated in paragraph 7 of the **IB.**

17. Opening and Preliminary Examination of Bids

17.1. The BAC shall open the Bids in public at the time, on the date, and at the place specified in paragraph 9 of the **IB**. The Bidders' representatives who are present shall sign a register evidencing their attendance. In case videoconferencing,

[1] In the case of Framework Agreement, the undertaking shall refer to entering into contract with the Procuring Entity and furnishing of the performance security or the performance securing declaration within ten (10) calendar days from receipt of Notice to Execute Framework Agreement.

webcasting or other similar technologies will be used, attendance of participants shall likewise be recorded by the BAC Secretariat.

In case the Bids cannot be opened as scheduled due to justifiable reasons, the rescheduling requirements under Section 29 of the 2016 revised IRR of RA No. 9184 shall prevail.

17.2. The preliminary examination of bids shall be governed by Section 30 of the 2016 revised IRR of RA No. 9184.

18. Domestic Preference

18.1. The Procuring Entity will grant a margin of preference for the purpose of comparison of Bids in accordance with Section 43.1.2 of the 2016 revised IRR of RA No. 9184.

19. Detailed Evaluation and Comparison of Bids

19.1. The Procuring Entity's BAC shall immediately conduct a detailed evaluation of all Bids rated "*passed*," using non-discretionary pass/fail criteria. The BAC shall consider the conditions in the evaluation of Bids under Section 32.2 of the 2016 revised IRR of RA No. 9184.

19.2. If the Project allows partial bids, bidders may submit a proposal on any of the lots or items, and evaluation will be undertaken on a per lot or item basis, as the case maybe. In this case, the Bid Security as required by **ITB** Clause 14 shall be submitted for each lot or item separately.

19.3. The descriptions of the lots or items shall be indicated in **Section VII (Technical Specifications)**, although the ABCs of these lots or items are indicated in the **BDS** for purposes of the NFCC computation pursuant to Section 23.4.2.6 of the 2016 revised IRR of RA No. 9184. The NFCC must be sufficient for the total of the ABCs for all the lots or items participated in by the prospective Bidder.

19.4. The Project shall be awarded as follows:

Option 1 – One Project having several items that shall be awarded as one contract.

20. Post-Qualification

20.1. Within a non-extendible period of five (5) calendar days from receipt by the Bidder of the notice from the BAC that it submitted the Lowest Calculated Bid, the Bidder shall submit its latest income and business tax returns filed and paid through the BIR Electronic Filing and Payment System (eFPS) and other appropriate licenses and permits required by law and stated in the **BDS**.

21. Signing of the Contract

21.1. The documents required in Section 37.2 of the 2016 revised IRR of RA No. 9184 shall form part of the Contract. Additional Contract documents are indicated in the **BDS**.

Section III. Bid Data Sheet

Notes on the Bid Data Sheet

The Bid Data Sheet (BDS) consists of provisions that supplement, amend, or specify in detail, information, or requirements included in the ITB found in Section II, which are specific to each procurement.

This Section is intended to assist the Procuring Entity in providing the specific information in relation to corresponding clauses in the ITB and has to be prepared for each specific procurement.

The Procuring Entity should specify in the BDS information and requirements specific to the circumstances of the Procuring Entity, the processing of the procurement, and the bid evaluation criteria that will apply to the Bids. In preparing the BDS, the following aspects should be checked:

a. Information that specifies and complements provisions of the ITB must be incorporated.

b. Amendments and/or supplements, if any, to provisions of the ITB as necessitated by the circumstances of the specific procurement, must also be incorporated.

Bid Data Sheet

ITB Clause	
5.3	For this purpose, contracts similar to the Project shall be: a. Purchase of Laboratory Equipment but may include other contracts similar to those classified as Laboratory Equipment b. completed within 5 years prior to the deadline for the submission and receipt of bids.
12	The price of the Goods shall be quoted DDP *[state place of destination]* or the applicable International Commercial Terms (INCOTERMS) for this Project.
14.1	The bid security shall be in the form of a Bid Securing Declaration, or any of the following forms and amounts: a. The amount of not less than *two percent (2%) of ABC]*, if bid security is in cash, cashier's/manager's check, bank draft/guarantee or irrevocable letter of credit; or b. The amount of not less than *five percent (5%) of ABC]* if bid security is in Surety Bond.
19.4	The Project shall be awarded as follows: One Project having several items, which shall be awarded as one contract.
21.2	Each bidder shall submit ONE (1) Original and TWO (2) DUPLICATE copies of the first and second components of its bid. Each set shall be properly fastened with tabbing for each requirement. Bid shall be sealed and arranged in accordance with the Diagram on last page. The bid envelope shall be marked as follows: **NAME AND ADDRESS OF THE BIDDER IN CAPITAL LETTERS** **Contact Number** **NAME OF THE CONTRACT TO BE BID IN CAPITAL LETTERS** **(CONTRACT REFERENCE NUMBER)** **BICOL UNIVERSITY** **Bids and Awards Committee** **DO NOT OPEN BEFORE… "the date and time for the opening of bids**

Section IV. General Conditions of Contract

Notes on the General Conditions of Contract

The General Conditions of Contract (GCC) in this Section, read in conjunction with the Special Conditions of Contract in Section V and other documents listed therein, should be a complete document expressing all the rights and obligations of the parties.

Matters governing performance of the Supplier, payments under the contract, or matters affecting the risks, rights, and obligations of the parties under the contract are included in the GCC and Special Conditions of Contract.

Any complementary information, which may be needed, shall be introduced only through the Special Conditions of Contract.

1. Scope of Contract

This Contract shall include all such items, although not specifically mentioned, that can be reasonably inferred as being required for its completion as if such items were expressly mentioned herein. All the provisions of RA No. 9184 and its 2016 revised IRR, including the Generic Procurement Manual, and associated issuances, constitute the primary source for the terms and conditions of the Contract, and thus, applicable in contract implementation. Herein clauses shall serve as the secondary source for the terms and conditions of the Contract.

This is without prejudice to Sections 74.1 and 74.2 of the 2016 revised IRR of RA No. 9184 allowing the GPPB to amend the IRR, which shall be applied to all procurement activities, the advertisement, posting, or invitation of which were issued after the effectivity of the said amendment.

Additional requirements for the completion of this Contract shall be provided in the **Special Conditions of Contract** (**SCC).**

2. Advance Payment and Terms of Payment

2.1. Advance payment of the contract amount is provided under Annex "D" of the revised 2016 IRR of RA No. 9184.

2.2. The Procuring Entity is allowed to determine the terms of payment on the partial or staggered delivery of the Goods procured, provided such partial payment shall correspond to the value of the goods delivered and accepted in accordance with prevailing accounting and auditing rules and regulations. The terms of payment are indicated in the **SCC**.

3. Performance Security

Within ten (10) calendar days from receipt of the Notice of Award by the Bidder from the Procuring Entity but in no case later than the signing of the Contract by both parties, the successful Bidder shall furnish the performance security in any of the forms prescribed in Section 39 of the 2016 revised IRR of RA No. 9184

4. Inspection and Tests

The Procuring Entity or its representative shall have the right to inspect and/or to test the Goods to confirm their conformity to the Project specifications at no extra cost to the Procuring Entity in accordance with the Generic Procurement Manual. In addition to tests in the **SCC**, **Section VII (Technical Specifications)** shall specify what inspections and/or tests the Procuring Entity requires, and where they are to be conducted. The Procuring Entity shall notify the Supplier in writing, in a timely manner, of the identity of any representatives retained for these purposes.

All reasonable facilities and assistance for the inspection and testing of Goods, including access to drawings and production data, shall be provided by the Supplier to the authorized inspectors at no charge to the Procuring Entity.

5. Warranty

5.1 In order to assure that manufacturing defects shall be corrected by the Supplier, a warranty shall be required from the Supplier as provided under Section 62.1 of the 2016 revised IRR of RA No. 9184.

5.2 The Procuring Entity shall promptly notify the Supplier in writing of any claims arising under this warranty. Upon receipt of such notice, the Supplier shall, repair or replace the defective Goods or parts thereof without cost to the Procuring Entity, pursuant to the Generic Procurement Manual.

6. Liability of the Supplier

The Supplier's liability under this Contract shall be as provided by the laws of the Republic of the Philippines.

If the Supplier is a joint venture, all partners to the joint venture shall be jointly and severally liable to the Procuring Entity.

Section V. Special Conditions of Contract

Notes on the Special Conditions of Contract

Similar to the BDS, the clauses in this Section are intended to assist the Procuring Entity in providing contract-specific information in relation to corresponding clauses in the GCC found in Section IV.

The Special Conditions of Contract (SCC) complement the GCC, specifying contractual requirements linked to the special circumstances of the Procuring Entity, the Procuring Entity's country, the sector, and the Goods purchased. In preparing this Section, the following aspects should be checked:

a. Information that complements provisions of the GCC must be incorporated.

b. Amendments and/or supplements to provisions of the GCC as necessitated by the circumstances of the specific purchase, must also be incorporated.

However, no special condition which defeats or negates the general intent and purpose of the provisions of the GCC should be incorporated herein.

Special Conditions of Contract

GCC Clause	
1	*[List here any additional requirements for the completion of this Contract. The following requirements and the corresponding provisions may be deleted, amended, or retained depending on its applicability to this Contract:]* **Delivery and Documents –** For purposes of the Contract, "EXW," "FOB," "FCA," "CIF," "CIP," "DDP" and other trade terms used to describe the obligations of the parties shall have the meanings assigned to them by the current edition of INCOTERMS published by the International Chamber of Commerce, Paris. The Delivery terms of this Contract shall be as follows: *[For Goods supplied from abroad, state:]* "The delivery terms applicable to the Contract are DDP delivered [*indicate place of destination*]. In accordance with INCOTERMS." *[For Goods supplied from within the Philippines, state:*] "The delivery terms applicable to this Contract are delivered *[indicate place of destination]*. Risk and title will pass from the Supplier to the Procuring Entity upon receipt and final acceptance of the Goods at their final destination." Delivery of the Goods shall be made by the Supplier in accordance with the terms specified in Section VI (Schedule of Requirements). For purposes of this Clause the Procuring Entity's Representative at the Project Site is *[indicate name(s)]*. **Incidental Services –** The Supplier is required to provide all of the following services, including additional services, if any, specified in Section VI. Schedule of Requirements: *Select appropriate requirements and delete the rest.* a. performance or supervision of on-site assembly and/or start-up of the supplied Goods; b. furnishing of tools required for assembly and/or maintenance of the supplied Goods; c. furnishing of a detailed operations and maintenance manual for each appropriate unit of the supplied Goods; d. performance or supervision or maintenance and/or repair of the supplied Goods, for a period of time agreed by the parties, provided that this service shall not relieve the Supplier of any warranty obligations under this Contract; and

	e. training of the Procuring Entity's personnel, at the Supplier's plant and/or on-site, in assembly, start-up, operation, maintenance, and/or repair of the supplied Goods. The Contract price for the Goods shall include the prices charged by the Supplier for incidental services and shall not exceed the prevailing rates charged to other parties by the Supplier for similar services. **Spare Parts –** The Supplier is required to provide all of the following materials, notifications, and information pertaining to spare parts manufactured or distributed by the Supplier: such spare parts as the Procuring Entity may elect to purchase from the Supplier, provided that this election shall not relieve the Supplier of any warranty obligations under this Contract; and in the event of termination of production of the spare parts: i. advance notification to the Procuring Entity of the pending termination, in sufficient time to permit the Procuring Entity to procure needed requirements; and ii. following such termination, furnishing at no cost to the Procuring Entity, the blueprints, drawings, and specifications of the spare parts, if requested.
	Packaging – The Supplier shall provide such packaging of the Goods as is required to prevent their damage or deterioration during transit to their final destination, as indicated in this Contract. The packaging shall be sufficient to withstand, without limitation, rough handling during transit and exposure to extreme temperatures, salt and precipitation during transit, and open storage. Packaging case size and weights shall take into consideration, where appropriate, the remoteness of the Goods' final destination and the absence of heavy handling facilities at all points in transit. The packaging, marking, and documentation within and outside the packages shall comply strictly with such special requirements as shall be expressly provided for in the Contract, including additional requirements, if any, specified below, and in any subsequent instructions ordered by the Procuring Entity. The outer packaging must be clearly marked on at least four (4) sides as follows: Name of the Procuring Entity Name of the Supplier

	Contract Description Final Destination Gross weight Any special lifting instructions Any special handling instructions Any relevant HAZCHEM classifications
	A packaging list identifying the contents and quantities of the package is to be placed on an accessible point of the outer packaging if practical. If not practical the packaging list is to be placed inside the outer packaging but outside the secondary packaging. **Transportation –** Where the Supplier is required under Contract to deliver the Goods CIF, CIP, or DDP, transport of the Goods to the port of destination or such other named place of destination in the Philippines, as shall be specified in this Contract, shall be arranged and paid for by the Supplier, and the cost thereof shall be included in the Contract Price. Where the Supplier is required under this Contract to transport the Goods to a specified place of destination within the Philippines, defined as the Project Site, transport to such place of destination in the Philippines, including insurance and storage, as shall be specified in this Contract, shall be arranged by the Supplier, and related costs shall be included in the contract price.
	Where the Supplier is required under Contract to deliver the Goods CIF, CIP or DDP, Goods are to be transported on carriers of Philippine registry. In the event that no carrier of Philippine registry is available, Goods may be shipped by a carrier which is not of Philippine registry provided that the Supplier obtains and presents to the Procuring Entity certification to this effect from the nearest Philippine consulate to the port of dispatch. In the event that carriers of Philippine registry are available but their schedule delays the Supplier in its performance of this Contract the period from when the Goods were first ready for shipment and the actual date of shipment the period of delay will be considered force majeure. The Procuring Entity accepts no liability for the damage of Goods during transit other than those prescribed by INCOTERMS for DDP deliveries. In the case of Goods supplied from within the Philippines or supplied by domestic Suppliers risk and title will not be deemed to have passed to the Procuring Entity until their receipt and final acceptance at the final destination. **Intellectual Property Rights –** The Supplier shall indemnify the Procuring Entity against all third-party claims of infringement of patent, trademark, or industrial design rights arising from use of the Goods or any part thereof.

2.2	*Partial payment is allowed.* The terms of payment shall be as follows: Progress payment shall be made corresponding to the contract price of each item after delivery, installation, commissioning, and acceptance of the item.
4	*The inspections and tests will be conducted.*

Section VI. Schedule of Requirements

The delivery schedule expressed as weeks/months stipulates hereafter a delivery date which is the date of delivery to the project site.

Item No.	Description	Quantity	Total	Delivered, Weeks/Months
				Bidders must state here either "Comply" or "Not Comply" with the delivery period against each item in the bid
				THREE HUNDRED (300) calendar days after receipt of NTP
	Purchase of Laboratory Equipment Charged to GAA 2024 Laboratories Modernization at Bicol University East Campus			

No.	**Unit**	**Item Description**	**Quantity**	*Bidders must state here either "Comply" or "Not Comply" with the delivery period against each item in the bid*
1-lot		**Purchase of Laboratory Equipment Charged to GAA 2024 Laboratories Modernization at Bicol University East Campus** **(See items in Technical Specifications)**		

_____ _____

[signature] *[in the capacity of]*

Duly authorized to sign Bid for and on behalf of _____

Section VII. Technical Specifications

Notes for Preparing the Technical Specifications

A set of precise and clear specifications is a prerequisite for Bidders to respond realistically and competitively to the requirements of the Procuring Entity without qualifying their Bids. In the context of Competitive Bidding, the specifications (*e.g.* production/delivery schedule, manpower requirements, and after-sales service/parts, descriptions of the lots or items) must be prepared to permit the widest possible competition and, at the same time, present a clear statement of the required standards of workmanship, materials, and performance of the goods and services to be procured. Only if this is done will the objectives of transparency, equity, efficiency, fairness, and economy in procurement be realized, responsiveness of bids be ensured, and the subsequent task of bid evaluation and post-qualification facilitated. The specifications should require that all items, materials and accessories to be included or incorporated in the goods be new, unused, and of the most recent or current models, and that they include or incorporate all recent improvements in design and materials unless otherwise provided in the Contract.

Samples of specifications from previous similar procurements are useful in this respect. The use of metric units is encouraged. Depending on the complexity of the goods and the repetitiveness of the type of procurement, it may be advantageous to standardize the General Technical Specifications and incorporate them in a separate subsection. The General Technical Specifications should cover all classes of workmanship, materials, and equipment commonly involved in manufacturing similar goods. Deletions or addenda should then adapt the General Technical Specifications to the particular procurement.

Care must be taken in drafting specifications to ensure that they are not restrictive. In the specification of standards for equipment, materials, and workmanship, recognized Philippine and international standards should be used as much as possible. Where other particular standards are used, whether national standards or other standards, the specifications should state that equipment, materials, and workmanship that meet other authoritative standards, and which ensure at least a substantially equal quality than the standards mentioned, will also be acceptable. The following clause may be inserted in the Special Conditions of Contract or the Technical Specifications.

Sample Clause: Equivalency of Standards and Codes

Wherever reference is made in the Technical Specifications to specific standards and codes to be met by the goods and materials to be furnished or tested, the provisions of the latest edition or revision of the relevant standards and codes shall apply, unless otherwise expressly stated in the Contract. Where such standards and codes are national or relate to a particular country or region, other authoritative standards that ensure substantial equivalence to the standards and codes specified will be acceptable.

Reference to brand name and catalogue number should be avoided as far as possible; where unavoidable they should always be followed by the words "*or at least equivalent*." References to brand names cannot be used when the funding source is the GOP.

Where appropriate, drawings, including site plans as required, may be furnished by the Procuring Entity with the Bidding Documents. Similarly, the Supplier may be requested to provide drawings or samples either with its Bid or for prior review by the Procuring Entity during contract execution.

Bidders are also required, as part of the technical specifications, to complete their statement of compliance demonstrating how the items comply with the specification.

In case of Renewal of Regular and Recurring Services, the Procuring Entity must indicate here the technical requirements for the service provider, which must include the set criteria in the conduct of its performance evaluation.

Technical Specifications

Item	Specification	Statement of Compliance
		[Bidders must state here either "Comply" or "Not Comply" against each of the individual parameters of each Specification stating the corresponding performance parameter of the equipment offered. Statements of "Comply" or "Not Comply" must be supported by evidence in a Bidders Bid and cross-referenced to that evidence. Evidence shall be in the form of manufacturer's un-amended sales literature, unconditional statements of specification and compliance issued by the manufacturer, samples, independent test data etc., as appropriate. A statement that is not supported by evidence or is subsequently found to be contradicted by the evidence presented will render the Bid under evaluation liable for rejection. A statement either in the Bidder's statement of compliance or the supporting evidence that is found to be false either during Bid evaluation, post-qualification or the execution of the Contract may be regarded as fraudulent and render the Bidder or supplier liable for prosecution subject to the applicable laws and issuances.]

No.	Unit	Item Description	Quantity	Unit Price	Total Amount	*Bidders must state here either "Comply" or "Not Comply" with the technical requirements against each item in the bid*
Purchase of Laboratory Equipment Charges to GAA 2024 Laboratories Modernization at Bicol University East Campus– 1 Lot ***(ABC: Php220,000,000.00)***						

1	unit	**Digital Shear Testing Machine** Technical Specification: • Can make the test with displacement control. • Real time display of test graph. • 4 analog channels for load cell and displacement sensor • Calibration function for channels. • Programmable digital gain adjustment for load-cell and potentiometric sensors, voltage and current transmitters. • Closed-loop PID for steady peace rate. Consolidation: • 25 pairs of time-vertical displacement values that can be written to memory • The vertical displacement value can be tared prior to recording • The analogical channel reading vertical displacement must have 26000 points effective resolution • The memory can be exported to PC software Speed Range : 0.00001 to 10,00 mm/min Maximum Shear Force : 5 kN (5000 N) Maximum Vertical Load : 0 to 500 N Horizontal Travel : 30 mm Dimensions : 450x1250x1200 mm Weight (approx.) : 110 kg	1	3,800,000.00	3,800,000.00	
2	unit	**Computer Control Electro-hydraulic Servo Universal Testing Machine** Technical Specification:	1	4,100,000.00	4,100,000.00	

		Max. capacity (KN) : 1,000 Frame structure : 4 columns and 2 screws Control way : Loading process by manual control Load accuracy : ≤±1% Measuring range : 2%-100% FS Load resolution : 1/300000 Deformation accuracy : ≤±1% Displacement resolution : 0.01mm Displacement error : ≤±0.5% Max. Piston stroke : 250mm Max. Piston moving speed : 0-90mm/min Crosshead lifting speed : 200mm/min Max. tension test space : 650 Max. compression test space : 550 Power : 220V 60HZ 3phase Columns net clearance : 500 Columns middle distance : 580mm Clamping method : Hydraulic clamping Round specimen clamping range(mm): : Φ13~Φ26 Φ26~Φ40 Flat specimen clamping thickness(mm): : 0-20 (20-40 optional) Flat specimen clamping width(mm): : 80 width of bending roller : 140mm Cabinet dimension(mm) : 1200×620×850 Frame dimension(mm) : 860*740*2539mm Frame Weight : Approx.2200kgs Motor power (kw) : 3 Safety devices : Software and machinery protection				
3	Unit	**Hydrostatics Bench & Fluid Properties** Anodized aluminum frame and panels made of painted steel. The unit shall include wheels to facilitate its mobility. Main metallic elements made of stainless steel.	1	3,800,000.00	3,800,000.00	

		Diagram in the front panel with distribution of the elements similar to the real one. PVC water storage tank glass, in the lower part of the bench. Two PVC tank glass, to work with the different accessories. Manual air pump. Two manual water pumps. Alcohol thermometer, range: -10 – 50 ° C. Hydrometer (0 – 70 Baumé, 0.700 – 2.000 Sp/gr). Ubbelhode capillary viscosimeter: 0.6 – 3 cp. Ubbelhode capillary viscosimeter: 2 – 10 cp. Ubbelhode capillary viscosimeter: 10 – 50 cp. Ubbelhode capillary viscosimeter: 60 – 300 cp. Three graduated cylinders 250 ml glass. Cylinders graduated 1000 ml plastic. Two 600 ml glass beakers. Three glass elements for demonstration of free surface in static conditions. Bourdon manometer, range: 0 – 2.5 bar. Two "U" tube manometers, range: 0 – 450 mm. Module to study Archimedes' Principle (lever balance with displacement vessel, bucket and cylinder). Weather Station: o Barometer up to 1040 hPa. o Thermometer:-40 – 60º C. o Hygrometer: 0 – 100 %. Stop clock. Bleed valves and circuit selection valves. Module of capillarity in parallel plates. Module of tubular capillary tubes. Elements included: -Flow over Weirs: Two drains (a rectangular neckline and a V-shape). Scale of the level meter: 0 – 160 mm. Dimensions of the weirs: 160 x 230 x 40 mm.				

		Neckline angle in the V-shape weir: 90º. Dimension of rectangular notch: 30 x 82 mm. - Hydrostatic Pressure: Tank capacity: 5.5 l. Distance between suspended masses and the support point: 285 mm. Area of the section: 0.007 m². Total depth of submerged quadrant: 160 mm. Height of support point on the quadrant: 100 mm. Set of masses of different weights. - Dead Weight Calibrator: Pressure manometer: Bourdon type. 0 – 2.5 bar. Set of masses of different weights. Piston diameter: 18 mm. Piston weight: 0.5 Kg. Module levelling through adjustable feet. - Metacentric Height: Maximum angle: +/- 13. Corresponding lineal dimension: +/- 90 mm. Dimension of the float: length = 353 mm, width = 204 mm, total height = 475 mm. Manuals: The unit must be supplied with the following manuals: Required Services, Assembly and Installation, Starting-up, Safety, Maintenance & Practices Manuals. -Dimensions: 1500 x 800 x 1900 mm approx. (59.05 x 31.49 x 74.80 inches approx.) -Weight: 200 Kg approx. (440 pounds approx.)				
4	unit	**Bomb Calorimeter** Technical Specifications: • Reaction vessel manufactured from Stainless steel •Vessel capacity of 300ml •Suppled complete with electronic digital thermometer, pellet press, ignition wire, pressure gauge & pressure regulator	1	500,000.00	500,000.00	

		The calorimeter must be provided with high pressure valves and ignition electrodes together with a firing unit. supplied; include an electronic digital thermometer (with a resolution of decimal places), pellet press(for powdered fuel), ignition wire, pressure gauge, safety bursting disc and a bottle pressure regulator for safer oxygen charging and a highly accurate set of digital scales. Learning capabilities • Measurement of Calorific value of liquid fuel • Measurement of Calorific value of solid fuel • Comparison with a standard fuel Technical Specifications: •Stainless steel vessel with a capacity of 300ml •Electronic digital thermometer to 2 decimal places •Pellet press •Ignition wire •Pressure gauge •Safety bursting disc •Bottle pressure regulator •Digital scales Essential Ancillaries •Commercial Oxygen in a suitable vessel capable of pressurising the reaction vessel up to 25 Bar gauge. •Stainless steel vessel with a capacity of 300ml •Water Jacket & Lid •Offset Stirrer •Electronic digital thermometer to 2 decimal places •Pellet press •Ignition wire •Pressure gauge •Safety bursting disc •Bottle pressure regulator •Digital scales Weights & Dimensions •Weight: 25Kg •Length: 900mm •Width: 900mm				

		•Height: 500mm Essential Services Oxygen: Commercial oxygen in a suitable vessel capable of pressurising the reaciton vessel up to 25 bar gauge Electrical: 230/240 volts, single phase, 50Hz (with earth/ground)				
5	unit	**AC/DC Electrical Learning System** Technical Specifications: Main Unit 1. DC Power Supply (1) Fixed DC power supply a. Voltage 5VDC and 12VDC b. With output overload protection (2) Dual DC power supply a. Voltage range: 3v-18VDC Continuously adjustable b. With output overload Protection 2. AC Power Supply (1) Voltage range : 9VAC~0VAC~9VAC (2) With output overload protection 3. Signal Generator (1) Pulse generator: (TTL level) a. Frequency range: 1Hz~10KHz/4 settings, continuously adjustable b. Fan out: 10 TTL load (2) Pulse switches 2 independent output, TTL level b. With Q, output, pulse width >5ms c. Fan out : 10 TTL load (3) Data switches a. 8 sets independent control output TTL level with DEBOUNCE circuit. b. Fan out : 10 TTL load 4. Function Generator (1) Output waveform : Sine triangle, square (2) Output frequency : 10~100KHz/4 settings, continuously adjustable (3) Output amplitude : ≥ 18Vpp (open circuit) 5. Testing and Display (1) 3 1/2 digital voltmeter /ammeter a. DC voltage range : 2V 200V	2	4,500,000.00	9,000,000.00	

		b. DC voltage accuracy : (0.3% of reading+1digit) d. DC current accuracy : (0.5% of reading +1digit) (2) Galvanometer a. Current range: 50Ma b. Accuracy Class: 2.5 (3) LED indicator a. 10 sets independent LED indicates high, low logic state b. Input impedance: ≥100K Ω (4) Digital Display a. 2 sets independent 7-segment LED b. With BCD-7segment decoder/driver and DP Input c. Input with 8-4-2-1 code 6. Breadboard 1680 tie-point breadboard on top panel can be easily put into and taken off. The equipment must have the following modules: (A) Basic Electricity Experiment Modules (B) Electronic Experiment Modules (C) Digital Logic Experiment Modules (D) Motor Experiment The equipment must be able to perform the following experiments: (A) Basic Electricity Experiments 1. BASIC MEASUREMENT 2. DC CIRCUITS 3. AC Circuits 4. Control Circuits (B) Electronic Circuit Experiments 1. Diode Characteristics 2. Rectifier and Filters 3. Diode Clipping and Clamping Circuits 4. Differentiator and Integrator 5. Transistor Characteristics 6. Transistor Amplifiers 7. Multistage Amplifiers 8. FET Characteristics 9. FET Amplifiers 10. OPA AMP Characteristics 11. Basic OP AMP Circuits 12. OP AMP Applications 13. OP AMP Comparator and Oscillators (C) Digital Logic Experiments				

		1. Basic Logic Gates 2. Combinational Logic Circuits 3. ADDER and SUBTRACTER 4. Encoder and Decoder 5. Multiplexers and Demultiplexers 6. Arithnmetic Elements 7. Sequential Logic Circuits 8. Sequential Logic Applications (D) MOTOR EXPERIMENT 1. Motor start, stop and overloaded control 2. Motor forward/reverse control 3. Motor Sequence control 4. Motor Alternatively running control 5. Wye-Delta Reduced voltage starting of three-phase induction motor				
6	unit	**Power Electronics Training System** Technical Specifications: The Training System must consist of the following Experiments -BasicMeasurement and Characteristic of SCR and TRIAC -Single-PhaseRectifiers andACVoltageController (AC→DC、AC→AC) -Three-PhaseRectifiers andACVoltageController (AC→DC、AC→AC) -DC Choppers (DC→DC) -Inverters (AC→DC→AC) -Applications of Power Electronics 1. DC Power Supply (15V/2A) - Short circuit & over temperature protection - Overcurrent indicator : LED - Over temperature indicator : LED -Rated output : ±15V/2A -Power indicator : LED - Operation power supply : AC220V, 50/60Hz 2. DC Power Supply (0-40V/6A) - Input voltage : 220VAC, 50/60Hz - 2 output voltage : 0~20V, 0~40VDC - Rated current : 0~20V/6A, 0~40V/6A - Overload protection	1	8,000,000.00	8,000,000.00	

		3. Reference Variable Generator - Vc range : 0V~ +10V, -10V~+10V - Linear scale : 0~100% - 7-segment display for displaying the value of output control voltage Vc - Operation power supply : ±15V 4. Differential Amplifier (1) 4 Channels output and input (2) Measuring voltage (Max.) : 700Vp (3) Output voltage (Max.) : 10Vp (4) Measuring frequency (Max.) : 200KHz (5) Input voltage range : 500V, 100V, 10V (6) Output voltage range : 10V (7) Output terminal : common ground, 3 types a. 2 BNCsockets for oscilloscope, switching switch to selected measuring channel (A/B, C/D) b. 4mm terminal for module connection (8) Operation power supply : AC220V, 50/60Hz 5. Current Transducer (1) Hall current sensor (2) Measuring frequency (Max.) : 200KHz (3) Current measuring : a. Input : 20Ap, output 10V b. Input : 5Ap, output 10V c. Input : 1Ap, output 10V (4) Overcurrent indicator (5) Operation power supply : AC220V, 50/60Hz 6. Three Phase Angle Controller (1) Pulse output : Electric isolation, directly drives up to 6 thyristors (2) Trigger angle : 0~180 (3) Control input signal : 0~10VDC (4) Rectification angle : 0~90 adjustable (5) Convert angle : 0~180 adjustable (6) Modeselect : Single pulse & continuous pulse (7) Operation power supply : ±15V				

		7. R.M.S. Meter (1) Measuring range : a. Current:0.1/0.3/1/3/10/30 A b. Voltage: 3/10/30/100/300/1000V (2) 3 Measuring types: a. RMS AC+DC: Total RMS value b. RMS AC: Ripple RMS value c. AV AC+DC: Arithmetic mean value (3) Overload protection (4) ± Value indicator : LED (5) Accuracy : 2%. Full scale (6) Operation power supply : AC220V, 50/60Hz 8. Power Meter (0.3W-30KW) (1) Measuring range : 0.3W~30KW a. Current: 0.1/0.3/1/3/10/30 A rms b. Voltage: 3/10/30/100/1000V rms (2) Frequency range : 0~20KHz (3) Overload protection (4) Overcurrent & overvoltage LED indicator (5) Reactive power ± value indicator (QL & QC) (6) Accuracy : 2% full scale (7) Output terminal : Measuring full scale 100%=1V (8) Operation power supply : AC220V, 50/60Hz 9. Resistor Load Unit (1) Bench top type (2) 3 load resistors, each one 100 Ω (3) Rated current : 2.5A (4) Rated power : 625W 10. Resistor Load (1) 2 resistors load: a. 5~50Ω /120W b. 10~100Ω /120W (2) Overcurrent protection 11. Inductive Load Unit (1) Bench top type (2) Load indicator : 50mH x 2/200mH (3) Rated current : 5A 12. Flyback Switching Power Supply (1) Test point: a. Switching control IC output signal b. Current feedback signal c. Voltage feedback signal d. Switching power component terminal (2) Switching frequency up to 40KHz				

		(3) Converter control : Isolation feedback converter (4) Input voltage : 95~250V AC (5) Output : 45W, up to 80% efficiency (6) Output voltage ripple : ≤ 5% (7) Output voltage regulation : ≤ 5% "(8) Output voltage : DC 12V ~ 15V, DC 12V ~ 15V, adjustable by R18" (9) Rated current : 2AMax. overload & short circuit protection 13. Boost Switching Power Supply (1) Test Point: a. Switching control IC output signal b. Current feedback signal c. Voltage feedback signal d. Switching power component terminal (2) Switching frequency : ≥ 40KHz (3) Input voltage : DC 10 ~ 16V (4) Output : 60W, up to 85% efficiency (5) Output voltage ripple : ≤ 5% (6) Output voltage regulation : ≤ 5% (7) Output voltage : DC 18V ~ 30V, adjustable (8) Rated current : 2AMax. overload & short circuit protection 14. Buck Switching Power Supply (1) Test point: a. Switching control IC output signal b. Current feedback signal c. Voltage feedback signal d. (2) Switching frequency : ≥40KHz (3) Input voltage : DC 17~ 30V (4) Output : 45W, up to 85% efficiency (5) Output voltage ripple : ≤5% (6) Output voltage regulation : ≤5% (7) Output voltage : DC 10V ~ 15V, adjustable (8) Rated current : 2AMax. overload & short circuit protection 15. Buck-Boost Switching Power Supply Unit (1) Test point: a. Switching control IC output signal				

		b. Current feedback signal c. Voltage feedback signal d. Switching power component terminal (2) Switching frequency : ≥40KHz (3) Input voltage : DC 20 ~ 30V (4) Output : 60W, up to 85% efficiency (5) Output voltage ripple : ≤5% (6) Output voltage regulation : ≤5% (7) Output voltage : DC 25V ~ 30V, adjustable (8) Rated current : 2AMax. overload & short circuit protection 16. Electronic Ballast Fluorescent Lamp (1) Switching frequency : 10KHz (2) Input voltage range : 220V AC (3) Type of lamp : 35cm long tube 10W (4) Control mode : half-bridge self-excitation feedback multivibrator (5) Output current : 2Amax. with overflow and short circuit protection (6) Switching power component : BJT 17. IGBT Drive Set (1) Input voltage : DC 20~300V (2) Output voltage : 20~300Vp (3) Drive circuit : Photo couple and drive circuit (4) Output device : IGBT, 800V/60A (5) Current protector 18. DC PWM Generator (1) Triangular wave (carrier) generator: a. Amplitude: 0~10V or -10V~+10V b. Frequency: 1K, 10K, 15KHz (2) PWM signal generator : 2 x PWM control signal (3) IP input : DC -10V~+10V (4) Operation power supply :DC±15V 19. Single Phase PWM Controller (1) Triangular wave(carrier) generator : a. Amplitude: -10V~+10V b. Frequency: 1K, 5K, 15KHz				

		(2) Sine wave signal generator (3) Multiplex (4) PWM Signal generator : 2 x TTL level (5) Square wave signal generator (6) IP input : DC 0V~+10V (7) Operation power supply:DC±15V 20. Three Phase PWM Controller (1) Triangular wave(carrier) generator : a. Amplitude: -10V~+10V b. Frequency: 5K, 10K, 20KHz (2) Sine wave signal generator (3) Multiplex (4) PWM Signal generator : 6 x TTL level (5) Square wave signal generator (6) IP input : DC -10V~+10V (7) Operation power supply :DC±15V 21. Three Phase Rectifier & Filter (1) Power input : 1Ø or 3Ø, 20~220VAC (2) With Inductor & capacitor filter circuit (3) Surge protection in voltage circuit (4) Output voltage : 28~310VDC (max.)/10A(max.) 22. Universal Inverter 3x230V (1) 6 x TTL level signal input : > 2.5μS, for interlock & dead time control (2) Power input : 1Ø or 3ØAC 20~220V (3) With photo-couple, isolation and main circuit (4) Output power component : IGBT 800V/50A (5) With adjustable overcurrent protection circuit (6) Output capacity : 220V/ 1.5KV (7) Operation power supply : AC220V, 50/60Hz 23. Power Diode Set (1) Rated voltage : 1200V (2) Rated current : 40A 24. Fuse Set (1) Module design (2) 3 x D-Type fuses, 500V/6A				

		25. Thyristor (800V/10A) (1) Rated voltage : 800V (2) Rated current : 10A (3) With RC surge buffer protection circuit 26. SCR/TRIAC Set (1) SCR : 800V/16A (2) TRIAC : 600V/12A (3) Load lamp : 2 x 24V/10W (with switch) (4) Load inductor : 1 x 50m H/1A(with switch) (5) With current/voltage transfer measurement (6) With trigger control adjustable (7) Operation power supply : AC220V, 50/60Hz 27. MOSFET/ IGBT Set (1) IGBT : 800V/50A (2) MOSFET : 100V/48A (3) Load lamp : 2 x 24V/10W (with switch) (4) Load inductor : 1 x 50mH/1A(with switch) (5) With current/voltage transfer measurement (6) With trigger control adjustable (7) With external signal input (8) Operation power supply : DC+15V 28. SCR DC Chopper Set (1) Operating voltage : ±15V, 0.4A (2) Input voltage range : 50V~300VDC (3) Maximum output current : 5A (4) Chopping frequency range : 220~280Hz (5) Minimum duty cycle : 0.1 (6) Maximum duty cycle : 0.8 (7) External input : DC 0V~10V 29. Isolating Transformer (1) Benchtop type (2) Output voltage : 3Ø, 4W, Y type connected, 110/164/190/220V line-to-line voltage output (3) Rated capacity : 1.5KVA (4) Input : AC, 3Ø, 220V, 50/60Hz 30. System Transformer (1) Rated power : 1.5KVA				

		(2) Primary : Depend on the local line voltage (3) Secondary : AC, 3Ø, 220V (4) Frequency : 50/60Hz 31. Three-phase Power Supply Module (1) Modular design (2) Overcurrent /leakage protection switch (3) Start and emergency power off buttons (4) Working voltage : 3 ø 220 Vac, 50/60 Hz (5) Rated output : 3 ø 220 Vac/10 A (6) Fuse protection (7) Terminals : 4mm safety sockets (8) Temperature indicator 32. Magnetic Powder Brake Unit (1) Power supply : 110/220V AC (2) Type : Forced air-cooling magnetic powder brake (3) Braking torque : 0.999 kg-m (9.999 N-m), max. (4) Speed sensing : Photoelectric type, 60 pluse /rev. (5) Torque sensing : Strain-gauge torque transducer, torsion bar (6) Temperature sensing : Thermal switch (7) Base unit : Integral, aluminum alloy (8) Connecting to controller via the dedicated cable (9) Cooling fan : 12V DC/0.29A Analog DC output: a. Torque output (1V/1kg-m) b. Speed output (1V/1000 rpm) c. Power output (1V-1 KW) 33. Brake Controller (1) Power Supply : 110/220 V AC (2) Connecting to magnetic powder brake unit via dedicated cable (3) 4-digit 7-segment LED Display : 2 sets a. Display speed (S), torque (T) and power (P) of themotor under test power brake unit (4) LCD character display (20x2) & Buttons for command control of entry and display				

		(5) LCD graphic display (128x64) Graphically display characteristics of brake and motor (6) Display range : a. Torque: 0 ~ 0.999 kg-m or 0 ~ 9.999 N-m b. Speed: 0 ~ 9999 rpm c. Power: 0 ~ 9.999 KW d. Voltage: 0 ~ 24 V e. Current: 0 ~ 0.999 A (7) Control Mode: a. Open-loop control mode Manual on loading and unloading power to brake automatic loading and unloading power, brake selectable initial power Wi and max power Wm : 0 ~ 0.999 kg-m Selectable loading time : 1 ~ 15 sec b. Closed-loop control mode Constant-torque mode Constant-speed mode (8) Fault detection and indication a. MAIN indicator for controller fault b. BRAKE indicator for brake fault c. MOTOR indicator for motor fault 34. DC Permanent-Magnet Machine (1) The machine can be as motor and generator operation. (2) Ratings for motor operation a. Rated voltage: 180Vdc b. Rated current: 2.7 A c. Rated speed: 2500 rpm d. Rated power: 0.4 Kw 35. Three-Phase Squirrel Cage Motor (1) Rated voltage : △ 220 Vac , 50/60 Hz (2) Rated current : 1.4 A (3) Rated speed : 1670 rpm(60 Hz);1420 rpm(50 Hz) (4) Rated power : 0.3 KW (5) Power factor : 0.82 36. Experimental Frame (1) Must be suitable for demonstration with 297 mm high experimental panels (2) Secured to benches or back uprights and removed at any time.				

		(3) Must consist of rectangular tube steel, 60x30x2mm, protected against corrosion, Horizontal Sections contains of anodized-aluminum profiles. (4) Frame dimension: 1800 (W) x 1060 (H) X 250(D) mm, ±5% 37. Coupling (1) Material : Rubber (2) Coupling sleeve for mechanical connection between two electrical machines 38. Coupling Guard (1) Material : Plate coating (2) A guard attachable for contact-proof with electrical machines rotating parts 39. Shaft End Guard (1) Material : Plate coating (2) A guard attachable to avoid contact with electrical machines rotating parts 40. Connecting Leads Set (1) 4mm safety plugs with leads (2) Max. rating current : 19A (3) Consists of : Connecting leads (25cm), Red/Black/Yellow/Blue/White Connecting leads (50cm), Red/Black/Yellow/Blue/White/Green Connecting leads (100cm), Red/Black/Yellow/Blue/White/Green Connecting leads (150cm), Red/Black/Yellow/Blue/White/Black 41. Safety Bridging Plugs Set (1) 4mm safety bridge plugs, 19 mm spacing (2) Max. rating current : 19 A (3) Consists of : Safety bridge plus Safety bridge plus 42. Laboratory Table Dimension : 1800(W) x 900(D) x 780(H)mm, 5% 43. Connecting Lead Holder				

		(1) Mobile type with 5-foot tubular steel base and five casters (2) Height: 1400mm, iron plate suitable with 20 connecting leads slots. 44. Hand Held Digital Multimeter 45. 50MHz 2-Channel Digital Storage Oscilloscope				
7	unit	**Digital Communication Trainer** Technical Specifications: Main Unit -1Dual Function Generators -1 output waveform: sine, triangle, square and TTL level signal -2 output voltage a. 1Hz ~ 50KHz : 0 ~ 20Vpp, continuously adjustable b. 50KHz ~ 200KHz : 0 ~ 16Vpp, continuously adjustable c . 200KHz ~ 500KHz : 0 ~ 10Vpp, continuously adjustable -3 output frequency: 6 range, selectable a. 1Hz ~ 10Hz, continuously adjustable b. 10Hz ~ 100Hz, continuously adjustable c . 100Hz ~ 1KHz, continuously adjustable d. 1KHz ~ 10KHz, continuously adjustable e. 10KHz ~ 100KHz, continuously adjustable f. 100KHz ~ 500KHz, continuously adjustable All above ranges are adjusted by a 10-turn fine tuning knob -4 AM modulation signal a. Input amplitude : 0 ~ 5Vpp b. Input frequency range : 1Hz ~ 100KHz c . Percentage modulation : 80% d.Output : AM amplitude continuously adjustable -4 AM modulation signal a. Input amplitude : 0 ~ 5Vpp	1	4,300,000.00	4,300,000.00	

		b. Input frequency range : 1Hz ~ 100KHz c . Percentage modulation : 80% d. Output : AM amplitude continuously adjustable 2 V/F Converter -1 Input voltage: 0 ~ 20V -2 output frequency: 0 ~ 20KHz -3 conversion ratio: 1V = 1KHz 3 Adjustable DC Power Supply -1 Output voltage: 0 ~ 20V, continuously adjustable -Max. output current: 100mA with overload protection 2 adjustable 4 Fixed DC Power Supply -1 output voltage: +5V, -5V (rated current 500mA) -2 output voltage: +12V, -12V (rated current 500mA) 5 Universal Frequency/Period Counter -1 Function : logic probe/frequency/period/pulse width -2 Input frequency range (F) : 1Hz ~ 99.999999MHz, 10Hz ~ 100.00000MHz -3 Input period range (TH&TL) : 0.01μs ~ 999999.99μs, 1μs ~ 99999999μs -4 Input level : TTL, analog signal (Vin ≥ 2.2Vpp) -5 Sampling time : 1sec & 0.1sec -6 Display : 8-digit, 7-segment display ISM/ASK/FSK Transceiver & Digital Encoder 1 RF Carrier -1 Transceiver carrier frequency : 434.92MHz -2 Transmitter carrier power : 10dBm -3 Receiver carrier sensitivity : about -100dBm at 2.4Kbps -4 Modulation : ASK/FSK selectable -5 IF signal : ASK (250KHz), FSK (150KHz) -6 Bandwidth of modulation : 100Hz ~ 16KHz 2 Date Rate				

		-1 100Hz/62.5Hz -2 160Hz/100Hz -3 1.6K/1KHz -4 16K/10KHz 3 Data Transmission Format -1 Start Bit 2 Setting -3 Stop bit 4 Data Transmission -1 Direct modulation -2 Manchester encoding 5 Data Setting and Display: 8-bit data set by high and low key switches and LED display 6 Code Division Encoding and Setting: 8-bit DIP switch ISM ASK/FSK Transceiver & Digital Datal Decoder 1 RF Carrier -1 Transceiver carrier frequency: 434.92 MHz - 2 Transmitter carrier power: 10dBm -3 Receiver carrier sensitivity: about-100dBm at 2.4Kbps -4 Modulation: ASK/FSK selectable -5 IF signal: ASK (250KHz), FSK (150KHz) -6 Bandwidth of modulation: 100Hz ~ 16KHz 2 Data Rate - 1 100Hz/62.5Hz - 2 160Hz/100Hz - 3 1.6/1KHz - 4 16K/10KHz 3 Data Transmission Format -1 Start bit -2 setting - stop bit 4 Data Transmission -1 Direct modulation -2 Manchester encoding 5 Data Setting and Display : 8-bit data set by high and low key switches and LED display 6 Code Division Encoding and Setting : 8-bit DIP switch				

		ISM ASK/FSK Transceiver & Digital Data Decoder 1 RF Carrier -1 Transceiver carrier frequency: 434 .92MHz -2 Transmitter carrier power: 10Dbm -3 Received carrier sensitivity: about -100dBM at 2.4Kbps -4 Modulation: ASK/FSK selectable -5 IF signal: ASK (250KHz), FSK (150Khz) -6 Bandwidth of modulation: 100Hz-16KHz 2 Data Rate -1 100Hz/62.5Hz -2 160Hz/100Hz -3 1.6K/1KHz -4 16K/10Khz 3 Decoder Sampling Frequency: 16X transmitted signal frequency 4 Received Data Decoding Format -1 Start bit check -2 8-bit spread spectrum code check -3 Stop bit 5 Data Received -1 Direct demodulation -2 Manchester decoding 6 Received Code Division Data Display 16 LEDs used for 64-bit data display, 16-bit x 4, selected by 2 DIP switches 7 Decoded Data Display : 8 LEDs 8 Code Division Decoding Set : 8-bit DIP switch ID Code/CRC/FEC (Block Code)/Manchester Data Encoder 1 Data Rate -1 100Hz/62.5Hz -2 160Hz/100Hz -3 1.6K/1KHz -4 16K/10KHz 2 Data Setting and Display: 8-bit data set by high and low key switches and LED display 3 8-bit data Forward Error Correction (FEC) mode				

		'Two 16-bit Hamming codes -1 4-bit data +3-bit error-corrector code x 2 -2 7-bit data+4-bit error-correcting code 4 16-bit Hamming Code Display : 16 LEDs 5 8-bit ID Code Setting : 8-bit DIP switch 6 CRC Code : CRC-16 7 Data Format : 58-bit data -1 Start bit -2 16-bit preamble code -3 8-bit ID -4 16-bit FEC Hamming code -5 CRC -16 code -6 Stop bit 8 Data Transmission -1 Direct modulation -2 Manchester encoding 9 Error Code Setting : 6-bit DIP switch 10 Data Transmission via ISM FSK/ASK Transceiver for RF Remote Data Transfer 1 Data Rate100Hz/62.5Hz -1 160Hz/100Hz -2 1.6K/1KHz -3 16K/10KHz 2 8-bit Data Forward Error Correction (FEC) mode Two 16-bit Hamming codes 4-bit data + 3-bit error-correcting code x 2 7-bit data + 4-bit error-correcting code 3 FEC Data Display : 8 LEDs for displaying 8-bit or 7-bit correct data received 4 8-bit ID Code Setting : 8-bit DIP switch 5 CRC Code : CRC-16 6 Data Format : 58-bit data Start bit detecting 16-bit preamble code : detecting signal strength and synchronization 8-bit ID code check				

		8/7-bit data decoded from 16-bit Hamming code CRC-16 code check Stop bit 7 Data Received -1 Direct demodulation 8 Received Data Display: 16 LEDs for displaying 64-bit receive data (including CRC code) 9 Decoder Output Display: 8 LEDs 10 Decoding Check - 1 Flags for ID and CRC checks - 2 Hamming code error bits detecting: 6 LEDs 11 Data Transmission via ISM FSK/ASK Transceiver for RF Remote Data Transfer ID Code/CRC/FEC (Convolution)/Manchester Data Encoder 1 Data Format -1 Start bit -2 32-bit data or 32-bit data interleave 16-bit data setting via FEC convolution encoding (1/2 data rate) -3 8-bit ID code -4 64-bit data transmission: 40-bit data plus CRC-16 code plus 8-bit 2 Error Code Setting and Transmitted Data Monitor -1 error bits -2 16 LEDs used for monitoring the transmitted data 3 Transmitted Data Can Select Manchester Encoding. 4 Data Transmission via ISM FSK/ASK Transceiver for RF Remote Data Transfer ID Code/CRC/FEC (Viterbi)/Manchester Data Decoder 1 Data Received -1 Start bit detecting -2 8-bit ID code check -3 64-bit data: CRC-16 code calculation and detection -4 32-bit data interleave setting				

		-5 Viterbi algorithm for decoding correct 16-bit data 2 Manchester Decoding 3 Data Decoding and Receiving LED Display 4 Data Receiving via ISM FSK/ASK Transceiver for RF Remote Data Transfer 1 RF Carrier Transceiver carrier frequency : 433.2MHz Transmitter carrier power : 15dBm Receiver carrier sensitivity : about -105dBm at 100Kbps Modulation : FSK IF signal : 200KHz at 100Kbps Bandwidth of modulation : 1KHz ~ 100KHz 2 Data Transmission Format -1 Programmable preamble: 2bytes or 4bytes -2 Programmable Identifier: 2bytes or 4bytes -3 Programmable data: 1 to 64bytes -4 FEC Hamming encoding: FEC 4-bit data + 3-bit error correcting code CRC-16 3 Transmission Interface : SPI interface 4 Communicating with PC via SCI Interface 'Remark : (1) Experiment module x 2 (2) To carry out more experiment computer is essential but extra. 1 TDMA Modulation and Transmission -1 Speech ADC sampling rate: about 8KHz -2 Speech ADC output: 7-bit -3 Transmission channels: 5 2 Data Input : 5 sets set by five 8-bit DIP switches, 00-7FH (MSB = 0), 2 of the five sets can be from DIP switch or ADC 3 Preamble Code : AAAA55H 4 TDMA Transmission Bits : 64-bit				

		5 TDMA Transmission Rate : about 512.8KHz 6 TDMA Output Signals : STS1 data, Frame Sync Transmit (FSX) and bit sync clock (SYNCLK) 7 TDMA Reception and Demodulation -1 From transmitter output STS1 data -2 Bit clock regeneration -3 Preamble code detect 8 TDMA Demultiplexer Outputs '3 channels (24-bit, 8-bit each) indicated by LEDs, 2 of the 3 channels can select LED 'indications or DAC output 9 TDMA Transmission Rate : about 512.8KHz 1 Speech ADC Sampling Frequency : about 8KHz 2 Speech ADC Output : 7-bit 3 Transmission Channel : 3 sets of STS1 multiplexing transmission 4 Input Data : 7 sets set by seven 8-bit DIP switches, 00-7FH (MSB = 0) 5 Preamble Code : AAAA55AA55H 6 TDMA Transmission bits : 160-bit 7 TDMA Transmission Rate : about 2.105MHz 8 Two STS1 Data Outputs 9 STM1 Data : multiplexed output of three STS1 data inputs 1 Received STM1 Data Bit clock regeneration Preamble code detect : AAAA55AA55H Demultiplexer STS1 data : 3 sets 2 Demultiplexer Output Display : 7 x 8 LEDs 3 TDMA Transmission Rate : about 2.105MHz TDM/CODEC ; PCM/PWM ; DSP-FIR Module 1 TDM-SADC-SDAC-CODEC Codec module : TI TLV320AIC23 chip Stereo TDM (Time Division Multiplexing) signal TDM signal sources a. Internal signal generator : left-sine wave, right-triangle wave				

		b. External line and microphone inputs 2. ADC-PCM-SDAC-PWM -ADC module a. Resolution: 12-bit b. Max sampling rate: 2MHz -2 PCM (Pulse Code Modulation) a. PCM transmission: SPI bus b. Switch-selected 4 channel inputs -3 PCM-SDAC: PCM data to analog signal -4 PWM (Pulse Width Modulation) PWM resolution: 12 bit - ADC Parallel output and scanned display a. Inputs : 4-channel inputs from ADC outputs b. Outputs : 12-bit parallel TTL-level output, LED indications c. ADC output data display : 4-digit, 7-segment LED scanned display DSS/CDMA Encoder & Decoder 1 CDMA Encoder -1 CDMA encoder channels : 3 channels -2 Data input of each channel : 8-bit DIP switch setting -3 PN code input of each channel : 8-bit DIP switch setting -4 CDMA encoded sum sequence : 4-bit 2DSSS Generator Sine, nSine and square wave generator Frequency range : 300Hz ~ 10KHz adjustable, ±20% 3-channel DSSS encoder 3 CDMA spread-spectrum signals for BPSK modulation Multi-channel DSSS carrier generator BPSK sum QAM output signal with adjustable gain (Gain value : 1 ~ 2) 2 CDMA Decoder -1 PN code : 8-bit DIP switch setting -2 CDMA multiplier output : 5-bit -3 CDMA accumulator output				

		-4 CDMA accumulator sign detecting -5 CDMA decoded data-word output 4 DSSS Decoder -1 Multiplying BPSK sum by PN sequence in DSSS multiplier decoder -2 BPSK sync clock delay adjustment -3 BAPSK (Binary Amplitude Phase Shift Keying) outputs -4 CDMA BAPSK demodulator -5 5-bit DSSS add-accumulate processing and sign detecting 6- DSSS decoded data-word output PCM-TDM-Compander Modulation/Demodulation 1 PCM-TDM-Compander (A-/μ-Law) Modulation 8-bit ADC Module a. Strobe signal : 8KHz b. 4Vpp positive and negative signal levels adjustment c. Input audio frequency : 100Hz ~ 2KHz d. PCM output : 8-bit parallel data PCM to serial TDM output 14-bit μ-Law and 13-bit A-Law audio compression to TDM output a. Switch-selected 14-bit μ-Law or 13-bit A-Law compression b. Converting A-/μ-Law input data set by 14-bit DIP switch to 8-bit compressed data c. A-/μ-Law compressed 8-bit output indication : 8 LEDs d. A-/μ-Law compression rate : at least 1MHz TDM transmitter system a. Operating frequency : 20MHz b. Multiplexer bits : preamble (55AAH) plus 32-bit data c. Bit clock : 434KHz or higher d. Frame Sync Transmit (FSX) frequency : at least 46KHz e. Master/slave setting f . TDM output : TTL-level Q and open-collector NQ g. Connecting two sets of 16-bit data for TDM master/slave multiplexing transmission 2 PCM-TDM-Compander (A-/μ-Law) Demodulation 8-bit DAC module a. Signal analog output : R-2R buffer and level shifter				

		b. Audio output frequency : 100Hz ~ 2KHz 14-bit μ-Law and 13-bit A-Law expanding a. Switch-selected 14-bit μ-Law or 13-bit A-Law audio expanding b. 14/13-bit expanded output indicated by LEDs TDM receiver system a. Operating frequency : 20MHz b. Demultiplexer bits : preamble (55AAH) plus 32-bit data c. Bit clock : 434KHz produced by clock regeneration d. Master/slave demultiplexing setting Must have the following List of Experiments: 1 Data Spread-Spectrum Modulation and Manchester Encoding 2 Serial Data Manchester Encoding/Decoding 3 Spread-Spectrum Data Sampling, Decoding and Checking 4 ASK Digital Data Transmission 5 FSK Digital Data Transmission 6 Data Hamming Encoding and Manchester Encoding 7 Digital Data Decoding and Error Correction 8 Digital Data ASK/FSK Transmission and Decoding 9 Convolutional Encoding and Data Interleaving 10 Viterbi Decoding and Error Correction 11 Viterbi Decoding and FSK Transmission 12 64-byte Data Transmission 13 1-byte Data Transmission 14 1-byte ADC Data Transmission 15 10-byte ADC Data Transmission 16 PC Digital Data Transmission 21 TDM Codec 22 DSP-Based FIR Filters 23 Multichannel ADC 24 SPI and Serial DAC 25 PWM Modulation 26 CDMA Encoding 27 CDMA Decoding 28 DSSS Encoding 29 DSSS Decoding 30 μ-Law Encoding 31 A-Law Encoding				

		32 Time Division Multiplexing and Data Compressing 33 Time Division Demultiplexing and Data Expanding Equipment Required 34 Rack Frame 35 Digital Storage Oscilloscope (DSO) : 100MHz bandwidth, 1GS/s sampling rate and FFT function or better 36 4GHz Logic Analyzer (200MHz, 18 Channel) 37 Hand-held Digital Multimeter Accessories 1 Connection Leads and Plugs 2 Storage Cabinet x 2 3 Experiment Manual				
8	unit	**Electrical Wiring Learning System Technical Specifications:** Total Learning outcome: OBJECTIVES: 38 SKILLS: 23 Mobile Workstation Shall be made of 1.5 inch steel tubing frame, floor-standing design, minimum dimensions shall be 72" (183 cm) L x 72" (183 cm) H x 28" (71 cm) W. The components shall be mounted to panels of 11-gauge sheet steel. Four adjustable casters shall be attached to the bottom of the frame. Also included are the storage racks for the wire spools. Control Panel Enclosure The control panel [8" (20 cm) L x 30 ¼" (77 cm) H x 30 ¼" (77 cm) W] components include six (6) contactors [two (2) forward / reverse contactors and four (4) auxiliary contactors]. Additional components include: • Contactors: 9A, (3) N.O. power poles, 24VDC coil voltage • Overload Relay: Electric thermal overload relay, 1.7 to 2.6A, bi-metallic • Circuit Breakers	2	6,000,000.00	12,000,000.00	

		• Control Transformer: • DC Power Supply: 24VDC, 1-phase, aluminum housing, 35mm DIM rail mount, screw terminals • Disconnect Switch: Fusible, class CC, load break capable, 3-pole, 600 VAC, 100kA • Timer Relay: 24VDC, • Terminal Blocks: Includes the following terminal block bridges: 2 position (10), 5 position (2), and 10 positions (2) Manual Operator Station The operator station [6" (15 cm) L x 12" (30 cm) H x 10" (25 cm) W] includes three (3) push-to-test indicators, two (2) pushbuttons, one (1) emergency stop button, one (1) selector switch, and one (1) release screw to open the enclosure door. Pneumatic Actuator Panel The electro-pneumatic equipment includes the electro-pneumatic junction box [4" (10 cm) L x 6 3/8" (16 cm) H x 6 3/8" (16 cm) W] which provides an interface between the control panel and the pneumatic devices, and the following pneumatic devices: • Limit Switch: 1 Position, 90 Degree Siemens Rotary Switch with Roller Crank Lever • Pneumatic Cylinder: Standard type, double acting, single rod, 5/8" bore, 3" stroke • Air Pressure Regulator: Modular type filter regulator, pressure gauge • Solenoid-Operated Directional Control Valve: 24VDC, Single Solenoid • Pressure Switch: Measures, controls, and switches pressures from vacuum to 500 psi Three-Phase Motor The included component will be a Baldor .33HP, 1800RPM, premium				

		efficiency 3-phase motor. This motor will be mounted to plate on the frame of the workstation and connected to the motor disconnect switch. • Power Cord with 4-pole, 5-wire grounding twist-lock plug • Motor Disconnect Switch Enclosure: Allen-Bradley, 16A, 500VAC, 3 Pole, Red/Yellow Knob Lockout / Tagout Equipment Safety equipment must be provided to prevent unsafe power up of the system. This includes equipment to lockout the safety switch and the power cord. The equipment must meet OSHA standards. The equipment must include the following: • Safety Lockout Hasp • Safety Lockout Tag (3) • Padlocks and Keys (2) • Plug Lockout The system shall be used to understand the following: INTRODUCTION TO ELECTRICAL CONTROL WIRING ELECTRICAL PRINTS ELECTRICAL PANELS PANEL WIRING FUNDAMENTALS SIZING DISCONNECTS AND OVERCURRENT DEVICES WIRING ELECTRICAL PANELS GROUNDING CONTROL SYSTEMS INTERNAL PANEL WIRING WIRING BETWEEN ELECTRICAL PANELS WIRE BUNDLING WIRING A MOTOR PNEUMATIC CONTROL CIRCUIT WIRING INTRODUCTION TO PNEUMATICS ELECTRO-PNEUMATIC VALVES PNEUMATIC SCHEMATICS ELECTRO-PNEUMATIC SYSTEM INSTALLATION				

		• VFD/PLC Wiring Learning System The system covers installing a VFD and PLC in an electrical panel to create power and control circuits that learners will test and operate. This system adds to the Electrical Wiring Learning System and requires PLC programming software, a computer, and electricity. This system includes: Programmable Logic Controller Motor, 3-Phase, 1/3 HP, 9 Lead Motor Disconnect Switch Terminal Blocks (8) Bridge, Terminal Block, 2 Position (10) Bridge, Terminal Block, 5 Position (2) Bridge, Terminal Block, 10 Position (2) Terminal Block, grounding Terminal Block, dual-level (5) Terminal Block, cage clamp (5) VFD, Allen-Bradley The system shall be used to understand the following: PLC AND VFD ELECTRICAL CONTROL WIRING PLC AND VFD INSTALLATION WIRING A PLC IN AN ELECTRICAL ENCLOSURE VFD MOTOR CONTROL WIRING A PLC AND VFD IN AN ELECTRICAL ENCLOSURE Consumables Package Fuse, Fast Act TB Marker Strip Diode, Rectifier, 1.0A Mobile Technology Workstation Should consist of a welded tubular steel frame with four '(4) heavy duty casters (2 locking type), and white laminated work surface. The minimum dimensions shall be 30”H x 30”W x 72”L.				

		• Industrial Soldering Learning System Technical Description: This system adds to the Electrical Wiring Learning System Soldering Station Fume Remover De-soldering Tool Set Solder Components Panel Soldering Component Hardware The system shall be used to understand the following: INDUSTRIAL SOLDERING APPLICATIONS SOLDERING BASICS SOLDERING TECHNIQUES DESOLDERING TECHNIQUES ELECTRIC PANEL SOLDERING APPLICATIONS • Ethernet and Analog Wiring Learning System Technical Description: This system adds to the Electrical Wiring Learning System. Total Learning outcome: OBJECTIVES: 8 SKILLS: 7 Ethernet Switch Siemens HMI Ethernet Cable; Analog Transmitter Unit Thermocouple with Mounting Hardware Cooling Fan with Mounting Hardware Conduit Set Fitting Set The system shall be used to understand the following: HMI, ETHERNET, AND ANALOG WIRING HMI Panel Installation HMI Panel interfacing and testing Ethernet Switch Installation Analog Interfacing				

9	unit	**ELECTRICAL POWER DISTRIBUTION LEARNING** Low-voltage power supply & distribution training system assessment of vocational training equipment, the didactic equipment is used in plant power supply of electrical engineering education equipment , refers to the plant required to supply and distribution of electric energy, also known as plant distribution. Transmission and distribution of electric energy both simple and economical, and easy to control, regulate and measure conducive to the production process automation, and information technology and other high-tech now and both are based on the application of electrical energy. So electricity in industrial production and the entire national economy is now living in wide range of applications. The power distribution cabinet training equipment is educational training equipment used for trainig electrician in technical vocational schools lab. Technical Parameters 1. Input power: 3 phase 4 fires AC380V±10% 50±2%Hz 2. Capacities: ≤3kVA 3. Workbench equipped with standard high voltage distribution cabinet with safety lock 4.Dimension: No less than 1800mm×800mm×800mm（One cabinet) Training Content: Training 1 Stop transmission power system simulation	1	7,000,000.00	7,000,000.00	

		Training 2 Transformers Wiring Measurement Experiment Training 3 Low-voltage switching operation Training 4 Stop transmission operation of universal circuit breaker Training 5 Motor training project Training 6 Autoreclosure device training Training7 Definite time delay overcorrect protection Training 8 MCGS basic configuration training project Training 9 Motor star delta configuration training project Training 10 Siemens Software experiment Training 11 Listing operation training Training 12 Systems stop transmission training Training 13 PLC control inverter motor multi-stage control speed and other training				
10	unit	**ELECTRICAL MOTOR CONTROL LEARNING SYSTEM** **Technical Specifications:** A. Electromechanic Components Board With this board, the students can perform experiments with components normally used in industrial electrical environment. The components on the front panel can be wired together through 2 mm terminals for what concerns the low voltage controls, and through 4 mm safety terminals for the connections to the mains or for further applications. All the components are identified through clear synoptic diagrams showing their types and symbols. On the rear side of the board, there are switches to allow for the introduction of faults by the teacher. Technical features The board must consist of the following components				

		• 1 power supply, 24 Vac • 1 bipolar switch, 1 - 0 - 2 1 thermal relay with auxiliary contacts • 2 timers • 5 push-buttons • 5 signaling lamps • 5 contactors with 5 auxiliary contacts each Power supply: single-phase from mains. Experiments: • Single-pole control auxiliaries • Contactor • Logic operators • Contactor self-supply • Interlock between contactors • Sequentially controlled contactors • Exclusive-OR operator • Static timer • Pulse generator • Squirrel Cage Motor Control The board, allowing the simulation of starting systems for the motors with squirrel cage rotor, is equipped with a clear synoptic diagram that shows through terminals: the push-buttons, the thermal relay contacts, the contactor coils and the signaling lamps. The system, besides the board, includes a three-phase asynchronous motor supplied at the reduced voltage of 42 V, complete with educational base and terminals that make easy the connection to the simulation panel. The speed meter, connected to an opto-encoder, allows measuring the rotation speed of the motor.Besides, a magneto-thermal switch and an emergency key allow the immediate interruption of the supply circuit in case of overload or short-circuit.				

		With this system, the student will be able to study the following: •Telestarting of three-phase asynchronous motor •Running teleinversion •Star-delta telestarting •Bias teleswitch •Star-delta telestarting with running teleinversion •Bias teleswitch for two speed motor of Dahlander connection. The checking and the automatic management are carried out by means of PLC. Complete with educational manual. Power supply: single-phase from mains. NOTE: It can be connected to a PLC such. • Programmable Logic Controller –26 In/22 Out The Programmable Logic Controller –26 In/22 Out is a programmable controller that combines high performance and ease of use for those who are entering the world of PLCs for the first time. Technical features The Programmable Logic Controller –26 In/22 Out configuration includes the following components: •1 power supply, 24Vdc/2.7A •1 selector for the use of theI/O via terminalsorconnectors •1 CPU (model Siemens 1212C of theS7-1200series) with8 digitalinputs, 6 relay outputs and 2 analoginputs •1 digital expansion module (model SM 1223) with16 digitalinputs and16 relay outputs •1 Ethernet LAN port for programming The front panel also features input/output terminals, suitably duplicated using 37-pin connectors,for digital and analog I/O to facilitate connections				

		between the Programmable Logic Controller –26 In/22 Out module and the hardware applications in the automation laboratory. It is complete with the software STEP 7 (TIA Portal) for programming with single license and Ethernet cable, supply cable, 2mm cables and connectors. Power supply: single-phase from mains. Experiments: • How to create a simple latch circuit • How to create a simple latch circuit (with timer) • Countdown experiment • Simulation and control of a conveyor belt • Simulation with detection of the direction of a conveyor belt • Simulation of a traffic light • How to implement an equation • Simulation of starting and stopping a motor • Simulation of starting a motorclockwise and counterclockwise • Simulation of Y/Δstarting a three-phase motor • Simulation of control in sequence of starting and stopping a motor • Simulation of a stepper motor B. OPENLAB MANUAL CONFIGURATION The system is a complete set of components and modules suitable for assembling the rotating electric machines, both for direct current and for alternating current. Students can perform a critical and well analyzed assembly, in order to understand the production techniques before performing practical tests of the operating characteristics. The system is supplied at low voltages in order to prevent the risk of				

		accidents. However, the machines have fully industrial features. The OPENLABsystem, in its basic configuration, is composed of: • A set of components • A power supply module • A measurement module • A loads and rheostat module • An adapter bracket • A locking and rotating device • A parallel board • A pole changing module • Electromagnetic brake • Star/Delta starter • Starting and synchronization SET OF COMPONENTS It must includes the following components: 1. Base plate 2. Supports with bearing 3. Coupling joints 4. Flexible coupling 5. Electronic speed transducer 6. Assembling screws 7. Wrenches 8. DC stator 9. AC stator 10. Rotor with commutator 11. Brush holder with 2 brushes 12. Cage rotor 13. Ring rotor 14. Brush holder with 6 brushes POWER SUPPLY Outputs in ac: • Three-phase: 24 V/14 A, 42V/10A • Single-phase: 0 – 48 V/5 A, 0 – 10 V/12A Outputs in dc: • 32 V/14 A, 42 V/10 A, 0 – 40 V/5 A, 0 – 8 V/12 A Three-phase power supply from mains. Complete with over-speed protection ELECTRIC AND SPEED MEASUREMENT • Power supply: 100-240 Vac 50/60 Hz • Vac/Vdc measurement range: 0-65V • Iac/Idc measurement range: 0-20A				

		• Speed measurement range: 0- 4000 rpm at 50Hz 0-6000 rpm at 60Hz • Communication: Modbus RTU RS485 • Encoder resolution: 5 pulses / revolution LOADS AND RHEOSTAT • resistors: 3x15 Ohm, 90 W each, 1 Ohm + (0 - 2 Ohm), 80 W • capacitors: 3 x 80 μF, 150 V • rheostat: 0 - 80 Ohm, 1 A				
11	Unit	**Programmable Logic Controller Trainer** Technical Specifications: 1. AC Adapter : input 100V ~ 240V AC, output 24V DC 2. PLC Main Unit : SIEMENS SIMATIC S7-1214C 3. Digital Input : 14 4. Digital Output : 10 5. Analog Input : 2 6. Support High-speed Counters : 6 7. Support PTO/PWM Pulses : 4 (total) 8. Support Timers : limited by the amount of memory in the CPU 10. Module Expansion Port and DIO Extension Port 11. Traffic Light Control Module 12. Tank-filling Device Module 13. 4-digit, 7-segment Display 14. 4-digit Thumbwheel Switch 15. Step Motor 16. Encoder 17. 24V DC Motor 18. Proximity Sensor 19. Micro Switch 20. Buzzer 21. 4 x 4 Keypad 22. Analog Input Knob : 0 ~ 10V DC 23. 24V DC Expansion Power Must have the following List of Experiments: 1. STEP 7 TIA portal operations 2. Basic control circuits 3. Light control 4. Traffic light control 5. Digital clock control	1	3,000,000.00	3.000,000.00	

		6. Step motor control 7. Tank filling device control 8. Keypad control 9. DC motor control Accessories 1. Power Cord 2. Experiment Manual 3. Connecting Leads Set 4. Industrial Ethernet Cable, CAT 6, Length 6M				
12	unit	**INDUSTRIAL ELECTRONIC TRAINER** Technical Specification: 1. Power Supply Unit (1) ACV output voltage : 18V-0V-18V, 0.5A (2) ACV output voltage : 12V-0V-12V, 0.5A (3) DCV output voltage : +12V, 0.5A (4) DCV output voltage : +5V, 0.5A 2. Meter/Motor Unit (1) Dual-scale ACV : 150V-300V, class 2.5 (2) Dual-scale ACA : 0-100mA-1A, class 2.5 (3) Dual-scale DCV : 0-10V-20V, class 2.5 (4) Dual-scale DCA : 0-100mA-1A, class 2.5 (5) AC110V/220V motor List of Experiments 1. Power Supply Unit Experiments (1) AC voltage measurement (2) DC voltage measurement 2. UJT Experiments UJT Characteristic & Equivalent Circuit (1) UJT introduction (2) UJT characteristic (3) UJT equivalent circuit (4) CDS trigger, RTH trigger UJT Oscillator Circuit & Timer Switch (1) UJT relaxation oscillator (2) UJT timer switch 3. PUT Experiments PUT Characteristic & Equivalent Circuit	2	3,000,000.00	6,000,000.00	

		(1) PUT introduction (2) PUT characteristic (3) PUT equivalent circuit (4) CDS trigger (5) RTH trigger PUT Oscillator Circuit & Timer Switch (1) PUT circuit oscillator (2) PUT timer switch 4. PUT & SCR Experiments PUT Staircase Generator & Voltage Control Ramp Circuit (1) PUT staircase generator circuit (2) PUT voltage control ramp circuit SCR Characteristic & RC Shift Control Circuit (1) SCR principle (2) SCR characteristic curve (3) SCR construction (4) SCR trigger mode (5) SCR RC phase control circuit 5. SCS Experiments SCS Characteristic Experiment (1) SCS construction and operation mode (2) Use VOM meter measuring SCS (3) SCS schmitt circuit (4) SCS simulate PUT circuit SCS Trigger Circuit Experiment (1) CDS trigger (2) RTH trigger 6. UJT & PUT Trigger SCR Experiments UJT Trigger SCR Phase Control Circuit (1) Phase control basic circuit (2) Phase control analysis (3) AC phase control circuit analysis (4) UJT trigger SCR phase control circuit PUT Trigger SCR Phase Control Circuit 7. SCR Control DC Motor & DIAC, TRIAC SCR Characteristic Experiments SCR Control DC Motor Forward / Reverse Experiment (1) SCR cut-off principle (2) SCR control DC motor forward / reverse control experiment				

		DIAC, TRIAC Characteristic Experiment (1) DIAC construction and characteristic (2) DIAC operation mode and measurement (3) TRIAC construction and characteristic (4) TRIAC trigger mode (5) TRIAC static measurement 8. Automatic Control Lamp, TRIAC Control Speed Experiments Automatic Control Lamp Experiment (1) TRIAC shift control (2) TRIAC automatic control lamp experiment TRIAC Control Motor Speed Experiment (1) Different motor introduction (2) TRIAC control motor speed experiment 9. Temperature Ratio, Photo-Couple and Touch Control Experiments Bridge Temperature Ratio Control Experiment (1) Electronic component of thermal resistor (2) SCR bridge temperature ratio control experiment Photo-Couple and Touch Control Experiment (1) Photo-couple control circuit (2) FET construction and characteristic (3) Touch alarm circuit 10. Over / Under Voltage Breaker and Flasher Control Experiments Over / Under Voltage Breaker Experiment (1) OPA characteristic with reverse & non-reverse circuit (2) Voltage comparison circuit Flasher Control Experiment (1) Application of TRIAC power control (2) AC circuit control (3) Multivibrator 11. TRIAC Liquid Level & IC Timer Switch Experiments				

		TRIAC Liquid Level Control Experiment (1) Digital circuit introduction (2) TRIAC liquid level control experiment IC Timer Switch Experiment (1) NE 555 IC circuit introduction (2) lC timer switch experiment 12. Digital Signal Driver & Zero-Voltage Switch Experiments Digital Signal Driver Control Experiment Digital signal driver control experiment Zero-Voltage Switch Experiments (I) Ideal half-wave zero-voltage switch experiments 13. Zero-Voltage Switch Experiments Zero-Voltage Switch Experiments (II) (1) TRIAC zero-voltage switch experiments (2) IC mode zero-voltage switch experiments 14. SCR Converter Experiments (1) Parallel converter introduction (2) Series converter introduction (3) Converter trigger source (4) Converter voltage adjustment (5) Converter output-waveform improvement 15. SCR Rectifier Circuit Experiments (1) Single-phase half-wave rectifier (2) Single-phase full-wave rectifier (3) Single-phase bridge rectifier (4) Three-phase half-wave rectifier (5) Three-phase full-wave rectifier 16. JFET / MOSFET Characteristic & MOSFET Speed Control Experiments (1) JFET characteristic experiment (2) MOSFET characteristic experiment				

		(3) MOSFET speed control experiment 17. IGBT Characteristic & IGBT Speed Control Experiments (1) IGBT characteristic experiment (2) IGBT speed control experiment 18. Accessories (Including Storage Cabinet 2 pcs) 19. Rack Frame 20. Power Supply (0+-30V, 3A) 21. Transformer (For local 3 phase power not 220V) 22. Digital Storage Oscilloscopr 23. Hand-held digital multimeter				
13	unit	**ANALOG COMMUNICATION SYSTEM** Technical Specifications: 144MHz VHF FM Transceiver Trainer Experiment Modules 1. 2mm connection leads are used throughout the system 2. The building block diagrams are printed on the surface of each module. 3. Modules are secured in plastic housings(297x226x60mm) Analog Communication System Module (1) General characteristics a. Frequency range : 144~146 or 144~148 MHz b. PLL range : 130~170 MHz c. Modulation type : FM d. Channel setting step : 5, 10, 12.5, 20, 25, 50KHz e. Antenna impedance : 50 Ω f. Squelch sensitivity : 0.16 μVmax g. Audio output : 250mW h. Maximum offset : ±5KHz i . 1st IF signal : 21.8MHz j . 2nd IF signal : 455KHz (2) Key-Pad function a. SQL : To eliminate the “ZA” noise on FM	1	2,400,000.00	2,400,000.00	

		b. Volume : Power switch/volume control c. TX/RX LED : Signal transmitter/receiver indicator; red (transmitting) green (receiving) d. Channel : Channel selector e. M.S. socket : External MIC or speaker f. Function key g. PTT : Exchange transmitting and receiving function List of Experiments 1. Introduction to Analog Communication System 2. Microphone Amplifiers 3. Phase-Locked Loops 4. Voltage-Controlled Oscillators 5. RF Power Amplifiers 6. RF Amplifiers 7. Mixers and IF Amplifiers 8. FM Demodulators 9. Audio Amplifiers Accessories 1. Power Supply Module (SPS-001) Fixed DC power supply a. Output voltage : +5V, -5V, +12V, -12V b. Output current : +5V/3A, -5V/0.3A, +12V/1.5A, -12V/0.3A c. Output connector : 5 PIN DIN connector d. With output overload protection 2. : 1 pce Teacher's guide 3. Experiment manual : 1 pce 4. VHF, FM transceiver : 1 set Equipment Required 1. Digital Storage Oscilloscope (DSO) : 100MHz bandwidth, 1GS/s sampling rate and FFT function or better 2. FM signal generator : Capable of generating 130MHz 180MHz FM signal 3. AF signal generator : Frequency range : 1Hz~10KHz Waveforms : Sine wave Amplitude : 10Vp-p or better 4. Digital multimeter				

14	unit	**PORTABLE LIGHTWEIGHT SERVICE ROBOTIC ARM** Technical Specifications: Training Kit Specifications: 1 Size (H) 2 Workspace 1.2M (W) x 0.9M (D) 3 Weight- about 100KG I with Robot about 140kg 4 Material - Aluminium (top plate/inside/Side) 5 Robot – M0609 (6kg Payload/ 0.6m Working Radius) (PL-e / Cat.4) 6 Power - 100-240 VAC 47-63 Hz Training Kit Specialization 1 size 0.9M (W) x 0.9M (D) 2 Material Aluminium (top plate/Acrylic (part) 3 Power 100-240 VAC 47-63 Hz Features Playload – 6kg Reach – 900mm Repeatability ±0.03mm Features Electric sequence part - PLC - HMI - Positioning module - MCCB - Fuse holder/fuse - Relay socket/relay - Timer relay socket/timer - Internal input/output terminal block - External input/output terminal block - Indicator lights (RED/Green/Yellow) - Push button switch (red/green) - buzzer - selector switch - emergency switch - Aluminum profile (□30(900/540/500) - Aluminum profile bracket/nut - acrylic board - board support - Aluminum plate (600*900mm) - Channel (35*500mm) Education Cell - 1.2M (W) x 0.9M (D) x 0.9M (H) - Weight : 100 kg	2	8,000,000.00	16,000,000.00	

		- Aluminum (top plate/inside) / Steel (side) - 100-240 VAC 47-63 Hz Index table part - 8 hole circular plate (Processed product, aluminum, 014Ox8T) - Connection bush (Processed product, aluminum, 019-L3O) - Stepping motor and driver (2 phase 42 angle, 1.8kgf[J:m, O.75A) - Profile (2Ox2O, LSOmm) - Motor fixing bracket - Proximity sensor (cylindrical, 24V, PNP) - Bolts (MS-4, M3-10) Gentry robot parts - Transfer bracket (255x1OOx1Omm) - Servo motor driver - Robot base (45x68Omm) - Servo motor 1OOW) - Robot axis (500mm) - Encode cable (for serv - Power cable (for power supply) Conveyor belt - DC motor - Sensor)optical sensor) - Converyor belt				
15	unit	**PROCESS CONTROL TRAINER** Technical Specifications: The AUTOMATIC PROCESS CONTROL trainer allows the study and performing of experiments in the field of process control. ➢ Power supply: single-phase from mains ➢ Process Control Trainer/Process panel, including: • Water tank capacity: 20 litres approx. • Motor recirculation pump: 6 litres/minute • Motor valve: electro modulated valve used for controlling the water flow • Motor pump with thermal protection and flow check valve	2	5,200,000.00	10,400,000.00	

		• Flow sensor: 8000 pulses/ litre • Pipelines (for processing water supply and for water draining out from the process tank) • Delivery valve (the main water supply valve) • Turbine Flow Meter (flow sensor with volumetric measuring turbine) • Visual Flowmeter (indicator for flow rate) • Manually valve (for reducing the water flow) • Pressurized vessel capacity: 5 litres approx., including: o Capacitive level sensor and a Metric scale for measuring the water level (cm or mm) o Float switch (to detect the level of water within the pressurized tank) o Heating element; Temperature sensor (PT100) and a Thermometer for measuring the temperature inside the process tank (°C or °F) o Pressure sensor and a Pressure gauge for measuring the pressure (bar or psi) o 4 types of Valves (3 manual and 1 controlled) o Safety valve ➢ Process Control Trainer/Control panel, including: • Input's interface (Sensors) ▪ LEVEL transducer ▪ FLOW transducer ▪ TEMPERATURE transducer ▪ PRESSURE transducer • Control's interface (Controllers) ▪ ON – OFF ▪ ON – OFF with hysteresis ▪ PID (P, PI, PD, PID • Output's interface (Actuators) ▪ Linear driver for PUMP ▪ Driver for MOTOR VALVE ▪ PWM driver for HEATER ▪ ON – OFF driver for SOL VALVE				
16	unit	**TUBULAR FLOW REACTOR** Technical Specifications:	1	5,700,000.00	5,700,000.00	

		Bench-mounted apparatus designed to demonstrate tubular reactor behaviour comprising two 20 litre feed tanks and non-corrosive feed pumps. It includes a temperature controlled water jacket, a pre-heating coils and 0.4 litres reactor volume. a) Reactor Water jacket : 10 L; borosilicate glass; stainless steel top and bottom plate Cooling system : 3/8" stainless steel tube with connections for cooling water Heating system : 2 x 1.0 kW immersion heaters; temperature sensor; temperature controller Tubular reactor : Coiled tubing; 0.4 L Pre-Heating : 3.0 L stainless steel vessel with coils and circulation pump b) Stirrer System Speed range : 0 to 1200 rpm; with speed controller and digital indicator Electrical : 240VAC/1-phase/50-60Hz Impellers : 2" dia.; stainless steel c) Feed Tanks Capacity : 20 litre (cylindrical) Material : Stainless steel d) Product Tanks Capacity : 60 litre (rectangular) Material : Stainless steel e) Feed Pumps Type : Peristaltic Pumps Capacity : 1 LPM Electrical : 240VAC/1-phase/50-60Hz f) Instrumentations The unit is fitted with all necessary sensors and digital indicators for measurements of temperature and conductivity. All sensors are of electronic type to ensure compatibility with data acquisition system. UTILITY REQUIREMENTS Electrical supply : 240VAC/1-phase/50-60Hz				

		Water supply : Laboratory mains supply with drainage points Working area : Ventilated; approx. 10 m2 OTHER REQUIREMENTS Chemicals : Ethyl acetate and caustic soda are suggested Analytical equipment OVERALL DIMENSIONS Height : 1.68 m Width : 1.22 m Depth : 0.91 m The unit is supplied with Operating and Experimental Manuals in English giving full descriptions of the unit, summary of theory, experimental procedures and typical experimental results. Computer Aided Learning i) Web Based Presentation ii) Augmented I Virtual Reality iii) Process Modelling (selected models only) iv) Real-time Access to Teaching Equipments (selected models only) v) Experiment Manuals and Sample Results vi) Q & A Session Industrial Revolution 4.0 / Data Acquisition System with Industry 4.0 i) Data Logging ii) Signal Analysis iii) Process Control iv) Real-time Display v) Industry 4.0 Compliance vi) Mobile App vii) Cloud Computing viii) Web UI ix) Database x) OPC Server				
17	unit	**CHEMICAL REACTOR COMPUTERIZED** Technical Specifications: 1. Glass reactor, 1 L, jacketed, Torion type draining valve.	1	6,000,000.00	6,000,000.00	

		Temperature measurement in the reactor and temperature measurement in jacketed. 2. Glass lid, with 8 hole: Central hole for stirring, Filling hole, Condenser hole, Temperature probe, Gas injection, Introduction from feed tank, Two holes for optional cooling coil (option 01). 3. Reflux head, with filling valve, and 0,5L distillate tank, temperature measurement of the vapor. 4. Stirring, adjustable speed motor 60 to 500 rpm (or 240 - 2000 rpm), stirring bearing, PTFE shaft and PTFE mobile. 5. Glass coil condenser. Input and output temperature measurement. 6. 0,5 L glass tank for reactants feeding, draining valve. 7. Gas intake circuit: pressure reducing valve with manometer, isolating valve, setting valve and float flowmeter, double check valve and dip pipe. 8. Cooling water circuit: isolating valve for feeding of group, isolating valve for feeding condenser, setting valve and flowmeter. 9. Heating group: thermostatic bath, with oil, 20 to 150°C, water cooling by coil. Display and temperature control by internal probe (bath temperature) or external probe (reaction mixture temperature, if option O2). Control unit Electrical cabinet with: • General switch and operating light indicator. • Emergency stop button. • On/off stirring motor. • On/off heating group. • USB port, data export. RJ45 port for remote supervision. • Touch screen 7'' color.				

		Instrumentation : 5 temperature probes Pt100Ω. Air flowmeter 10 - 100 L/h. Water flowmeter 40 - 400 L/h.				
18	unit	**GAS LIQUID ABSORPTION** Technical Specifications: 1. Feeding tank, 20 L, polyethylene, draining valve. 2. Liquid phase feeding pump, magnetic drive, sampling valve. 3. Liquid phase feeding circuit: flowmeter and control valve. 4. Glass column, ND 50, in three parts: Column head, ND 50, with SS plate equipped with a liquid flow diffuser and pressure tap. Packed section, ND 50, height: 600 mm, packing: glass Raschig rings , SS packing support. Column bottom, ND 50, SS plate, pressure tap. 5. Gas phase feeding circuit: air and solute gas (CO2) flow meters and control valves. 6. Enriched liquid phase withdrawal pump, magnetic drive, sampling valve, flow meter and flow control valve. 7. Enriched liquid phase receiver, 20 L, polyethylene, draining valve. 8. Gas phase outlet : CO2 analyzer on line CO2 percent (%) display 9. Manometric U tube to measure differential pressure of the column, draining valve. 10. Manometric U tube to measure differential pressure of the column, draining valve. Control unit Electrical cabinet with: • General switch. • Power supplied, emergency circuit breaking. • Two On/Off switches of pump engines. Overall dimensions - Utilities Dim : 155 x 52 x 110 cm - 80 kg Stainless steel tubular frame 40 x 40mm	1	5,500,000.00	5,500,000.00	

19	unit	**DIESEL ENGINE PERFORMANCE TEST BED With Complete Training module, Manual & Faculty Training** Technical Specifications: The Diesel Engine Performance Test Bed must be supplied with an installed running engine ideal for teaching of engine operation, tune-up, diagnosis, fault finding and troubleshooting. The test bed is of a modular design so that it can accommodate any of the diesel engines available, including three, four, six and eight cylinder engines. The engine test bed must be featured with a strong tubular steel frame with rubber engine mounts in order to reduce vibration. The frame should accommodate an engine with or without a transmission. A fly wheel safety guard must be provided for operation without the transmission. On models with the transmission the clutch and shifting mechanism are fully operable. The test bed must have four (4) large strong wheels for mobility and (2) two of the wheels have locks in order to keep the engine stationary during operation. The test bed must be supplied with the following: shifter (with transmission units), cooling system with radiator and water pump/fan, electrical system with 12 volt battery and charging system, fuel system with fuel pump and fuel tank, exhaust manifold and silencer, lubrication system including oil filter, air	2	5,000,000.00	10,000,000.00	

		filter, starter motor, instrumentation console gauges and ignition key and must come with complete operation and experiment manual. Should include: Electrical Test Point: All wiring connections to the ECU input and outputs are brought out to an electrical panels with terminals for each pin. This facilitates testing and monitoring of the engine and ECU. (For Common Rail Direct Injection Diesel Engine) Electronic Fault System: 10 electronic faults must be provided to introduce problems for trouble Shooting exercises; must be ordered together with Electrical Test Point (For Common Rail Direct Injection Diesel Engine) The engine test bed must be designed for teaching diagnosis, tune up, fault finding and trouble shooting. The engine must be mounted on a strong tubular steel frame and comes complete with instrumentation and accessories so that it is ready to run. • Modular Frame: The heavy duty welded tubular steel frame must be cross braced for maximum strength. The rear guard tube can be easily removed to increase work access space around the engine or to accommodate the connection of the dynamometer. Rubber engine mounts must be incorporated into the frame in order to reduce vibration. The frame must be mounted on hard rubber or nylon wheels for mobility, two wheels have locking mechanisms for stability during operation. A 10 liter fuel tank and a 12 Volt battery must be				

		mounted to the frame. All wirings must be neatly routed next to frame members for operational safety. Safety guard must be provided to the needs for rotational objects. • Standard Instrumentation and Control System: Each test bed is provided with an instrumentation panel to control engine operation. The instrument panel includes a key ignition switch, operational light, ampere meter, oil pressure gauge, water temperature gauge and preheater indicator. A throttle control is provided in order to set engine speed. • Cooling System: A standard type water radiator that is matched to engine size cools the engine. A radiator guard is provided for safety so as to prevent accidents from the radiator fan. The cooling system has a thermostat and a water temperature gauge for monitoring the engine during operation. • Electrical System: Each engine is provided with a 12 Volt battery. The engine has an alternator and a voltage regulator so as to allow the battery to be recharged during operation. An ampere gauge monitors the alternator output and charging during operation. A fuse has been installed in order to protect the wiring harness, engine and instrumentation. • Fuel System: The diesel engine test bed comes complete with a 10-liter fuel tank that is connected to the fuel filter and fuel injection system. • Air Intake and Exhaust System: Each engine is provided with a matched exhaust system				

		including exhaust manifold with silencer (muffler). The air intake is also provided with an air cleaner for use during operation. • Engine: Engines are provided according to project requirements, see attached specifications for an indication of manufacturer and model offered. All engines come complete with cooling system including water pump/fan and radiator, fuel system including fuel pump and fuel tank, lubrication system including oil filter, exhaust manifold with silencer (muffler), air filter, starter motor, electrical system including the alternator with voltage regulator. The engine can be optionally provided with a matched transmission and shifting mechanism . • Instructional Materials: The unit must be provided with a complete factory workshop manual covering all repair and maintenance aspects for the engine and transmission. • Modular Dynamometer Unit (MDS): The engine test bed must be specifically designed to operate with the Modular Dynamometer System (MDS). EDUCATIONAL OBJECTIVES : • Familiarization with Diesel Engine Components : Cooling system, Fuel System, starting and charging system. • Operate Diesel Engine in normal operation and observe the conditions • Understand the function of cooling system and working principles of cooling system. • Understand the function of radiator. • Understand the function of lubrication system. • Observe and work with lubrication system.				

		• Understand the function of glowplug and analyze the trouble symptoms on glowplug. • Observe and work with charging system. • Troubleshoot a charging circuit. • Understand the fuel system components in diesel engines. • Observe and work with diesel engine fuel system. • Understand the work principles of injection pump and the effect of injection timing. • Adjust the injection timing on a diesel engine for advance and retard injection timing. • Understand the function and work principle of diesel injector/ nozzle function. • Observe and work with diesel injector/nozzle fuel circuit • Understand the work principles of intercooler • Observe and work with intercooler system • Understand the function and work principles of turbocharger • Understand the function and work principles of EGR (Exhaust Gas Recirculation)				
20	unit	**GASOLINE ENGINE PERFORMANCE TEST BED With Complete Training Module, Manual & Faculty Training** Technical Specifications: The EFI Gasoling Engine Test Bed must be specially designed for teaching diagnosis, tune up, fault finding and trouble shooting. The engine must be mounted on a strong tubular steel frame and come complete with instrumentation and accessories so that is ready to run. . The test bed must feature a strong tubular frame that can accommodate most 4 or 6 cylinders engines. It must come complete with the engine, transmission with shifter and clutch pedal (EP-TBL option), cooling	2	5,000,000.00	10,000,000.00	

		cooling system with radiator and water pump/fan, electrical system with 12 volt battery and charging system, EFI fuel system with fuel pump and fuel tank, ignition system, exhaust manifold and silencer, lubrication system including oil filter, air filter, starter motor, instrumentation console with gauges and ignition key. It must be provided with operation and experiment manual. Should Include: • Modular Frame: The strong heavy duty welded tubular steel frame must be cross braced for maximum strength. The rear guard tube can be easily removed to increase work access space around the engine or to accommodate the connection of the dynamometer. Rubber engine mounts must be incorporated into the frame in order to reduce vibration. The frame must be mounted on hard rubber or nylon wheels for mobility, two wheels have locking mechanisms for stability during operation. A 10 liter fuel tank and a 12 Volt battery must also be mounted to the frame. All wirings must be neatly routed next to frame members for operational safety. Safety guard must be provided to the needs for rotational objects. • Standard Instrumentation and Control Systems: Each test bed must be provided with an instrumentation panel to control engine operation. The instrument panel must include: a key ignition switch, operation light, ampere meter, oil pressure gauge, and water temperature gauge and tachometer. A throttle control must be provided in order to set engine speed. The original ECU (Electronic Control Unit) should be mounted next to the				

		Instrument panel. It must feature a transparent Plexiglas cover so as to view the ECU LED signal light. • Cooling System: The engine must be cooled by a standard type automotive water radiator that is matched to the engine size. A radiator guard must be provided for safety so as to prevent accidents from the radiator fan. The engine must have a thermostat for controlling engine temperature and a temperature meter for monitoring temperature level. • Electrical System: The engine must be provided with a 12 Volt battery, an alternator with voltage regulator output and charging during operation. A fuse box must be installed in order to protect the wiring harness, engine and instrumentation. The original vehicle wiring harnesses including the fuse box and relay grouping must be used along with the test instrument diagnostic port. • EFI Fuel System: The EFI System must come with complete sensors and actuators as originally fitted to the engine such as injector system, mass air flow sensor, throttle body valve, lambda sensor, fuel pressure regulator, engine temperature sensor, air intake temp sensor, rotational speed sensor, engine knock sensor, etc. The fuel system must include include a 10-liter fuel tank with fuel pump and filter. • Exhaust System: The engine must be provided with a matched exhaust system including exhaust manifold with silencer (muffler). • Engine: With cooling system including water pump/fan and radiator, EFI fuel system including fuel pump and fuel tank, ignition system, lubrication system including oil filter,				

		exhaust manifold with silencer (muffler), air filter, starter motor, electrical system including alternator with a voltage regulator and the ECU. • Instructional Material: The unit must be provided with a complete factory workshop manual covering all repair and maintenance aspects for the engine and transmission. • Modular Dynamometer Unit: The gasolinee ngine test bed must be specifically designed so that it can operate with the Modular Dynamometer System (MDS). EDUCATIONAL OBJECTIVES: • Familiarization with EFI Engine Components: Cooling system, Fuel System, Ignition System, Engine Control Unit and Sensors, starting and charging system. • Operate EFI Engine in normal operation and observe the conditions • Observe the ignition timing and analyze the engine timing at different rpm • Observe the operation of fuel system components and understanding the electrical connection of the fuel pump, fuel pump relay and main relay. • Perform electrical measurement of the fuel pump control circuit • Familiarization with Engine Control unit and Sensors. • Test and troubleshoot of fuel injectors • Test and troubleshoot ignition coil • Test and troubleshoot of Idle Air Control Valve (IACV). • Test and troubleshoot Camshaft Position Sensor • Test and troubleshoot Crankshaft Position Sensor • Test and troubleshoot Mass Air Flow Sensor (MAF) • Test and troubleshoot Throttle Position Sensor (TPS). • Reading trouble codes				

21	unit	**Unmanned Areal Vehicle with RTK base station/includes Battery and Battery Station** Technical Specifications: • 6-Directional Sensing & Positioning • O3 Enterprise Transmission • Night-Vision FPV Camera • 55-Min Max Flight Time • Multi-Payload Support • IP 55 Rating Inclusions: • 1 unit - Commercial Drone Aircraft • 1 unit - Remote Controller • 1 pc. - Intelligent Battery (Battery of remote) • 1 pc. - Carrying Case • 2 pcs. - Landing Gear • 1 pair - 2110s Propellers (Extra Propellers) • 1 set - Screws & Tools • 1 set - Cleaning Tools • 4 pcs. - Spare Gimbal Damper • 1 set - Rubber Port Cover Set • 1 set - Manuals • Battery Compatibility: Matrice 350 RTK, Matrice 300 RTK Weight: Approx. 1.35 kg Capacity: 5880 mAh Energy: 263.2 Wh Voltage: 44.76 V Type: Li-ion • Battery Station Specifications: USB-C Charging Port: 65W max output power Dimensions: 580 x 358 x 254 mm (L x W x H) Net Weight: Approx. 9.03 kg Output Power: 100-120 V (AC), 750 W; 220-240 V (AC), 992 W	2	650,000.00	1,300,000.00	

22	unit	**High-Precision Aerial LiDAR System** Key Features • LiDAR & RGB Cameras on a 3-Axis Gimbal • Small 1.6 x 4.7" Dot Size • Capture 240,000 Points per Second • 20MP RGB with 0.7-Second Image Interval • Highly-Accurate IMU System • Detection Range of 820 to 1476' • Waypoint, Aera & Linear Route Types • No Warm-Up Needed When Powered On Note: requires DJI Terra to process point cloud data	2	700,000.00	1,400,000.00	
23	unit	**RTK GNSS** •1808 Channels All constellation supported •Latest with AR Live Camera CAD Stake-out Technology •Latest with Fast fixed technology even in heavy canopies •Auto-IMU Tilt: 60° (Free Calibration) •With advanced Anti-magnetic Interference •Long-range capabilities up to 20km+++ without external radio •Pocket triple booster/radio repeater (3mm x 115cm) •With long-lasting battery and can be powered by solar or a standard powerbank •With Silicon cover for rover protection against scratches and bump •2TB Memory Drive •Pocket solar battery with 4 solar panels back-up for base receiver •Pocket car charger for base, rover and controller •IP Standard: IP68 fully waterproof and can be submerged in water Complete With: 1pc. SV2 Base 1pc. SV2 Rover 1pc. Android Rugged Controller	2	400,000.00	800,000.00	

		1pc. PCTECH All-in-One Licensed Surveying Software 1pc. Triple Antenna Booster 2pcs. UHF Antenna 1pc. Tribrach with adapter 1pc. Pole extender 2pcs. Charger for RTK 1pc. Charger for Controller 1pc. Bracket 1pc. Lightweight Carrying Case 1pc. Aluminum Tripod 1pc. Fiberpole 1pc. Pole Extender 1meter 1pc. RTK Powerbank				
24	unit	**TOTAL STATION** • 2" Angle Accuracy • 1000m Laser Prismless/Reflectorless • Up to 5000m Long-range with Single Prism • Trigger Key, Hot key for faster operation • Direct data plotting on main screen • Easy connectivity by USB and Bluetooth • Complete Surveyinh /Construction Programs Complete with : 1 pc Total Station 2 pcs Battery 1 pc Charger 1 pc Quick guide 1 pc Carrying Case 1 pc Prism with Target 1 pc Rangepole 3 meters 1 pc Aluminum Tripod	4	300,000.00	1,200,000.00	
25	unit	**3D PRINTER** TECHINICAL SPECIFICATIONS Dual Extruder Print : 11.6x9.4x9.4 inch/ 295x240x240 mm Machine Size (WxDxH) 23.9x23.5x18.3 inch/ 607x596x465 mm Power Supply Input : 1 00-240 V AC, 50/60 Hz 230 V @ 2 A Power Supply Output : 24 V DC, 350 W	1	4,000,000.00	4,000,000.00	

		Print Technology : FFF Print Head System : Independent Dual Extruders Filament Diameter : 1.75 mm XYZ Step Size : 0.78125, 0.78125, 0.078125 micron Print Head Travel Speed : 30 - 150 mm/s Build Plate : Flexible Steel Plate with Buildtak Max Build Plate Temperature : 110 °C Heated Bed Material : Silicone Build Plate Leveling : Mesh-leveling with Flatness Detection Supported Materials : "PLA/ ABS/ HIPS/ PC/ TPU/ TPE/ NYLON/ PETG/ ASA/ PP/ PVN Glass Fiber Infused/ Carbon Fiber Infused/ Metal Fill/ Wood Fill" Layer Height : 0.02 - 0.25 mm Nozzle Diameter : 0.4 mm (Default), 0.2/ 0.6/ 0.8/ 1.0 mm (Available) Hot End : V3P (V3 hotend with PTFE version) Max Nozzle Temperature : 300°c Connectivity : Wi-Fi, LAN, USB port, Live camera Noise Emission (Acoustic) : < 50 dB(A) when building Operating AmbientTemperature : 15 - 30 °c, 10 - 90% RH non-condensing Storage Temperature : -25 to 55 °C, 10 - 90% RH non-condensing Technical Certifications : CB, CE, FCC, RoHS, RCM Filter : HEPA filter with activated charcoal Slicing Software : ideaMaker Supported File Types : STL/ OBJ/ 3MF Supported OS : Windows/ macOS/ Linux Machine Code Type : GCODE User Interface: 7 inch Touch Screen Network: Wi-Fi, Ethernet Resume Print after Power Outage: Firmware recording no need for battery installation Screen Resolution: 1024x600 Motion Controller: Atmel ARM Cortex-M4 120MHz FPU				

		Logic Controller : NXP ARM Cortex-A9 Quad 1 GHz Memory : 1 GB Onboard Flash : 8 GB OS : Embedded Linux Ports : USB 2.0x2, Ethernetx1				
26	unit	**CNC VERTICAL MILLING MACHINE** Technical Specifications: Controller: Equipped with the funtions of required for a standard machining center, 10.4" LCD Display Spindle motor: 7.5/11kw X/Y/Z axis motor: 1.8/1.8/3.0kw Coolant pump motor: 600w Magazine motor: 400w Chip conveyor motor: 600w Spindle driven type: Direct Spindle speed: 10,000rpm Spindle taper: BT-40BT Spindle diameter: Φ120mm Spindle bearing grade: P4 X axis travel: 750 (29.5")mm Y axis travel: 500 (19.7")mm Z axis travel: 500 (19.7")mm Spindle nose to table: 100-600 (3.9"-23.6")mm Spindle center to z-rail: 580 (22.8")mm Ballscrew grade: C3- X/Y/Z ballscrew: Φ40xP16 X/Y/Z linear guideway: 30(4)/30(4)/35(4) X/Y/Z cutting feed rate: 36/36/36mm X/Y/Z rapid feed rate: 10/10/10mm Table size: 850x500 (33.5"x19.7")mm T-slot (numberxwidthxpitch) 5x14x100 (5x0.6"x3.9")mm Maximum table load: 500kg Magazine type: Arm Tool capacity: 24pcs Tool selection: Two-way Selection Maximum tool length/ diameter: Φ150x300mm Maximum tool weight: 7kg Tool shank: 45 (90) degree	1	11,000,000.00	11,000,000.00	

		Chip conveyor: Dual-screw Air pressure: ≧6.5kg/cm² Power voltage: 220/380V Floor space: (LxWxH) 2621x2630x2496mm Machine weight: 4000kg Controller for a standard machining center , 10.4" LCD display v RS232 interface connector v Part program storage size 2MB v BT-40 belt/direct drive spindle v Rigid tapping v High pressure coolant system v Spindle coolant system v Spindle air blast system v Tool magazine (arm type) v T-slot work table v Heat exchanger for electrical cabinet v M30 auto power off system v LED work light v MPG hand wheel v Chip conveyor and chip cart v Foundation leveling pads v Fully enclosed guarding v Advanced auto lubrication system v Coolant pump v Three color warning work light v Maintenance tool kit v Operation & maintenance manuals v 30kVA solid state power conditioner (three-phase output) v Air compressor v Raw material plate 6061 / 300x120x80mm ER collet chuck style tool holder ER collet ER25-10 Drill SUS-D 10.0mm ER collet chuck style tool holder BT40-ER25 Milling tool S2203 / 10R*10D*75L ER collet chuck style tool holder BT40-ER25 ER collet ER25 Chamfering (10mm) ECSC09 With Milling cutting blade				
27	unit	**PRECISION SURFACE AND PROFILE GRINDING MACHINE** Technical Specifications:	1	12,000,000.00	12,000,000.00	

		(Working Surface Area 150*450 MM) Permanent-Magnetic Chuck 150*450Mm Fine Pole Pitch (Pitch: 1+1) Spare Grinding Wheel Adaptor Coolant System And Splash Guard 10Kva Solid State Power Conditioner (Three-Phase Output)				
28	unit	**CNC LATHE MACHINE WITH FANUC CONTROL OITFP-Plus** Technical Specifications: Controller FANUC 0i-TF Plus Bed swing diameter 450 (17.7) mm (inch) Saddle swing diameter 280 (11.0) mm (inch) Maximum turning diamteter 260 (10.2) mm (inch) Maximun turning length 300 (11.8) mm (inch) Bar capacity 42 (1.7) mm (inch) Power chuck diameter 6" Spindle motor power 7.5/11 kw Spindle speed 5000 rpm Spindle nose taper A2-5 ASA Spindle bearing diameter 90 (3.5) mm (inch) Spindle taper 45311 X/Z-axis servo motor 1.2/1.2 kw X-axis travel 125+20 (4.9+0.8) mm (inch) Z-axis travel 300 (11.8)mm (inch) X-axis rapid feed rate 24 m/min Z-axis rapid feed rate 30 m/min Slide way type Linear slideway X/Z-axis ballscrew/pitch 32/32 (P8/P10) mm X/Z-axis slideway width 35/35 mm Turret driven type Hydraulic Tool capacity 8 T OD tool shank size 25 (1.0) mm (inch) ID tool shank size 32 (1.3) mm (inch) Tailstock travel positioning Hydraulic Tailtsock quill taper diameter 70 (2.8) mm (inch) Tailstock quill travel 80 (3.1) mm (inch)	1	15,000,000.00	15,000,000.00	

		Tailstock base travel 200 (7.9) mm (inch) Quill taper size MT#4 MT Hydraulic tank capacity 30 liter Coolant tank capacity 145 liter Floor space (LxWxH) 2790x1542x1713 mm (inch) Machine weight 3300 kg CRITICAL COMPONENT SUPPLIER Controller FANUC Spindle motor and servo motors FANUC X/Z-axis ballscrew HIWIN Coupling KTR Bearing NSK Hollow hydraulic cylinder and 3-jaw chuck CHANDOX Turret LS Telescopic cover LUFEN Water pump STAIRS Heat exchanger SPINFLO Chip conveyor and chip cart FONGEI STANDARD ACCESSORIES FANUC 0i-TF Plus controller 10.4" color LCD display v Graphic function (Manual Guide 0i) v Part program storage size (2MB) v Registered program (1000) v Automatic data backup v Hydraulic hollow cylinder for chuck v Hydraulic 3-jaws chuck v Standard soft jaws v Hydraulic power supply unit v Turret (tool holder and sleeve package) v Facing tool holder Φ25 mm: 1 sets v Boring bar holder Φ32 (40)mm: 5 sets v Boring bar socket Φ32 (40)mm (8/25mm): 1 set v Boring bar socket Φ32 (40)mm (10/12/16/20mm): 2 sets v Hydraulic tailstock v Coolant pump (3kg/cm2) v Roll out coolant tank v LED work light v Three color warning work light v Heat exchanger for electric cabinet v Advanced auto lubrication system v				

		Belt type chip conveyor and chip cart (right discharge) v Foot switch for chuck operation v Fully enclosed guarding v Foundation leveling pads 6 Maintenance tool kit v Operation & maintenance manuals v 1-year warranty on machine parts v 30kVA solid state power conditioner (three-phase output) v MACHINE TOOLS Rod S50C / 63.5x15L : 5 Tooling fixed block 25*90mm : 5 Tooling fixed plate 25*90mm : 5 Soft jaws 8" : 5 OD tool MTJNR-2525M : 5 Blade TNMG160404R : 5				
29	unit	**GENERATION EDM with SE Technology** Technical Specifications: Power Stabilizer5KVA (220V) Oil Chiller ECEA-40PS1(220V) Fast Chuck (with centering plate*1、draw bar*1) Magnetic Chuck (Fine Pole 150*300mm) Special Carbide circuit (SH2) (Speed up circuit for tungsten-carbide machining) Vertical Centering Adjustable chuck (collect ER32 Ø20mm*1 (with EROWAcentering plate、draw bar) Paper Filter Round Copper Electrode(Ø20-100mm) Steel Plate (S45C) (150x100x11mm) Dial Gauge (dial Indicator 0.002mm grade x 2 pcs and mechanical arm+ magnetic base x 1 pce)	1	11,000,000.00	11,000,000.00	
30	unit	**PRINTING PRESS SETUP** A3 COLOUR MULTIFUNCTION PRINTER WITH FINISHER AND HIGH CAPACITY TRAY	1	6,050,000.00	6,050,000.00	

		PRINTING Printing Technology: PrecisionCoreTM Line Head Inkjet Technology Nozzle Configuration: 7,230 nozzles each colour (Black, Cyan, Magenta, Yellow) Maximum Resolution: 600 x 2,400 dpi Minimum Ink Droplet Volume: 3.8 pl Print Speed (Black and Colour): • ISO 24734, A4, Simplex / Duplex: Approx. 60 ipm / 60 ipm • ISO 24734.2, A3, Simplex / Duplex: Approx. 36 ipm / 20 ipm • First Page Out Time: Approx. 6.1 sec / 6.1 sec Printer Language: ESC/P-R, ESC/Page Maximum Monthly Duty Cycle: 384,000 pages per month Memory Capacity: Memory Capacity HDD Capacity: 320GB (Encrypted) Automatic 2-sided printing: Yes COPYING Copy Speed (Black and Colour): • ISO 29183, A4, Simplex (Flatbed): Approx. 60 ipm • ISO 24735, A4, Simplex (ADF 1:1): Approx. 60 ipm • ISO 24735, A4, Duplex (ADF 1:2 / 2:2): Approx. 60 ipm Maximum Copies from Standalone: 9,999 copies Max Copy Resolution: 600 x 1,200 dpi Reduction/Enlargement: 25 - 400%, Auto Fit Function Maximum Copy Size: A3 SCANNING Scanner Type: Flatbed colour image scanner Sensor Type: Colour CIS x 2 Optical Resolution: 600 x 600 dpi Maximum Scan Area: 297 x 431.8 mm (11.7 x 17") Scan Features: Scan to Network Folder/FTP, Scan to Email, Scan to Memory Device,				

		Scan to Computer (Document Capture Pro / Document Capture Pro Server), Scan to Computer (WSD), Scan to Computer (WSD), Scan to Cloud (Epson Connect) Scan Speed (Monochrome and Colour): • 200 dpi Flatbed: A4 Landscape: 3.0 sec, A3: 4.0 sec • ADF (Simplex / Duplex): A4: 60 ppm / 120 ipm • (ISO17991, Scan to Folder): A3: 30 ppm ADF FUNCTION Support Paper Thickness: 52 - 128 g/m2 Paper Capacity: 150 pages (80 g/m2 Automatic 2-sided Scan / Copy / Fax: Yes (1-pass) PAPER HANDLING Paper Feed Method: Friction feed Number of Paper Trays (Standard): 3 (Paper Cassettes: 2, MP Tray: 1) • Paper Hold Capacity: Up to 1,150 sheets (80 g/m2) (Paper Cassettes 1 - 2: 500 x 2 + MP Tray: 150 sheets) • Maximum Input Capacity: Up to 5,150 sheets (80 g/m2) (Paper Cassettes 1 - 4: 500 x 4 + MP Tray: 150 sheets + High Capacity Feeder Unit: 3,000 sheets) • Output Capacity: Up to 500 sheets (80 g/m2) Support Paper Weight: 52 – 300 g/m2 USB: USB 3.0 Network: Ethernet INCLUSIONS: • 1 SET OF INK OTHER REQUIREMENTS: • Lifetime free service warranty • Regular Monthly Preventive Maintenance (PMS) ELECTRIC PROGRAM-CONTROL PAPER GUILLOTINE				

		Driven Type: Electric Blade Material: Stainless Steel Max Cuttingthickness: 80mm Trademark: Front Classification: Single-blade Cutter Type: Living Paper Cutting Machine Computerized Cutting Machine INCLUSIONS: • Extra Blade • Cutting Stick • Digital Duplicator Resolution: 300x600 dpi Feeding Capacity: 1300 sheets (64gsm) 55kg (high grade paper) Image Area: B4 Image Modes: Text, Text Photo, Photo, & Pencil Weight: 79 kg Print Speed: 60,90,130 ppm (3 steps) Paper Size: Up to A3 size Others: With built-in Computer Interface, double feed detection INCLUSIONS: • INITIAL INK AND MASTER ROLL • PEDESTAL AUTOMATED BOOK BINDING MACHINE Machine type: Floor model The Number of Clamp: 1 Type of Binding: Binding with a cover, binding without a cover Book Block: • Binding thickness: 1 to 51 mm +cover thickness • Maximum size: 360 (L) x 320 (H) mm • Minimum size: 120 (L) x 120 (H) mm • Book block form: Sheet, single-folded, doublefolded • Paper type: - Fine:2 to 157 g/m² - Art/Coated:79 to 157 g/m² Cover:				

		• Feeding method: Belt suction(Separating air, separator manual non-step adjustment) • Maximum size: 360 (L) x 696 (W) mm • Minimum size: 120 (L) x 250 (W) mm • Paper type: - Fine: 81.4 to 302 g/m² - Art/Coated:104.7 to 302 g/m² • Stack height: 70 mm if the length is 170 mm or shorter, 40 mm Maximum Binding Speed: 525 cycle/hour Milling: Maximum 4 mm(0.16 inch) Manual 6 step adjustment: 0, 0.5, 1.0, 2, 3, 4 mm(0, 0.02, 0.04, 0.08, 0.12, 0.16 inch) Roughening: 2 pieces Gluing: • Glue thickness: 0.5 to 2.25 mm • Drum: 2 + spine meter roller • Side glue: Roller method •Glue cutting: Solenoid-driven • Warm-up period:Approximately 30 minutes Noise Emission: 76 dB or less (Sound pressure level at peak: 114.2 dB) Dimensions: 2,790(W) x 928(D) x 1,343(H) mm Weight: 712.5kg INCLUSIONS: • GLUE 3KGS AUTOMATIC AIR SUCTION FOLDER MACHINE Feeding Method: Fan motor belt suction method Regular Paper Size: A3 to B6 Range of Paper Size: • Max.311(W) x 648.0(L)mm • Min.120(W) x 182(L)mm Paper Type: • Fine quality Paper length 457.2 mm or less : 52.3 to 157.0 gsm Paper length more than 457.2 mm : 81.4 to 157.0 gsm • Art/Coated				

		Paper length 457.2 mm or less : 73.3 to 157.0 gsm Paper length more than 457.2 mm : 104.7 to 157.0 gsm Process Speed: 310 sheets per minute (A4/lengthways single fold) Feeding Capacity: 50mm Folding mode: Single fold, Double fold, Irregular Accordion fold, Letter fold, Accordion fold, Gate fold, Specific cross fold, Other non-standard fold Dimensions: • In use:1,353(W)×587(D)×614(H) mm • In storage:900(W)×587(D)×614(H) mm Weight: 71kg Standard Functions: Color LCD touch panel, Side Air fan, Double feed detection, Misfeed detection, Paper jam detection, Batch (interval) function INCLUSIONS: • 2 units of 3 KVA Voltage Stabilizer • 1 unit core i7 desktop Computer				
31	unit	**BIOSAFETY CABINET** Technical Specifications: External Size (W*D*H) : 1000*705*1770mm Internal Size (W*D*H) : 905*595*560mm Work Surface Height : 750mm Material : Main Body: Cold-rolled steel with anti-bacteria powder coating Work Table: 304 stainless steel Front& Side Windows : 5mm toughened glass Manual Max Opening : 320mm Pre Opening : Polyester fiber, Washable Hepa Filter : 99.99% efficiency at 0.3μm Airflow Velocity : 0.3 – 0.5 m/s, speed adjustable Noise : ≤65dB 20W*2 UV 20W*2	3	750,000.00	2,250,000.00	

		Emission of 253.7 nanometers, with UV timer Illumination Lamp : 40W*1 Illumination : ≥1000lux Shelf with IV Bar : Stainless steel, 502*150*50mm (W*D*H) Consumption : 300w Waterproof Socket : Two, total load≤500W Power Supply : AC220V±10%, 50/60Hz: 110V±10%, 60Hz Standard Accessory : Electric Height adjustable base stand Gross Weight : 178kg Package Size (W*D*H) : 1150*930*1450mm				

_____ _____

[signature] *[in the capacity of]*

Duly authorized to sign Bid for and on behalf of _____

Section VIII. Checklist of Technical and Financial Documents

Notes on the Checklist of Technical and Financial Documents

The prescribed documents in the checklist are mandatory to be submitted in the Bid, but shall be subject to the following:

a. GPPB Resolution No. 09-2020 on the efficient procurement measures during a State of Calamity or other similar issuances that shall allow the use of alternate documents in lieu of the mandated requirements; or

b. Any subsequent GPPB issuances adjusting the documentary requirements after the effectivity of the adoption of the PBDs.

The BAC shall be checking the submitted documents of each Bidder against this checklist to ascertain if they are all present, using a non-discretionary "pass/fail" criterion pursuant to Section 30 of the 2016 revised IRR of RA No. 9184.

Checklist of Technical and Financial Documents

I. TECHNICAL COMPONENT ENVELOPE

Class "A" Documents

Legal Documents

☐ (a) Valid PhilGEPS Registration Certificate (Platinum Membership) (all pages) **in accordance with Section 8.5.2 of the IRR**;

Technical Documents

☐ (b) Statement of the prospective bidder of all its ongoing government and private contracts, including contracts awarded but not yet started, if any, whether similar or not similar in nature and complexity to the contract to be bid; **and**

☐ (c) Statement of the bidder's Single Largest Completed Contract (SLCC) similar to the contract to be bid, except under conditions provided for in Sections 23.4.1.3 and 23.4.2.4 of the 2016 revised IRR of RA No. 9184, within the relevant period as provided in the Bidding Documents; **and**

☐ (d) Original copy of Bid Security. If in the form of a Surety Bond, submit also a certification issued by the Insurance Commission **or** Original copy of Notarized Bid Securing Declaration; **and**

☐ (e) Conformity with the Technical Specifications, which may include production/delivery schedule, manpower requirements, and/or after-sales/parts, if applicable; **and**

☐ (f) Original duly signed Omnibus Sworn Statement (OSS) **and** if applicable, Original Notarized Secretary's Certificate in case of a corporation, partnership, or cooperative; or Original Special Power of Attorney of all members of the joint venture giving full power and authority to its officer to sign the OSS and do acts to represent the Bidder.

(g) Other requirements

1. Warranty: One (1) year warranty against factory defects/workmanship and Two (2) years warranty on services
2. After Sales Services: (a) Free trainer's training at supplier's training center before the delivery of the equipment or at Bicol University, (b) Free Semi-Annual Re-training with certificate, on request. (c) Free Consultation/Seminar, on request (d) Free Annual product inspection, on request (e) Free Product demonstration, on Request, and (f) Free Seminar for Students, on request.
3. Bidder must be an Authorized Distributor/ Reseller of the bid item/s & authorize to provide technical support & must attach documents to support such claim.
4. Supplier shall provide well-trained and very competent technical personnel to perform the installation, commissioning, trainer's training and maintenance check of the equipment as necessary.
5. Supplier confirms the availability of manpower to perform such functions.
6. Supplier should attach the list of manpower requirements
7. General Conditions:
   a. Suppliers must submit Letter of intent to join the bidding with product catalog of item/s being offered,
   b. Must attached site inspection certification issued by the end-user,
   c. Suppliers may offer higher specifications provided it will not affect its compatibility, functionality, purpose & its related laboratory experiments

with the other specifications items. Below the minimum required specifications will be ground for disqualification, and

d. All electrical wirings for the installation of the equipment as well as the LAN connections & other incidental costs needed to make the equipment functional should be shouldered by the supplier.

Financial Documents

☐ (h) The prospective bidder's computation of Net Financial Contracting Capacity (NFCC) **or** **A** committed Line of Credit from a Universal or Commercial Bank in lieu of its NFCC computation.

Class "B" Documents

☐ (i) If applicable, a duly signed joint venture agreement (JVA) in case the joint venture is already in existence **or** duly notarized statements from all the potential joint venture partners stating that they will enter into and abide by the provisions of the JVA in the instance that the bid is successful.

II. FINANCIAL COMPONENT ENVELOPE

☐ (j) Original of duly signed and accomplished Financial Bid Form; **and**

☐ (k) Original of duly signed and accomplished Price Schedule(s).

Other documentary requirements under RA No. 9184 (as applicable)

☐ (l) *[For foreign bidders claiming by reason of their country's extension of reciprocal rights to Filipinos]* Certification from the relevant government office of their country stating that Filipinos are allowed to participate in government procurement activities for the same item or product.

☐ (m) Certification from the DTI if the Bidder claims preference as a Domestic Bidder or Domestic Entity.

Bid Form

Date : _____
Project Identification No. :

To: BICOL UNIVERSITY, LEGAZPI CITY

Having examined the Philippine Bidding Documents (PBDs) including the Supplemental or Bid Bulletin Numbers *[insert numbers],* the receipt of which is hereby duly acknowledged, we, the undersigned, offer to ***Purchase of Laboratory Equipment Charged to GAA 2024 Laboratories Modernization at Bicol University East Campus*** conformity with the said PBDs for the sum of *[total Bid amount in words and figures]* or the total calculated bid price, as evaluated and corrected for computational errors, and other bid modifications in accordance with the Price Schedules attached herewith and made part of this Bid. The total bid price includes the cost of all taxes, such as, but not limited to: *[specify the applicable taxes, e.g. (i) value added tax (VAT), (ii) income tax, (iii) local taxes, and (iv) other fiscal levies and duties],* which are itemized herein or in the Price Schedules,

If our Bid is accepted, we undertake:

a. to deliver the goods in accordance with the delivery schedule specified in the Schedule of Requirements of the Philippine Bidding Documents (PBDs);

b. to provide a performance security in the form, amounts, and within the times prescribed in the PBDs;

c. to abide by the Bid Validity Period specified in the PBDs and it shall remain binding upon us at any time before the expiration of that period.

Until a formal Contract is prepared and executed, this Bid, together with your written acceptance thereof and your Notice of Award, shall be binding upon us.

We understand that you are not bound to accept the Lowest Calculated Bid or any Bid you may receive.

We certify/confirm that we comply with the eligibility requirements pursuant to the PBDs.

The undersigned is authorized to submit the bid on behalf of *[name of the bidder]* as evidenced by the attached *[state the written authority]*.

We acknowledge that failure to sign each and every page of this Bid Form, including the attached Schedule of Prices, shall be a ground for the rejection of our bid.

Name: _____
Legal capacity: _____
Signature: _____

Duly authorized to sign the Bid for and behalf of: _____

Date: _____

For Goods Offered From Within the Philippines
Purchase of Laboratory Equipment Charged to GAA 2024 Laboratories Modernization at Bicol University East Campus

Name of Bidder _____

1	2	3	4	5	6	7	8	9	10
Item	Description	Country of origin	Quantity	Unit price EXWper item	Transportation and Insurance and all other costs incidental to delivery, per item	Sales and other taxes payable if Contract is awarded, per item	Cost of Incidental Services, if applicable, per item	Total Price, per unit (col 5+6+7+8)	Total Price delivered Final Destination (col 9) x (col 4)

_____ _____
[signature] *[in the capacity of]*

Duly authorized to sign Bid for and on behalf of _____

NET FINANCIAL CONTRACTING CAPACITY (NFCC)
Purchase of Laboratory Equipment Charged to GAA 2024 Laboratories Modernization at Bicol University East Campus

A. Summary of the Applicant Supplier's/Distributor's/Manufacturer's assets and liabilities on the basis of the attached income tax return and audited financial statement, stamped "RECEIVED" by the Bureau of Internal Revenue or BIR authorized collecting agent, for the immediately preceding year.

		Year 20__
1.	Total Assets	
2.	Current Assets	
3.	Total Liabilities	
4.	Current Liabilities	
5.	Net Worth (1-3)	
6.	Net Working Capital (2-4)	

B. The Net Financial Contracting Capacity (NFCC) based on the above data is computed as follows:

NFCC = K (current asset – current liabilities) minus value of all outstanding works under ongoing contracts including awarded contracts yet to be started

NFCC = P _____

K = 15 for a contract duration of one year or less

Herewith attached are certified true copies of the income tax return and audited financial statement: stamped "RECEIVED" by the BIR or BIR authorized collecting agent for the immediately preceding year.
Submitted by:

_____
Name of Supplier / Distributor / Manufacturer

_____
Signature of Authorized Representative
Date :_____
NOTE:

1. If Partnership or Joint Venture, each Partner or Member Firm of Joint Venture shall submit the above requirements.

COMMITTED LINE OF CREDIT CERTIFICATE

Date: _____

Dr. BABY BOY BENJAMIN D. NEBRES, III
President, Bicol University
Legazpi City

CONTRACT/PROJECT	:	***Purchase of Laboratory Equipment Charged to GAA 2024 Laboratories Modernization at Bicol University East Campus***
COMPANY/FIRM	:	_____
ADDRESS	:	_____
BANK/FINANCING INSTITUTION	:	_____
ADDRESS	:	_____
AMOUNT	:	_____

This is to certify that the above Bank/Financing Institution with business address indicated above, commits to provide the <*Supplier/Distributor/Manufacturer/Contractor*>, if awarded the above-mentioned Contract, a credit line in the amount specified above which shall be exclusively used to finance the performance of the above-mentioned contract subject to our terms, conditions and requirements.

The credit line shall be available within fifteen (15) calendar days after receipt by the <*Supplier/Distributor/Manufacturer/Contractor*> of the Notice of Award and such line of credit shall be maintained until the project is completed by the <*Supplier/Distributor/Manufacturer/Contractor*>.

This Certification is being issued in favor of said <*Supplier/Distributor/Manufacturer/Contractor*> in connection with the bidding requirement of Bicol University for the above-mentioned Contract. We are aware that any false statements issued by us make us liable for perjury.

Name and Signature of Authorized
Financing Institution Officer : _____
Official Designation : _____

Concurred By:
Name & Signature of <*Supplier/Distributor/Manufacturer/Contractor*>'s
Authorized Representative : _____
Official Designation : _____

Note:
The amount committed should be machine validated.

ACKNOWLEDGMENT

SUBSCRIBED AND SWORN to before me this _____ day of _____, 2022, affiant exhibited to me his/her Community Tax Certificate No. _____ issued on _____ at _____, Philippines.

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Omnibus Sworn Statement (Revised)

[shall be submitted with the Bid]

REPUBLIC OF THE PHILIPPINES)
CITY/MUNICIPALITY OF _____) S.S.

AFFIDAVIT

I, [Name of Affiant], of legal age, [Civil Status], [Nationality], and residing at [Address of Affiant], after having been duly sworn in accordance with law, do hereby depose and state that:

1. *[Select one, delete the other:]*

   [If a sole proprietorship:] I am the sole proprietor or authorized representative of [Name of Bidder] with office address at [address of Bidder];

   [If a partnership, corporation, cooperative, or joint venture:] I am the duly authorized and designated representative of [Name of Bidder] with office address at [address of Bidder];

2. *[Select one, delete the other:]*

   [If a sole proprietorship:] As the owner and sole proprietor, or authorized representative of [Name of Bidder], I have full power and authority to do, execute and perform any and all acts necessary to participate, submit the bid, and to sign and execute the ensuing contract for [Name of the Project] of the [Name of the Procuring Entity], as shown in the attached duly notarized Special Power of Attorney;

   [If a partnership, corporation, cooperative, or joint venture:] I am granted full power and authority to do, execute and perform any and all acts necessary to participate, submit the bid, and to sign and execute the ensuing contract for [Name of the Project] of the [Name of the Procuring Entity], as shown in the attached [state title of attached document showing proof of authorization (e.g., duly notarized Secretary's Certificate, Board/Partnership Resolution, or Special Power of Attorney, whichever is applicable;)];

3. [Name of Bidder] is not "blacklisted" or barred from bidding by the Government of the Philippines or any of its agencies, offices, corporations, or Local Government Units, foreign government/foreign or international financing institution whose blacklisting rules have been recognized by the Government Procurement Policy Board, **by itself or by relation, membership, association, affiliation, or controlling interest with another blacklisted person or entity as defined and provided for in the Uniform Guidelines on Blacklisting;**

4. Each of the documents submitted in satisfaction of the bidding requirements is an authentic copy of the original, complete, and all statements and information provided therein are true and correct;

5. [Name of Bidder] is authorizing the Head of the Procuring Entity or its duly authorized representative(s) to verify all the documents submitted;

6. *[Select one, delete the rest:]*

[If a sole proprietorship:] The owner or sole proprietor is not related to the Head of the Procuring Entity, Procurement Agent if engaged, members of the Bids and Awards Committee (BAC), the Technical Working Group, and the BAC Secretariat, the head of the Project Management Office or the end-user unit, and the project consultants by consanguinity or affinity up to the third civil degree;

[If a partnership or cooperative:] None of the officers and members of *[Name of Bidder]* is related to the Head of the Procuring Entity, Procurement Agent if engaged, members of the Bids and Awards Committee (BAC), the Technical Working Group, and the BAC Secretariat, the head of the Project Management Office or the end-user unit, and the project consultants by consanguinity or affinity up to the third civil degree;

[If a corporation or joint venture:] None of the officers, directors, and controlling stockholders of *[Name of Bidder]* is related to the Head of the Procuring Entity, Procurement Agent if engaged, members of the Bids and Awards Committee (BAC), the Technical Working Group, and the BAC Secretariat, the head of the Project Management Office or the end-user unit, and the project consultants by consanguinity or affinity up to the third civil degree;

7. *[Name of Bidder]* complies with existing labor laws and standards; and

8. *[Name of Bidder]* is aware of and has undertaken the responsibilities as a Bidder in compliance with the Philippine Bidding Documents, which includes:

    a. Carefully examining all of the Bidding Documents;
    b. Acknowledging all conditions, local or otherwise, affecting the implementation of the Contract;
    c. Making an estimate of the facilities available and needed for the contract to be bid, if any; and
    d. Inquiring or securing Supplemental/Bid Bulletin(s) issued for the *[Name of the Project]*.

9. *[Name of Bidder]* did not give or pay directly or indirectly, any commission, amount, fee, or any form of consideration, pecuniary or otherwise, to any person or official, personnel or representative of the government in relation to any procurement project or activity.

10. **In case advance payment was made or given, failure to perform or deliver any of the obligations and undertakings in the contract shall be sufficient grounds to constitute criminal liability for Swindling (Estafa) or the commission of fraud with unfaithfulness or abuse of confidence through misappropriating or converting any payment received by a person or entity under an obligation involving the duty to deliver certain goods or services, to the prejudice of the public and the government of the Philippines pursuant to Article 315 of Act No. 3815 s. 1930, as amended, or the Revised Penal Code.**

IN WITNESS WHEREOF, I have hereunto set my hand this __ day of ___, 20__ at _____, Philippines.

[Insert NAME OF BIDDER OR ITS AUTHORIZED REPRESENTATIVE]
[Insert signatory's legal capacity]
Affiant

[Jurat]
[Format shall be based on the latest Rules on Notarial Practice]

REPUBLIC OF THE PHILIPPINES)
CITY OF _____) S.S.

x----------x

BID SECURING DECLARATION
Invitation to Bid:

To: *BICOL UNIVERSITY, LEGAZPI CITY*

I/We, the undersigned, declare that:

1. I/We understand that, according to your conditions, bids must be supported by a Bid Security, which may be in the form of a Bid-Securing Declaration.

2. I/We accept that: (a) I/we will be automatically disqualified from bidding for any contract with any procuring entity for a period of two (2) years upon receipt of your Blacklisting order; and, (b) I/we will pay the applicable fine provided under Section 6 of the Guidelines on the Use of Bid Securing Declaration, within fifteen (15) days from receipt of the written demand by the procuring entity for the commission of acts resulting to the enforcement of the bid securing declaration under Sections 23.1(b), 34.2, 40.1 and 69.1, except 69.1(f), of the IRR of RA 9184; without prejudice to other legal action the government may undertake.

3. I/We understand that this Bid Securing Declaration shall cease to be valid on the following circumstances:

   (a) Upon expiration of the bid validity period, or any extension thereof pursuant to your request;

   (b) I am/we are declared ineligible or post-disqualified upon receipt of your notice to such effect, and (i) I/we failed to timely file a request for reconsideration or (ii) I/we filed a waiver to avail of said right;

   (c) I am/we are declared the bidder with the Lowest Calculated Responsive Bid, and I/we have furnished the performance security and signed the Contract.

IN WITNESS WHEREOF, I/We have hereunto set my/our hand/s this ____ day of *[month] [year]* at *[place of execution]*.

[Insert NAME OF BIDDER'S AUTHORIZED REPRESENTATIVE]
[Insert Signatory's Legal Capacity]
Affiant

SUBSCRIBED AND SWORN to before me this ___ day of *[month] [year]* at *[place of execution],* Philippines. Affiant/s is/are personally known to me and was/were identified by me through competent evidence of identity as defined in the 2004 Rules on Notarial Practice (A.M. No. 02-8-13-SC). Affiant/s exhibited to me his/her [insert type of government identification card used], with his/her photograph and signature appearing thereon, with no. _____ and his/her Community Tax Certificate No. _____ issued on ____ at _____.

Witness my hand and seal this ___ day of *[month] [year]*.

NAME OF NOTARY PUBLIC
Serial No. of Commission _____
Notary Public for _____ until _____
Roll of Attorneys No. _____
PTR No. _____ *[date issued], [place issued]*
IBP No. _____ *[date issued], [place issued]*

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List of all Ongoing Government & Private Contracts including contracts awarded but not yet started

1. Purchase of Laboratory Equipment Charged to GAA 2024 Laboratories Modernization at Bicol University East Campus

Business Name: _____
Business Address: _____

Name of Contract/ Project Cost	***a.*** **Owner's Name** b. Address c. Telephone Nos.	Nature of Work	**Bidder's Role**		***a.*** **Date Awarded** b. Date Started c. Date of Completion	% of Accomplishment		Value of Outstanding Works / Undelivered Portion
			Description	%		**Planned**	**Actual**	
Government								
Private								

Note: This statement shall be supported with:
1.Notice of Award and/or Contract
2.Notice to Proceed (if available)

Submitted by: _____
(Printed Name & Signature)

Designation: _____
Date: _____

Statement of Single Largest Completed Contract (SLCC)

1. ***Purchase of Laboratory Equipment Charged to GAA 2024 Laboratories Modernization at Bicol University East Campus***

Business Name: _____
Business Address: _____

Contract Details	Nature of Work	Bidder's Role		Contract Cost & Duration	Start of Contract & Completion
		Description	%		
Name:				Amount at Award:	Date Awarded:
Owner:				Amount at Completion:	Date Started:
Address/Contract Information:				Contract Duration:	Date Completed

Note: This statement shall be supported with:

1. Contract or Purchase Order
2. Certificate of Completion or Certificate of Acceptance or any equivalent documents.

Submitted by: _____
(Printed Name & Signature)

Designation: _____
Date: _____

SEALING AND MARKING OF PROPOSALS