



## RETURN BIDS TO:

## RETOURNER LES SOUMISSIONS À:

Bid Receiving Public Works and Government  
Services Canada/Réception des soumissions  
Travaux publics et Services gouvernementaux  
Canada

Pacific Region

401 - 1230 Government Street  
Victoria, B.C.

V8W 3X4

Bid Fax: (250) 363-3344

## REQUEST FOR PROPOSAL DEMANDE DE PROPOSITION

**Proposal To: Public Works and Government  
Services Canada**

We hereby offer to sell to Her Majesty the Queen in right  
of Canada, in accordance with the terms and conditions  
set out herein, referred to herein or attached hereto, the  
goods, services, and construction listed herein and on any  
attached sheets at the price(s) set out therefor.

**Proposition aux: Travaux Publics et Services  
Gouvernementaux Canada**

Nous offrons par la présente de vendre à Sa Majesté la  
Reine du chef du Canada, aux conditions énoncées ou  
incluses par référence dans la présente et aux annexes  
ci-jointes, les biens, services et construction énumérés  
ici sur toute feuille ci-annexée, au(x) prix indiqué(s).

**Comments - Commentaires**

**Vendor/Firm Name and Address**

**Raison sociale et adresse du**

**fournisseur/de l'entrepreneur**

**Issuing Office - Bureau de distribution**

Public Works and Government Services Canada - Pacific  
Region

401 - 1230 Government Street

Victoria, B. C.

V8W 3X4

<b>Title - Sujet</b> Weapons Engineering Technician Trai Weapons Engineering Technical Training	
<b>Solicitation No. - N° de l'invitation</b> W0103-229031/A	<b>Date</b> 2022-01-26
<b>Client Reference No. - N° de référence du client</b> W0103-229031	
<b>GETS Reference No. - N° de référence de SEAG</b> PW-\$VIC-258-8341	
<b>File No. - N° de dossier</b> VIC-1-44109 (258)	<b>CCC No./N° CCC - FMS No./N° VME</b>
<b>Solicitation Closes - L'invitation prend fin</b> <b>at - à 02:00 PM</b> Pacific Standard Time PST <b>on - le 2022-02-15</b> Heure Normale du Pacifique HNP	
<b>F.O.B. - F.A.B.</b> Specified Herein - Précisé dans les présentes <b>Plant-Usine:</b> <input type="checkbox"/> <b>Destination:</b> <input type="checkbox"/> <b>Other-Autre:</b> <input checked="" type="checkbox"/>	
<b>Address Enquiries to: - Adresser toutes questions à:</b> Cowie, Angela	<b>Buyer Id - Id de l'acheteur</b> vic258
<b>Telephone No. - N° de téléphone</b> (250) 217-2150 ( )	<b>FAX No. - N° de FAX</b> ( ) -
<b>Destination - of Goods, Services, and Construction:</b> <b>Destination - des biens, services et construction:</b> DEPARTMENT OF NATIONAL DEFENCE CFB ESQUIMALT STN FORCES P.O.BOX 17000 VICTORIA British Columbia V9A7N2 Canada	

**Instructions: See Herein**

**Instructions: Voir aux présentes**

<b>Delivery Required - Livraison exigée</b> See Herein – Voir ci-inclus	<b>Delivery Offered - Livraison proposée</b>
<b>Vendor/Firm Name and Address</b> <b>Raison sociale et adresse du fournisseur/de l'entrepreneur</b>	
<b>Telephone No. - N° de téléphone</b> <b>Facsimile No. - N° de télécopieur</b>	
<b>Name and title of person authorized to sign on behalf of Vendor/Firm</b> <b>(type or print)</b> <b>Nom et titre de la personne autorisée à signer au nom du fournisseur/</b> <b>de l'entrepreneur (taper ou écrire en caractères d'imprimerie)</b>	
<b>Signature</b>	<b>Date</b>

## TABLE OF CONTENTS

<b>PART 1 - GENERAL INFORMATION .....</b>	<b>3</b>
1.1 SECURITY REQUIREMENT.....	3
1.2 STATEMENT OF WORK.....	3
1.3 DEBRIEFINGS .....	3
1.4 EPOST CONNECT SERVICE .....	3
1.5 COVID-19 VACCINATION REQUIREMENT.....	3
<b>PART 2 - BIDDER INSTRUCTIONS .....</b>	<b>3</b>
2.1 STANDARD INSTRUCTIONS, CLAUSES AND CONDITIONS.....	3
2.2 SUBMISSION OF BIDS.....	3
2.3 FORMER PUBLIC SERVANT.....	4
2.4 ENQUIRIES - BID SOLICITATION.....	5
2.5 APPLICABLE LAWS.....	5
2.6 BID CHALLENGE AND RECOURSE MECHANISMS.....	5
<b>PART 3 - BID PREPARATION INSTRUCTIONS.....</b>	<b>5</b>
3.1 BID PREPARATION INSTRUCTIONS .....	5
<b>PART 4 - EVALUATION PROCEDURES AND BASIS OF SELECTION .....</b>	<b>6</b>
4.1 EVALUATION PROCEDURES.....	6
4.2 BASIS OF SELECTION - HIGHEST COMBINED RATING OF TECHNICAL MERIT AND PRICE .....	7
<b>PART 5 - CERTIFICATIONS AND ADDITIONAL INFORMATION .....</b>	<b>7</b>
5.1 CERTIFICATIONS REQUIRED WITH THE BID .....	8
5.2 CERTIFICATIONS PRECEDENT TO CONTRACT AWARD AND ADDITIONAL INFORMATION .....	8
<b>PART 6 - RESULTING CONTRACT CLAUSES .....</b>	<b>9</b>
6.1 SECURITY REQUIREMENTS .....	9
6.2 STATEMENT OF WORK.....	9
6.3 STANDARD CLAUSES AND CONDITIONS.....	9
6.4 TERM OF CONTRACT .....	10
6.5 AUTHORITIES .....	10
6.6 PROACTIVE DISCLOSURE OF CONTRACTS WITH FORMER PUBLIC SERVANTS .....	11
6.7 PAYMENT .....	11
6.8 INVOICING INSTRUCTIONS .....	11
6.9 CERTIFICATIONS AND ADDITIONAL INFORMATION.....	12
6.10 APPLICABLE LAWS.....	12
6.11 PRIORITY OF DOCUMENTS .....	12
6.12 INSURANCE - NO SPECIFIC REQUIREMENT.....	13
6.13 DISPUTE RESOLUTION.....	13
<b>ANNEX A .....</b>	<b>14</b>
STATEMENT OF WORK .....	14
<b>ANNEX B .....</b>	<b>40</b>
BASIS OF PAYMENTS .....	40
<b>ANNEX C .....</b>	<b>42</b>

Solicitation No. - N° de l'invitation  
W0103-229031/A  
Client Ref. No. - N° de réf. du client  
W0103-229031

Amd. No. - N° de la modif.  
File No. - N° du dossier

Buyer ID - Id de l'acheteur  
VIC258  
CCC No./N° CCC - FMS No./N° VME

---

TECHNICAL EVALUATION CRITERIA .....	42
<b>ANNEX D TO PART 3 OF THE BID SOLICITATION .....</b>	<b>45</b>
ELECTRONIC PAYMENT INSTRUMENTS .....	45
<b>ANNEX E TO PART 5 OF THE BID SOLICITATION .....</b>	<b>46</b>
FEDERAL CONTRACTORS PROGRAM FOR EMPLOYMENT EQUITY - CERTIFICATION .....	46
<b>ANNEX F .....</b>	<b>47</b>
STATUS AND AVAILABILITY OF RESOURCES - CERTIFICATION .....	47
<b>ANNEX G .....</b>	<b>48</b>
COVID-19 VACCINATION REQUIREMENT CERTIFICATION .....	48

---

## PART 1 - GENERAL INFORMATION

### 1.1 Security Requirement

There is no security requirement applicable to the contract.

### 1.2 Statement of Work

The Work to be performed is detailed under Article 6.2 of the resulting contract clauses.

### 1.3 Debriefings

Bidders may request a debriefing on the results of the bid solicitation process. Bidders should make the request to the Contracting Authority within 15 working days from receipt of the results of the bid solicitation process. The debriefing may be in writing, by telephone or in person.

### 1.4 epost Connect service

This bid solicitation requires bidders to use the epost Connect service provided by Canada Post Corporation to transmit their bid electronically. Bidders must refer to Part 2 entitled Bidder Instructions, and Part 3 entitled Bid Preparation Instructions, of the bid solicitation, for further information.

### 1.5 Covid-19 Vaccination Requirement

This requirement is subject to the COVID-19 Vaccination Policy for Supplier Personnel. Failure to complete and provide the COVID-19 Vaccination Requirement Certification as part of the bid will render the bid non-responsive.

## PART 2 - BIDDER INSTRUCTIONS

### 2.1 Standard Instructions, Clauses and Conditions

All instructions, clauses and conditions identified in the bid solicitation by number, date and title are set out in the [Standard Acquisition Clauses and Conditions Manual](https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual) (<https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual>) issued by Public Works and Government Services Canada.

Bidders who submit a bid agree to be bound by the instructions, clauses and conditions of the bid solicitation and accept the clauses and conditions of the resulting contract.

The [2003](#) (2020-05-28) Standard Instructions - Goods or Services - Competitive Requirements, are incorporated by reference into and form part of the bid solicitation.

### 2.2 Submission of Bids

Bids must be submitted only to Public Works and Government Services Canada (PWGSC) Bid Receiving Unit by the date, time and place indicated in the bid solicitation.

Note: Bidders must submit using epost Connect for bids closing at the Bid Receiving Unit in the Pacific Region (PR) the email address is:

[TPSGC.RPReceptiondessoumissions-PRBidReceiving.PWGSC@tpsgc-pwgsc.gc.ca](mailto:TPSGC.RPReceptiondessoumissions-PRBidReceiving.PWGSC@tpsgc-pwgsc.gc.ca)

**Note:** Bids will not be accepted if emailed directly to this email address. This email address is to be used to open an epost Connect conversation, as detailed in Standard Instructions [2003](#), or to send bids through an epost Connect message if the bidder is using its own licensing agreement for epost Connect.

Due to the nature of the bid solicitation, bids transmitted by facsimile to PWGSC will not be accepted.

### 2.3 Former Public Servant

Contracts awarded to former public servants (FPS) in receipt of a pension or of a lump sum payment must bear the closest public scrutiny, and reflect fairness in the spending of public funds. In order to comply with Treasury Board policies and directives on contracts awarded to FPSs, bidders must provide the information required below before contract award. If the answer to the questions and, as applicable the information required have not been received by the time the evaluation of bids is completed, Canada will inform the Bidder of a time frame within which to provide the information. Failure to comply with Canada's request and meet the requirement within the prescribed time frame will render the bid non-responsive.

#### Definitions

For the purposes of this clause, "former public servant" is any former member of a department as defined in the [Financial Administration Act](#), R.S., 1985, c. F-11, a former member of the Canadian Armed Forces or a former member of the Royal Canadian Mounted Police. A former public servant may be:

- an individual;
- an individual who has incorporated;
- a partnership made of former public servants; or
- a sole proprietorship or entity where the affected individual has a controlling or major interest in the entity.

"lump sum payment period" means the period measured in weeks of salary, for which payment has been made to facilitate the transition to retirement or to other employment as a result of the implementation of various programs to reduce the size of the Public Service. The lump sum payment period does not include the period of severance pay, which is measured in a like manner.

"pension" means a pension or annual allowance paid under the [Public Service Superannuation Act](#) (PSSA), R.S., 1985, c. P-36, and any increases paid pursuant to the [Supplementary Retirement Benefits Act](#), R.S., 1985, c. S-24 as it affects the PSSA. It does not include pensions payable pursuant to the [Canadian Forces Superannuation Act](#), R.S., 1985, c. C-17, the [Defence Services Pension Continuation Act](#), 1970, c. D-3, the [Royal Canadian Mounted Police Pension Continuation Act](#), 1970, c. R-10, and the [Royal Canadian Mounted Police Superannuation Act](#), R.S., 1985, c. R-11, the [Members of Parliament Retiring Allowances Act](#), R.S. 1985, c. M-5, and that portion of pension payable to the [Canada Pension Plan Act](#), R.S., 1985, c. C-8.

#### Former Public Servant in Receipt of a Pension

As per the above definitions, is the Bidder a FPS in receipt of a pension? **Yes ( ) No ( )**

If so, the Bidder must provide the following information, for all FPSs in receipt of a pension, as applicable:

- name of former public servant;
- date of termination of employment or retirement from the Public Service.

By providing this information, Bidders agree that the successful Bidder's status, with respect to being a former public servant in receipt of a pension, will be reported on departmental websites as part of the published proactive disclosure reports in accordance with [Contracting Policy Notice: 2019-01](#) and the [Guidelines on the Proactive Disclosure of Contracts](#).

#### Work Force Adjustment Directive

Is the Bidder a FPS who received a lump sum payment pursuant to the terms of the Work Force Adjustment Directive? **Yes ( ) No ( )**

If so, the Bidder must provide the following information:

- name of former public servant;
- conditions of the lump sum payment incentive;
- date of termination of employment;
- amount of lump sum payment;
- rate of pay on which lump sum payment is based;

- f. period of lump sum payment including start date, end date and number of weeks;
- g. number and amount (professional fees) of other contracts subject to the restrictions of a work force adjustment program.

## 2.4 Enquiries - Bid Solicitation

All enquiries must be submitted in writing to the Contracting Authority no later than 5 calendar days before the bid closing date. Enquiries received after that time may not be answered.

Bidders should reference as accurately as possible the numbered item of the bid solicitation to which the enquiry relates. Care should be taken by Bidders to explain each question in sufficient detail in order to enable Canada to provide an accurate answer. Technical enquiries that are of a proprietary nature must be clearly marked "proprietary" at each relevant item. Items identified as "proprietary" will be treated as such except where Canada determines that the enquiry is not of a proprietary nature. Canada may edit the question(s) or may request that the Bidder do so, so that the proprietary nature of the question(s) is eliminated, and the enquiry can be answered to all Bidders. Enquiries not submitted in a form that can be distributed to all Bidders may not be answered by Canada.

## 2.5 Applicable Laws

Any resulting contract must be interpreted and governed, and the relations between the parties determined, by the laws in force in British Columbia.

Bidders may, at their discretion, substitute the applicable laws of a Canadian province or territory of their choice without affecting the validity of their bid, by deleting the name of the Canadian province or territory specified and inserting the name of the Canadian province or territory of their choice. If no change is made, it acknowledges that the applicable laws specified are acceptable to the Bidders.

## 2.6 Bid Challenge and Recourse Mechanisms

- (a) Several mechanisms are available to potential suppliers to challenge aspects of the procurement process up to and including contract award.
- (b) Canada encourages suppliers to first bring their concerns to the attention of the Contracting Authority. Canada's [Buy and Sell](#) website, under the heading "[Bid Challenge and Recourse Mechanisms](#)" contains information on potential complaint bodies such as:
  - Office of the Procurement Ombudsman (OPO)
  - Canadian International Trade Tribunal (CITT)
- (c) Suppliers should note that there are **strict deadlines** for filing complaints, and the time periods vary depending on the complaint body in question. Suppliers should therefore act quickly when they want to challenge any aspect of the procurement process.

# PART 3 - BID PREPARATION INSTRUCTIONS

## 3.1 Bid Preparation Instructions

The Bidder must submit its bid electronically, Canada requests that the Bidder submits its bid in accordance with section 08 of the 2003 standard instructions. The epost Connect system has a limit of 1GB per single message posted and a limit of 20GB per conversation.

The bid must be gathered per section and separated as follows:

Section I: Technical Bid  
Section II: Financial Bid  
Section III: Certifications  
Section IV: Additional Information

Prices must appear in the financial bid only. No prices must be indicated in any other section of the bid.

#### **Section I: Technical Bid**

In their technical bid, Bidders should explain and demonstrate how they propose to meet the requirements and how they will carry out the Work.

#### **Section II: Financial Bid**

Bidders must submit their financial bid in accordance with the Basis of Payment at Annex B.

##### **3.1.1 Electronic Payment of Invoices – Bid**

If you are willing to accept payment of invoices by Electronic Payment Instruments, complete Annex E Electronic Payment Instruments, to identify which ones are accepted.

If Annex E Electronic Payment Instruments is not completed, it will be considered as if Electronic Payment Instruments are not being accepted for payment of invoices.

Acceptance of Electronic Payment Instruments will not be considered as an evaluation criterion.

#### **Section III: Certifications**

Bidders must submit the certifications and additional information required under Part 5.

#### **Section IV: Additional Information**

### **PART 4 - EVALUATION PROCEDURES AND BASIS OF SELECTION**

#### **4.1 Evaluation Procedures**

- (a) Bids will be assessed in accordance with the entire requirement of the bid solicitation including the technical and financial evaluation criteria.
- (b) An evaluation team composed of representatives of Canada will evaluate the bids.

##### **4.1.1 Technical Evaluation**

Mandatory and point rated technical evaluation criteria are included in Annex C.

##### **4.1.2 Financial Evaluation**

###### **4.1.2.1 Mandatory Financial Criteria**

Mandatory Financial criteria are included in Annex B – Basis of Payment

###### **4.1.2.2 Evaluation of Price - Bid**

---

SACC Manual clause A0220T (2014-06-26) Evaluation of Price

#### 4.2 Basis of Selection - Highest Combined Rating of Technical Merit and Price

1. To be declared responsive, a bid must:
  - a. comply with all the requirements of the bid solicitation; and
  - b. meet all mandatory criteria; and
  - c. obtain the required minimum of 2 points overall for the technical evaluation criteria which are subject to point rating. The rating is performed on a scale of 5 points.
2. Bids not meeting (a) or (b) or (c) will be declared non-responsive.
3. The selection will be based on the highest responsive combined rating of technical merit and price. The ratio will be 60 % for the technical merit and 40 % for the price.
4. To establish the technical merit score, the overall technical score for each responsive bid will be determined as follows: total number of points obtained / maximum number of points available multiplied by the ratio of 60 % .
5. To establish the pricing score, each responsive bid will be prorated against the lowest evaluated price and the ratio of 40 %.
6. For each responsive bid, the technical merit score and the pricing score will be added to determine its combined rating.
7. Neither the responsive bid obtaining the highest technical score nor the one with the lowest evaluated price will necessarily be accepted. The responsive bid with the highest combined rating of technical merit and price will be recommended for award of a contract.

The table below illustrates an example where all three bids are responsive and the selection of the contractor is determined by a 60/40 ratio of technical merit and price, respectively. The total available points equals 135 and the lowest evaluated price is \$45,000 (45).

##### Basis of Selection – Highest Combined Rating Technical Merit (60%) and Price (40%)

		Bidder 1	Bidder 2	Bidder 3
Overall Technical Score		115/135	89/135	92/135
Bid Evaluated Price		\$55,000.00	\$50,000.00	\$45,000.00
Calculations	Technical Merit Score	$115/135 \times 60 = 51.11$	$89/135 \times 60 = 39.56$	$92/135 \times 60 = 40.89$
	Pricing Score	$45/55 \times 40 = 32.73$	$45/50 \times 40 = 36.00$	$45/45 \times 40 = 40.00$
Combined Rating		83.84	75.56	80.89
Overall Rating		1 <sup>st</sup>	3 <sup>rd</sup>	2 <sup>nd</sup>

#### PART 5 – CERTIFICATIONS AND ADDITIONAL INFORMATION

Bidders must provide the required certifications and additional information to be awarded a contract.

The certifications provided by Bidders to Canada are subject to verification by Canada at all times. Unless specified otherwise, Canada will declare a bid non-responsive, or will declare a contractor in default if any certification made by the Bidder is found to be untrue whether made knowingly or unknowingly, during the bid evaluation period or during the contract period.



---

The Contracting Authority will have the right to ask for additional information to verify the Bidder's certifications. Failure to comply and to cooperate with any request or requirement imposed by the Contracting Authority will render the bid non-responsive or constitute a default under the Contract.

## **5.1 Certifications Required with the Bid**

Bidders must submit the following duly completed certifications as part of their bid.

### **5.1.1 Integrity Provisions - Declaration of Convicted Offences**

In accordance with the Integrity Provisions of the Standard Instructions, all bidders must provide with their bid, **if applicable**, the declaration form available on the [Forms for the Integrity Regime](http://www.tpsgc-pwgsc.gc.ca/ci-if/declaration-eng.html) website (<http://www.tpsgc-pwgsc.gc.ca/ci-if/declaration-eng.html>), to be given further consideration in the procurement process.

### **5.1.2 COVID-19 Vaccination Policy for Supplier Personnel**

In accordance with the COVID-19 Vaccination Policy for Supplier Personnel, all Bidders must provide with their bid, the COVID-19 Vaccination Requirement Certification attached to this bid solicitation at Annex G, to be given further consideration in this procurement process. This Certification incorporated into the bid solicitation on its closing date is incorporated into, and forms a binding part of any resulting Contract.

## **5.2 Certifications Precedent to Contract Award and Additional Information**

The certifications and additional information listed below should be submitted with the bid, but may be submitted afterwards. If any of these required certifications or additional information is not completed and submitted as requested, the Contracting Authority will inform the Bidder of a time frame within which to provide the information. Failure to provide the certifications or the additional information listed below within the time frame provided will render the bid non-responsive.

### **5.2.1 Integrity Provisions – Required Documentation**

In accordance with the section titled Information to be provided when bidding, contracting or entering into a real property agreement of the [Ineligibility and Suspension Policy](http://www.tpsgc-pwgsc.gc.ca/ci-if/politique-policy-eng.html) (<http://www.tpsgc-pwgsc.gc.ca/ci-if/politique-policy-eng.html>), the Bidder must provide the required documentation, as applicable, to be given further consideration in the procurement process.

### **5.2.2 Federal Contractors Program for Employment Equity - Bid Certification**

By submitting a bid, the Bidder certifies that the Bidder, and any of the Bidder's members if the Bidder is a Joint Venture, is not named on the Federal Contractors Program (FCP) for employment equity "FCP Limited Eligibility to Bid" list available at the bottom of the page of the [Employment and Social Development Canada \(ESDC\) - Labour's](https://www.canada.ca/en/employment-social-development/programs/employment-equity/federal-contractor-program.html#) website (<https://www.canada.ca/en/employment-social-development/programs/employment-equity/federal-contractor-program.html#>).

Canada will have the right to declare a bid non-responsive if the Bidder, or any member of the Bidder if the Bidder is a Joint Venture, appears on the "FCP Limited Eligibility to Bid" list at the time of contract award.

Canada will also have the right to terminate the Contract for default if a Contractor, or any member of the Contractor if the Contractor is a Joint Venture, appears on the "[FCP Limited Eligibility to Bid](#)" list during the period of the Contract.

---

The Bidder must provide the Contracting Authority with a completed annex titled Federal Contractors Program for Employment Equity - Certification, before contract award. If the Bidder is a Joint Venture, the Bidder must provide the Contracting Authority with a completed annex Federal Contractors Program for Employment Equity - Certification, for each member of the Joint Venture.

### **5.2.3 Additional Certifications Precedent to Contract Award**

#### **5.2.3.1 Status and Availability of Resources**

SACC *Manual* clause [S3005T](#) (2008-12-12) Status and Availability of Resources. The Bidder must complete the certification form at Annex F and submit with their bid.

#### **5.2.3.2 Education and Experience**

SACC *Manual* clause [S1010T](#) (2008-12-12) Education and Experience

## **PART 6 - RESULTING CONTRACT CLAUSES**

The following clauses and conditions apply to and form part of any contract resulting from the bid solicitation.

### **6.1 Security Requirements**

**6.1.1** There is no security requirement applicable to the Contract.

### **6.2 Statement of Work**

The Contractor must perform the Work in accordance with the Statement of Work at Annex A.

### **6.3 Standard Clauses and Conditions**

All clauses and conditions identified in the Contract by number, date and title are set out in the [Standard Acquisition Clauses and Conditions Manual](#) (<https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual>) issued by Public Works and Government Services Canada.

#### **6.3.1 General Conditions**

[2010C](#) (2020-05-28), General Conditions - Services (Medium Complexity) apply to and form part of the Contract.

#### **6.3.2 Supplemental General Conditions**

[4006](#) (2010-08-16) Contractor to Own Intellectual Property Rights in Foreground Information, apply to and form part of the Contract.

## **6.4 Term of Contract**

### **6.4.1 Period of the Contract**

The period of the Contract is from date of Contract to December 31, 2023 inclusive.

### **6.4.2 Option to Extend the Contract**

The Contractor grants to Canada the irrevocable option to extend the term of the Contract by up to 1 additional 1 year period under the same conditions. The Contractor agrees that, during the extended period of the Contract, it will be paid in accordance with the applicable provisions as set out in the Basis of Payment.

Canada may exercise this option at any time by sending a written notice to the Contractor at least 90 calendar days before the expiry date of the Contract. The option may only be exercised by the Contracting Authority, and will be evidenced for administrative purposes only, through a contract amendment.

## **6.5 Authorities**

### **6.5.1 Contracting Authority**

The Contracting Authority for the Contract is:

Name: Angela Cowie  
Title: Supply Specialist  
Public Works and Government Services Canada  
Acquisitions Branch  
Address: 1230 Government St, Victoria BC

Telephone: (250)217-2150  
E-mail address: Angela.Cowie@pwgsc-tpsgc.gc.ca

The Contracting Authority is responsible for the management of the Contract and any changes to the Contract must be authorized in writing by the Contracting Authority. The Contractor must not perform work in excess of or outside the scope of the Contract based on verbal or written requests or instructions from anybody other than the Contracting Authority.

### **6.5.2 Technical Authority**

The Technical Authority for the Contract is:

Name: \_\_\_\_\_  
Title: \_\_\_\_\_  
Organization: \_\_\_\_\_  
Address: \_\_\_\_\_

Telephone: \_\_\_\_\_  
Facsimile: \_\_\_\_\_  
E-mail address: \_\_\_\_\_

The Technical Authority is the representative of the department or agency for whom the Work is being carried out under the Contract and is responsible for all matters concerning the technical content of the Work under the Contract. Technical matters may be discussed with the Project Authority, however the

Project Authority has no authority to authorize changes to the scope of the Work. Changes to the scope of the Work can only be made through a contract amendment issued by the Contracting Authority.

### 6.5.3 Contractor's Representative

Name: \_\_\_\_\_  
Title: \_\_\_\_\_  
Organization: \_\_\_\_\_  
Address: \_\_\_\_\_  
  
Telephone: \_\_\_\_\_  
Facsimile: \_\_\_\_\_  
E-mail address: \_\_\_\_\_

### 6.6 Proactive Disclosure of Contracts with Former Public Servants

By providing information on its status, with respect to being a former public servant in receipt of a [Public Service Superannuation Act](#) (PSSA) pension, the Contractor has agreed that this information will be reported on departmental websites as part of the published proactive disclosure reports, in accordance with [Contracting Policy Notice: 2019-01](#) of the Treasury Board Secretariat of Canada.

### 6.7 Payment

#### 6.7.1 Basis of Payment

In consideration of the Contractor satisfactorily completing all of its obligations under the Contract, the Contractor will be paid firm unit price(s), as specified in Annex B for a cost of \$ \_\_\_\_\_ (insert the amount at contract award). Customs duties are included and Applicable Taxes are extra.

Canada will not pay the Contractor for any design changes, modifications or interpretations of the Work, unless they have been approved, in writing, by the Contracting Authority before their incorporation into the Work.

#### 6.7.2 Monthly Payments

SACC Manual clause [H1008C](#) (2008-05-12) Monthly Payment

#### 6.7.3 Electronic Payment of Invoices – Contract

The Contractor accepts to be paid using any of the following Electronic Payment Instrument(s):

- a. Visa Acquisition Card;
- b. MasterCard Acquisition Card;
- c. Direct Deposit (Domestic and International);
- d. Electronic Data Interchange (EDI);
- e. Wire Transfer (International Only);
- f. Large Value Transfer System (LVTS) (Over \$25M)

### 6.8 Invoicing Instructions

1. The Contractor must submit invoices in accordance with the section entitled "Invoice Submission" of the general conditions. Invoices cannot be submitted until all work identified in the invoice is

completed.

Each invoice must be supported by:

- a. a copy of time sheets to support the time claimed;
  - b. a copy of the release document and any other documents as specified in the Contract;
2. Invoices must be distributed as follows:
- a. The original and one (1) copy must be forwarded to the following address for certification and payment.  
\_\_\_\_\_  
\_\_\_\_\_  
*(Insert the name of the organization)*  
*(Insert the address of the organization)*
  - b. One (1) copy must be forwarded to the Contracting Authority identified under the section entitled "Authorities" of the Contract.

## 6.9 Certifications and Additional Information

### 6.9.1 Compliance

Unless specified otherwise, the continuous compliance with the certifications provided by the Contractor in its bid or precedent to contract award, and the ongoing cooperation in providing additional information are conditions of the Contract and failure to comply will constitute the Contractor in default. Certifications are subject to verification by Canada during the entire period of the Contract.

### 6.9.2 Federal Contractors Program for Employment Equity - Default by the Contractor

The Contractor understands and agrees that, when an Agreement to Implement Employment Equity (AIEE) exists between the Contractor and Employment and Social Development Canada (ESDC)-Labour, the AIEE must remain valid during the entire period of the Contract. If the AIEE becomes invalid, the name of the Contractor will be added to the "[FCP Limited Eligibility to Bid](#)" list. The imposition of such a sanction by ESDC will constitute the Contractor in default as per the terms of the Contract.

### 6.9.3 Replacement of Specific Individuals

SACC Manual clause [A7017C](#) (2008-05-12), Replacement of Specific Individuals

## 6.10 Applicable Laws

The Contract must be interpreted and governed, and the relations between the parties determined, by the laws in force in British Columbia.

### 6.11 Priority of Documents

If there is a discrepancy between the wording of any documents that appear on the list, the wording of the document that first appears on the list has priority over the wording of any document that subsequently appears on the list.

- (a) the Articles of Agreement;
- (b) the supplemental general conditions:  
[4006](#) (2010-08-16) Contractor to Own Intellectual Property Rights in Foreground Information;
- (c) the general conditions [2010C](#) (2020-05-28), Services (Medium Complexity);
- (d) Annex A, Statement of Work;
- (e) Annex B, Basis of Payments;

- (f) the Contractor's bid dated \_\_\_\_\_ (*insert date of bid*) (*If the bid was clarified or amended, insert at the time of contract award: “, as clarified on \_\_\_\_\_” or “, as amended on \_\_\_\_\_” and insert date(s) of clarification(s) or amendment(s)*)

#### **6.12 Insurance – No Specific Requirement**

SACC Manual clause G1005C (2016-01-28) Insurance – No Specific Requirement

#### **6.13 Dispute Resolution**

- (a) The parties agree to maintain open and honest communication about the Work throughout and after the performance of the contract.
- (b) The parties agree to consult and co-operate with each other in the furtherance of the contract and promptly notify the other party or parties and attempt to resolve problems or differences that may arise.
- (c) If the parties cannot resolve a dispute through consultation and cooperation, the parties agree to consult a neutral third party offering alternative dispute resolution services to attempt to address the dispute.
- (d) Options of alternative dispute resolution services can be found on Canada's Buy and Sell website under the heading “Dispute Resolution”.

## **ANNEX A**

### **STATEMENT OF WORK**

#### **1.0 Introduction**

##### **1.1 General**

The Department of National Defence's (DND) Royal Canadian Navy (RCN) has a requirement for in-class technical education, pedagogical and logistics support for DND sponsored students from a post-secondary academic institution on Canada's Pacific coast. The academic/core technology courses for Naval Weapons Engineering Technician Systems Maintainer (WENG TECH Systems Maintainer) must be delivered to a maximum of 20 students between January and December 2022, and again between January and December 2023 with an optional year for 2024.

#### **2.0 Curriculum Requirements**

##### **2.1 DND WENG TECH Systems Maintainer Curriculum Report**

The Contractor must provide a report detailing the gap(s) between civilian academic courses and the DND WENG TECH Systems Maintainer requirements. The Contractor's report must identify which courses and/or curriculum changes are required and courses required to be developed and implemented to meet DND student training requirements. The Contractor must indicate how DND training requirements must be met by the Institution with respect to the Institution's courses and curriculum and identified changes.

###### **2.1.1 Course Alteration**

DND may need to change courseware to meet changing trade requirements. DND may require course curriculum changes.

##### **2.2 Educational Program Description**

The Contractor must develop and provide lectures and laboratory/practical exercises as specified in Appendix A1 (Detailed Academic Component Requirements for Weapons Engineering Technician (WENG TECH) - System Maintainer). These will be, wherever possible, commercial off the shelf courses offered to civilian students.

##### **2.3 Academic Staff**

The Contractor must provide instructional staff, teaching and laboratory assistants having professional and academic qualification appropriate to the instructional requirements.

#### **3.0 Course and Pedagogical Requirements**

##### **3.1 General**

The Contractor must provide the necessary equipment, academic and professional expertise to conduct the courses. The Contractor must enable the success of DND students with all the support and options that are provided for the success of civilian students. The Institution must also provide all administrative and academic documentation in support of the program as described herein.

## 3.2 Deliverables

**3.2.1 Technical Review Meetings:** The Contractor must conduct Technical Review Meetings. First to take place 2 weeks after contract award, then during delivery a minimum of once monthly and as required by the parties to monitor project progress and risk mitigation to delivery timelines. An agenda must be forwarded a minimum of three days prior to the meeting to permit attendees to provide inputs and minutes must be taken at the meeting and submitted for input a minimum of two days following the meeting to obtain inputs and revisions as required.

**3.2.2 Course Reports:** The Contractor must provide the TA with a written course report, complete with grades and narrative on each student, within fourteen (14) days of completion of each academic term (quarter) or semester. Course reports must be submitted within 48 hours in the case of student failure. A course report example must be provided with the Contractor's bid.

**3.2.3 Course Certificates and Transcripts:** The Contractor must provide Certificates to the graduates which will be officially recognized by the Institution should the student wish to return in order to advance their education in the future. The Institution must also provide an official Academic Transcript to each student, at no cost to the student, when they depart the Institution.

**3.2.4 Pedagogical Supplies:** The Contractor must provide Students with all essential course textbooks, handouts, and supplies (pens, paper, binders, planners, etc.) to facilitate student success.

**3.2.5 College Information Package:** The Contractor must, once students have registered, provide each student with a College Information Package.

## 3.3 Test Invigilation Procedures

The Contractor must adhere to and apply the same standards for academic integrity as determined by the Institution to DND students as they would for civilian students. The Contractor must notify the TA of any breach of the Institutions academic integrity policy by DND students.

## 3.4 Academic Instructors

The Contractor must provide all resources such as instructional staff, teaching and laboratory assistants. The resources must possess the professional and academic qualifications appropriate to teach and assist the DND students the Academic Component Requirements for Weapons Engineer Systems Maintainer Technician and they must be no less qualified than those resources provided to civilian students for same/similar courses.

## 3.5 Class Monitoring

DND may monitor classroom and laboratory instruction. One week in advance the Contractor will be advised of the proposed time a DND observer may attend.



### **3.6 Tutorial Assistance**

The Contractor must provide tutorial assistance on a case-by-case basis to the DND students. The tutorial assistance must be in addition to DND student's regularly scheduled class time. DND students must be permitted attend any number of tutorials if they need extra assistance.

In cases where DND students are experiencing poor academic performance the Contractor must make attendance to tutorial(s) mandatory. The academic staff must identify students experiencing poor academic performance and consult with the TA to determine applicability of mandatory attendance at tutorials.

### **3.7 Academic Programs**

Classes must be provided on a set schedule with instructors who must be available to engage the students and answer any questions. If students are required to watch reference videos as homework, those videos must make up less than 2.5% of total instruction time of the duration of the course in any one subject. The Contractor must have sufficient laboratory equipment and tools etc. to ensure each student has their own set as required without having to share with another student.

### **3.8 Institutional Services**

The Contractor must provide DND students access to, all normal institutional student services at no direct cost to the student.

## **4.0 Constraints**

### **4.1 General**

The Contractor must not subcontract out the instruction of students.

### **4.2 Registration**

Although it is the intent of DND to sponsor the annual enrolment for the program, a minimum of one serial with an average of ten students each to a maximum of one serial with twenty students, there is no guarantee the maximum enrolment will be met. DND will provide advance notice of enrollment levels at a 60-day interval and changes may be applied at a minimum 30-day interval prior to the start date of the individual serial.

### **4.3 Location of the Institution**

Due to the location of DND student accommodations the In-Institution courses at a minimum, must be located in the Greater Victoria Area.

## **5.0 DND Student Conduct and Intake**

### **5.1 General**

---

DND students must comply with the Contractor's specified academic rules and regulations that are equally applicable to the civilian student population. The Institution must not require DND students to participate in any activities that might discredit or appear to discredit the Canadian Armed Forces or the Government of Canada. If the Institution is in doubt, it must obtain approval from the TA before the student may participate in the activity. The Technical Authority may remove any DND student found to display unsatisfactory progress or improper conduct.

## **5.2 Registration Instructions**

The Institution must provide written registration instructions to all DND students. These instructions must be provided through the TA. The Institution must provide facility operating hours and state the specific times that these facilities are available to DND students.

## **5.3 Attendance**

The Contractor must advise the TA, of all cases of DND student absenteeism, habitual lateness, or any other attendance or performance issues as they arise. The Contractor must support and maintain to the DND students that their attendance and satisfactory performance is mandatory.

## **5.4 Student Progress**

DND students are employees of DND, the Contractor must facilitate all DND students in endorsing DND's access to individual student academic and attendance records.

## APPENDIX A1: DETAILED ACADEMIC COMPONENT REQUIREMENTS FOR WEAPONS ENGINEERING TECHNICIAN (WENG TECH) - SYSTEM MAINTAINER

### Academic Program Summary

The academic program for the Weapons Engineering Technician is summarized below and broken down by Educational Objectives. This description is a representative description of a program of study that would meet DND's requirements. It is not intended to be restrictive in content or textbook/ reference selection.

### The Course consists of the following Objectives

001 APPLY PULSE ELECTRONICS THEORY  
002 APPLY DIGITAL THEORY  
003 APPLY CONTROL SYSTEMS THEORY  
004 APPLY MECHANICAL THEORY  
005 APPLY THE THEORY OF ENGINEERING MATERIALS  
006 APPLY HYDRAULIC THEORY  
007 APPLY MICROPROCESSOR THEORY  
008 APPLY DIGITAL SIGNAL PROCESSING THEORY  
009 APPLY NETWORKING FUNDAMENTALS  
010 WRITE CORRESPONDENCE  
011 REPORT TECHNICAL INFORMATION  
012 PRESENT TECHNICAL INFORMATION  
013 APPLY FIBRE OPTIC THEORY

Glossary:	
Term:	Description:
NDT (EO005.03)	Non-Destructive Testing
ADC	Analog to digital conversion
DTFT	Discrete-time Fourier Transform
OSI	Open system intercommunications
VOIP	Voice over IP
UNIX	UNIX is a Portable operating System
VCSEL	Vertical-cavity surface-emitting laser
OTDR	Optical Time-domain Reflectometer

## **001 APPLY PULSE ELECTRONICS THEORY**

### **001.01 Apply Pulse Fundamentals**

Types of waveforms;

- a. Characteristics of pulse waveforms;
- b. Harmonic and frequency synthesis; and
- c. Waveform distortion.

### **001.02 Explain the Principles of Capacitive-Resistive Circuits**

- a. Series RC circuits;
- b. RC circuit response to square waves; and
- c. Integration of sine waves.

### **001.03 Explain the Principles of Diode Switching**

- a. Diode characteristics;
- b. Zener diode characteristics;
- c. Diode series clippers;
- d. Diode shunt clippers; and
- e. Diode clamping circuits.

### **001.04 Explain the Principles of Transistor Switching**

- a. Ideal BJT transistor switch
- b. Practical BJT transistor switch
- c. Transistor switching times;
- d. Direct coupled inverter;
- e. Capacitor coupled inverters;
- f. JFET switches; and
- g. MOSFET switches.

### **001.05 Explain the Principles of IC Operational Amplifiers in Switching Circuits**

- a. Op amp characteristics
- b. Linear amplifiers;
- c. Op amp switches;
- d. Op amp clipper circuits;
- e. Op amp integrator; and
- f. Op amp differentiator.

### **001.06 Explain the principles of Schmitt Trigger Circuits (Op Amp Only) and Voltage Comparators**

- a. Inverting Schmitt triggers;
- b. Non-inverting Schmitt triggers;

- c. Op amp voltage comparators; and
- d. Relaxation oscillators.

**001.07 Explain the Principles of IC Timer Circuits**

- a. RS Flip flops;
- b. 555 timer block diagram;
- c. Monostable operation of a 555 timer; and
- d. Astable operation of a 555 timer

**001.08 Explain the Principles of Ramp Generators**

- a. Transistor RC ramp generators;
- b. Constant current ramp generators; and
- c. Bootstrap ramp generators;

**Final Exam: To make a final review of the topics covered and assessment of each student's knowledge of the subject:**

**Assessment:**

Achieving a 50% mark on the Final Exam: To make a final review of the topics covered and assessment of each student's knowledge of the subject; and  
Achieving an overall final grade of 60% determined from the following:

- 1) Recommend the use of Hand-in assignments to monitor progress no more than 10%
- 2) Recommend the use of Progress tests to monitor students' progress no more than 30%
- 3) Recommend the use of Labs monitor students' progress no more than 10%
- 4) Final Exam: To make a final review of the topics covered and assessment of each student's knowledge of the subject= 50%

**002 APPLY DIGITAL THEORY**

**002.01 Explain the Principles of Digital Logic**

- a. History of Digital Technology; and
- b. Introduction to Digital Functions.

**002.02 Explain the Principles of Number Systems and Codes**

- a. Number Systems and Conversions;
- b. Binary Math Operations; and
- c. Digital Codes and Error Detection.

**002.03 Explain the Principles of Logic Gates and Boolean Algebra**

- a. OR and AND Gate Circuit Operation;
- b. OR and AND Gate Truth Tables;
- c. Inverters (NOT Gates);
- d. NANO and NOR Gate Circuit Operation;
- e. NANO and NOR Gate Truth Tables;
- f. Exclusive-OR and Exclusive-NOR Logic Gates;

- g. Exclusive-OR and Exclusive-NOR Truth Tables; and
- h. Alternate Logic Gate Representation.

002.04 Explain the Principles of Combinational Logic Circuits

- a. Combinational Logic Circuits; and
- b. Simplification of Combinational Logic Circuits.

002.05 Explain the Principles of Flip-Flops and Related Devices

- a. Unclocked RS Flip-Flops;
- b. Clocked RS Flip-Flops;
- c. D-Type Flip-Flops;
- d. JK Flip-Flops;
- e. Flip-Flop Triggering;
- f. Master Slave Flip-Flops; and
- g. Flip-Flop Timing Considerations.

002.06 Explain the Principles of Digital Arithmetic: Operations and Circuits

- a. Binary Arithmetic;
- b. Hexadecimal Arithmetic;
- c. 4-Bit Adder;
- d. Binary Subtractor; and
- e. 4-Bit Subtractor.

002.07 Explain the Principles of Counters and Registers

- a. Data Registers and Memory;
- b. 4-Bit Storage Registers;
- c. 4-Bit Shift Registers;
- d. 8-Bit Shift Registers;
- e. Digital Counting and Frequency Division;
- f. Asynchronous (Ripple) Counters;
- g. Synchronous Counters;
- h. Shift Register Counters; and
- i. Digital Counter Applications.

002.08 Explain the Principles of MSI Logic Circuits

- a. Integrated Circuit Registers;
- b. Universal Logic Gates;
- c. Digital Multiplexers;
- d. Digital Demultiplexers;
- e. Magnitude Comparators;
- f. Magnitude Comparator Circuits;
- g. Open-Collector and Tri-State Devices; and
- h. Tri-State Registers and Bus Structures.

**Final Exam: To make a final review of the topics covered and assessment of each student's knowledge of the subject:**

### Assessment:

Achieving a 50% mark on the Final Exam: To make a final review of the topics covered and assessment of each student's knowledge of the subject; and  
Achieving an overall final grade of 60% determined from the following:

- 1) Recommend the use of Hand-in assignments to monitor progress no more than 10%
- 2) Recommend the use of Progress tests to monitor students' progress no more than 30%
- 3) Recommend the use of Labs monitor students' progress no more than 10%
- 4) Final Exam: To make a final review of the topics covered and assessment of each student's knowledge of the subject= 50%

## **003 APPLY CONTROL SYSTEMS THEORY**

### 003.01 Introduction to Control Systems

- a. Define a Control System;
- b. Define Open-Loop Control System:
  - (1) Define Controlled Variable, Manipulated Variable, Actuator, Process, Controller;
  - (2) Sketch a block diagram of an Open-Loop Control System; and
  - (3) State where Open-Loop Control Systems are commonly applied.
- c. Define Closed-Loop Control System:
  - (1) Define Setpoint, Error, Measurement Transmitter, Error Detector;
  - (2) Sketch a block diagram of a Closed-Loop Control System; and
  - (3) Identify the actions performed by a Closed-Loop Control System;
- d. Identify the Usefulness of Control Systems;
- e. Examine Closed-Loop Speed Control Systems;
- f. Examine Closed-Loop Position Control Systems; and
- g. Recognize the difference in the responses of Open-Loop and Closed-Loop Control System to disturbances.

### 003.02 Explain the Principles of Sensors and Measuring

- a. Describe the make-up of a Measurement Transmitter;
- b. Define the various Measurement Characteristics;
- c. Explain the operation of different Linear Position Sensors;
- d. Explain the operation of different Angular Position Sensors;
- e. Explain the operation of an Inductive Proximity Sensor;
- f. Explain the operation of various Linear Velocity Sensors;
- g. Explain the operation of various Angular Velocity Sensors;
- h. Explain the operation of various Acceleration Sensors;
- i. Explain the operation of various Force Sensors;
- j. Explain the operation of various Temperature Sensors;
- k. Explain the operation of various Torque Sensors; and
- l. Explain the operation of various Flow Sensors.

#### 003.03 Explain the Principles of Actuators

- a. Explain the operation of Manually Operated Switches;
- b. Explain the operation of Mechanically Operated Switches;
- c. Explain the operation of Electromagnetic Relays and Solenoids;
- d. Explain the operation of Motor Protection Switches;
- e. Explain the operation of SCRs;
- f. Explain the operation of Triacs;
- g. Explain the operation of Power MOSFETs;
- h. Explain the operation of Insulated Gate Bipolar Junction Transistors;
- i. Explain the operation and application of Unijunction Transistor;
- j. Explain the theory and operation of Wound Field DC Motors;
- k. Explain the theory and operation of Permanent Magnet and Brushless DC Motors;
- l. Explain the different ways of categorizing AC Motors;
- m. Explain the theory and operation of select Single Phase Motors;
- n. Explain the theory and operation of Three Phase Motors;
- o. Explain the construction of Stepper Motors;
- p. Explain the different stepping modes with Stepper Motors;
- q. Explain how Thyristors can be used to convert an AC Source to Adjustable DC;
- r. Explain how Four Quadrant Control of DC Motors is possible with an AC Source;
- s. Explain how Four Quadrant Control of DC Motors is possible with a DC Source; and
- t. Explain AC Motor Control.

#### 003.04 Explain the Principles of Analog Signal Conditioning

- a. Explain the function of the signal conditioner;
- b. Explain the theory and operation of the Operational Amplifier;
- c. Explain the effect of Common Mode Rejection Ratio and the Simplifying Assumptions;
- d. Explain the circuit characteristics of various simple Op-Amp Circuits;
- e. Explain the circuit characteristics of various complex Op-Amp Circuits; and
- f. Explain the theory and application of the six functions of a Signal Conditioner.

#### 003.05 Explain the Principles of Process Characteristics

- a. Describe the Common Elements of Control System Processes;
- b. Explain the different modes of examining processes;
- c. Explain and describe all facets of the Integral Process;
- d. Explain and describe all facets of the First Order Lag Process;
- e. Explain and describe all facets of the Second Order Lag Process;
- f. Explain and describe all facets of the Dead Time Process; and
- g. Explain and describe all facets of the First Order Lag Plus Dead Time Process.

#### 003.06 Explain the Principles of the Control of Continuous Processes

- a. Explain how Control modes can provide effective control using error as only input;
- b. Explain the theory of operation of Two-Position Control;
- c. Explain the theory of operation of Floating Mode Control;



- d. Explain the theory of operation of Proportional Control;
- e. Explain the theory of operation of Integral Control;
- f. Explain the theory of operation of Derivative Control;
- g. Explain the theory of operation of Proportional Integral Control;
- h. Explain the theory of operation of Proportional Integral Derivative;
- i. Explain why controllers need to be tuned;
- j. Explain the theory of operation of Ultimate Cycle Original Method;
- k. Explain the theory of operation of Ultimate Cycle Modified Method; and
- l. Explain the theory of operation of Process Reaction Method.

**003.07 Explain the Principles of Advanced Control System Concepts**

- a. Explain the theory of operation of Cascade Control;
- b. Explain the theory of operation of Feedforward Control;
- c. Explain the theory of operation of Stability in Closed-loop Control Systems;
- d. Explain the Mathematics of Feedback;
- e. Explain the Effect of Feedback on Overall System Gain;
- f. Explain the Effect of Feedback on System Sensitivities;
- g. Explain the Effect of Feedback on System Input and Output Impedance; and
- h. Explain the Effect of Feedback on System Bandwidth.

**003.08 Explain the Principles of the Control of Discrete Processes**

- a. Explain Discrete Processes;
- b. Explain Sequential Processes;
- c. Explain the different methods of describing Sequential Processes;
- d. Explain a Time Driven Sequential Process Example;
- e. Explain an Event Driven Sequential Process Example;
- f. Define a Programmable Logic Controller;
- g. State PLC History and Programming Languages;
- h. Describe PLC Structure; and
- i. Describe the theory of operation of the PLC lab trainer.

**003.09 Explain the Principles of a Digital Control System**

- a. Sketch and explain the block diagram of a digital control system;
- b. Explain the operation of Digital Control Hardware;
- c. Explain Digital Control Concepts Sampling and Quantization Error;
- d. Describe how Proportional, Integral and Derivative modes are synthesized in a Microprocessor; and
- e. Explain Digital Filtering.

**Final Exam: To make a final review of the topics covered and assessment of each student's knowledge of the subject:**

**Assessment:**

Achieving a 50% mark on the Final Exam: To make a final review of the topics covered and assessment of each student's knowledge of the subject; and  
Achieving an overall final grade of 60% determined from the following:

- 1) Recommend the use of Hand-in assignments to monitor progress no more than 10%
- 2) Recommend the use of Progress tests to monitor students' progress no more than 30%
- 3) Recommend the use of Labs monitor students' progress no more than 10%

- 4) Final Exam: To make a final review of the topics covered and assessment of each student's knowledge of the subject= 50%

#### **004 APPLY MECHANICAL THEORY**

##### **004.01 Introduction to Stress Analysis**

- a. Explain the various components of the Machine Design Process;
- b. Explain Normal Stress and Shear Stress;
- c. Explain Normal Strain and Shear Strain; and
- d. Explain the Stress vs. Strain Curve and the Elastic Constant.

##### **004.02 Explain the Principles of the Applications of Stress Analysis**

- a. Explain the Applications of Stress Analysis including Safety Factors;
- b. Explain Stress Concentrations and Stress Concentration Factors;
- c. Analyse Welded Connections;
- d. Explain the Stress caused by Thermal Expansion;
- e. Explain Interference Fits;
- f. Explain Shear Stress in Circular Shafts;
- g. Explain Stress Concentrations in Circular Shafts;
- h. Explain the Angle of Twist in Shafts; and
- i. Explain the Transmission of Power in Shafts.

##### **004.03 Explain the Principles of Journal Bearings**

- a. Explain the construction of Journal Bearing;
- b. Explain the different bearing types;
- c. Explain Journal Bearing lubrication;
- d. Explain Hydrodynamic Action in Journal Bearings;
- e. Explain Journal Bearing Friction Effects; and
- f. Explain Journal Bearing Pressure and Bearing Selection Criteria.

##### **004.04 Explain the Principles of Anti-Friction Bearings**

- a. Explain Rolling Resistance;
- b. Explain the Basic Components of Anti-Friction Bearings;
- c. Explain the different types of Anti-Friction Bearings;
- d. Explain the Life of Anti-Friction Bearings and the Factors associated;
- e. Explain the lubrication of Anti-Friction Bearings; and
- f. Compare all aspects of Anti-Friction and Journal Bearings.

##### **004.05 Explain the Principles of Various Shaft Arrangements**

- a. Explain Critical Speeds of Shafts;
- b. Explain Flexible Shafts and Keys;
- c. Explain Rigid, Flexible and Assorted Shaft Couplings;
- d. Explain the Basic Operation and Terms of Cams; and
- e. Explain Cam Types, Follower Types and Simple Follower Motion.

##### **004.06 Explain the Principles of Gearing**

- a. Explain Basic Gear Theory and Terms
- b. Explain Gear Formulas

- c. Explain Characteristics and Generation of the Involute Profile
- d. Explain Common Gear Failures
- e. Explain Different Types of Gears
- f. Explain Types of Gear Trains.

#### 004.07 Explain the Principles of Machine Construction

- a. Explain the Factors involved in Belt Selection;
- b. Explain the Types of Belts;
- c. Explain Roller Chains;
- d. Compare Belts and Chains;
- e. Explain Theory and Types of Clutches;
- f. Explain Theory and Types of Brakes;
- g. Explain Classifications of Fasteners;
- h. Explain Screws; and
- i. Explain Assorted Fasteners.

**Final Exam: To make a final review of the topics covered and assessment of each student's knowledge of the subject:**

#### Assessment:

Achieving a 50% mark on the Final Exam: To make a final review of the topics covered and assessment of each student's knowledge of the subject; and  
Achieving an overall final grade of 60% determined from the following:

- 1) Recommend the use of Hand-in assignments to monitor progress no more than 10%
- 2) Recommend the use of Progress tests to monitor students' progress no more than 30%
- 3) Recommend the use of Labs monitor students' progress no more than 10%
- 4) Final Exam: To make a final review of the topics covered and assessment of each student's knowledge of the subject= 50%

### **005 APPLY THE THEORY OF ENGINEERING MATERIALS**

#### 005.01 Explain the Structure of Materials

- a. Explain bonding mechanisms in materials;
- b. Explain the classification of engineering materials;
- c. Explain the structure of metals; and
- d. Explain plastic deformation in polycrystalline materials

#### 005.02 Explain Mechanical Properties and their Associated Testing Methods

- a. Explain the classification of mechanical properties;
- b. Explain materials testing principles;
- c. Explain the tensile test;
- d. Explain the compression test;
- e. Explain the shear test;
- f. Explain the torsion test;
- g. Explain the flexure test;
- h. Explain the creep test;
- i. Explain the weld test;
- j. Explain the hardness test;

- k. Explain the impact test; and
- l. Explain the fatigue test.

**005.03 Explain Non-Destructive Testing Methods**

- a. Explain the reasons for NDT;
- b. Explain NDT methods;

**005.04 Explain the use of Phase Diagrams in Metallurgy**

- a. Explain concepts related to phase diagrams;
- b. Describe binary isomorphous systems; and
- c. Describe binary eutectic systems.

**005.05 Explain the use of Iron - Iron Carbide Phase Diagram in Metallurgy**

- a. Interpret the iron-iron carbide phase diagram;
- b. Describe the effects of alloying elements on iron;
- c. Explain the nomenclature of steels;
- d. Explain the classification of cast irons; and
- e. Explain the characteristics of non-ferrous metals.

**005.06 Explain the Effects of Heat Treatment on Steels**

- a. Explain the heat treatment of steels;
- b. Describe hardening as a heat treatment method;
- c. Describe softening as a heat treatment method; and
- d. Describe conditioning as a heat treatment method.

**005.07 Explain the Principles of Polymeric Materials**

- a. Explain the general characteristics of polymers;
- b. Explain polymerization processes;
- c. Explain the function of additives;
- d. Explain the general classification of polymers; and
- e. Explain the general properties of polymers

**005.08 Explain the Principles of Ceramics Materials**

- a. Explain the general characteristics of ceramics;
- b. Explain ceramic processing and fabrication; and
- c. Explain the general properties of ceramics.

**005.09 Explain the Principles of Corrosion**

- a. Explain the nature of corrosion;
- b. Explain the corrosion of iron and steel;
- c. Explain the types of corrosion;
- d. Explain biological corrosion; and
- e. Explain the principles of corrosion control

**Final Exam: To make a final review of the topics covered and assessment of each student's knowledge of the subject:**

**Assessment:**

Achieving a 50% mark on the Final Exam: To make a final review of the topics

- covered and assessment of each student's knowledge of the subject; and  
Achieving an overall final grade of 60% determined from the following:
- 1) Recommend the use of Hand-in assignments to monitor progress no more than 10%
  - 2) Recommend the use of Progress tests to monitor students' progress no more than 30%
  - 3) Recommend the use of Labs monitor students' progress no more than 10%
  - 4) Final Exam: To make a final review of the topics covered and assessment of each student's knowledge of the subject= 50%

## **006 APPLY HYDRAULIC THEORY**

### **006.01 Apply Hydraulic Theory**

- a. Review basic fluid power principles;
  - (1) Force/pressure relationship
  - (2) Flow/speed relationship;
  - (3) Identify ISO/ANSI symbology; and
  - (4) Review the operation of standard hydraulic components
- b. Explain the basic principles of pneumatics;
  - (1) Explain safety aspects, applications and advantages of pneumatics; and
  - (2) Explain operation, construction and function of basic pneumatic components;
- c. Describe the operation, construction and function of accumulators;
- d. Describe the operation, construction and function of electro- hydraulic components and systems;
- e. Describe the operation, construction and function of electro-hydraulic servo and proportional systems; and
- f. Electrohydraulic circuit troubleshooting.

**Final Exam: To make a final review of the topics covered and assessment of each student's knowledge of the subject:**

### **Assessment:**

- Achieving a 50% mark on the Final Exam: To make a final review of the topics covered and assessment of each student's knowledge of the subject; and  
Achieving an overall final grade of 60% determined from the following:
- 1) Recommend the use of Hand-in assignments to monitor progress no more than 10%
  - 2) Recommend the use of Progress tests to monitor students' progress no more than 30%
  - 3) Recommend the use of Labs monitor students' progress no more than 10%
  - 4) Final Exam: To make a final review of the topics covered and assessment of each student's knowledge of the subject= 50%

## **007 APPLY MICROPROCESSOR THEORY**

---

007.01 Explain the Principles of Microprocessor Theory

- a. Evolution of the microprocessor;
- b. Hardware Elements of Digital Computers; and
- c. Microprocessor Operation.

007.02 Explain the Principles of the 68000 Microprocessor (Or Equivalent)

- a. The Software model of the 68000 (Or Equivalent);
- b. The Seven interfaces of the 68000 (Or Equivalent);
- c. Data Organization; and
- d. Introduction to the SBC68K Computer Board.

007.03 Explain the Principles of 68000 Microprocessor Assembly Language Programming (Or Equivalent Microprocessor)

- a. The assembly process, from source code to object code;
- b. The eight groups of instructions used by the 68000 (Or Equivalent);
- c. The 14 Addressing Modes used by the 68000 (Or Equivalent); and
- d. 68000 Instruction set (Or Equivalent).

007.04 Explain the Principles of Exception Processing and the 68000 Microprocessor (Or Equivalent)

- a. Exception/Interrupt Concept;
- b. Exception Processing;
- c. Special Exceptions;
- d. External Interrupt Processing;
- e. Exception Instructions; and
- f. Exception service routines.

007.05 Explain the Hardware Architecture of 68000 based systems (Or Equivalent)

- a. CPU Pin Descriptions; and
- b. Troubleshooting Techniques.

007.06 Explain the Principles of Semiconductor Memories

- a. Memory Classifications;
- b. Static RAM Circuits;
- c. Dynamic RAM Circuits;
- d. Non-volatile memories;
- e. Error Detection and Correction; and
- f. Troubleshooting memory interfaces.

007.07 Explain the Principles of Semiconductor Memory Interface

- a. Address Decoding;
- b. Static and Dynamic RAM interface circuits; and
- c. Dynamic RAM Refresh techniques.

007.08 Explain the Principles of 68000 Input/Output Interfaces (Or Equivalent)

- a. Memory Mapped I/O;
- b. Simple output interface device;
- c. Parallel I/O;
- d. Serial I/O;
- e. Serial Interface Buses; and

---

f. Troubleshooting I/O devices.

**007.09 Explain the Principles of Programming and Interfacing with Advanced 68000 Peripherals (Or Equivalent)**

- a. The 68230 (Or Equivalent) Parallel Interface/Timer; and
- b. The IEEE 488.

**Final Exam: To make a final review of the topics covered and assessment of each student's knowledge of the subject:**

**Assessment:**

Achieving a 50% mark on the Final Exam: To make a final review of the topics covered and assessment of each student's knowledge of the subject; and  
Achieving an overall final grade of 60% determined from the following:

- 1) Recommend the use of Hand-in assignments to monitor progress no more than 10%
- 2) Recommend the use of Progress tests to monitor students' progress no more than 30%
- 3) Recommend the use of Labs monitor students' progress no more than 10%
- 4) Final Exam: To make a final review of the topics covered and assessment of each student's knowledge of the subject= 50%

**008 APPLY DIGITAL SIGNAL PROCESSING THEORY**

**008.01 Explain the Introduction to Signal Processing Theory**

- a. What is Digital Signal Processing?
- b. The importance of Digital Signal Processing;
- c. Implementation of DSP; and
- d. DSP Applications.

**008.02 Explain the Fundamental Requirements for DSP Systems**

- a. Introduction;
- b. Linearity;
- c. Time Invariance; and
- d. Causality.

**008.03 Explain the Principles of Signal Spectra**

- a. Introduction;
- b. Spectrum;
- c. Fourier Transform;
- d. Signal Spectrum, and Time Domain vs. Frequency Domain;
- e. Properties of Fourier Transform; and
- f. Math Review.

**008.04 Explain the Principles of Signal Filters**

- a. Introduction;

- b. Basic Signal Filters;
- c. Frequency Response;
- d. Transfer Function;
- e. Gain & Bode Plot;
- f. Filter Terminology; and
- g. Typical Signal Filters.

**008.05 Explain the Principles of Analogue to Digital Conversion: Signal Sampling**

- a. Introduction;
- b. Background;
- c. How to Sample Signals;
- d. Shannon Sampling Theory; and
- e. Implementation of Sampling Theory.

**008.06 Explain the Principles of Time Characteristics of Sampled Signals**

- a. Introduction;
- b. Aliasing Effect Avoidance;
- c. Signal Sampling viewed in the time domain; and
- d. Resulted frequency appeared in the time domain.

**008.07 Explain the Principles of Frequency Characteristics of Sampled Signals**

- a. Introduction;
- b. Two-Sided Spectrum;
- c. Signal Sampling Viewed in the Frequency Domain;
- d. Oversampling; and
- e. Under Sampling.

**008.08 Explain the Principles of Analogue to Digital Conversion: Signal Quantization**

- a. Introduction;
- b. Quantization;
- c. Unipolar and Bipolar ADC;
- d. Performance Discussion; and
- e. Stream of Digital Codes.

**008.09 Explain the Properties of Analogue to Digital Conversion**

- a. Introduction;
- b. DIA Process;
- c. DIA Converter; and
- d. Analog-to-Digital-back to-Analog.

**008.10 Explain the Principles of the Digital Signals**

- a. Introduction;
- b. Digital Signals Expressed by Pictures;
- c. Digital Signals Denoted in Maths; and
- d. Time Domain Digital Signal Manipulations.

**008.11 Explain the Principles of Digital Functions**



- a. Introduction;
- b. Step Functions;
- c. Power and Exponential Functions;
- d. Sine and Cosine Functions; and
- e. Composite Functions.

**008.12 Explain the Properties of Digital Systems - Difference Equations**

- a. Introduction;
- b. Background: Control Systems;
- c. Difference Equations; and
- d. Recursive and non-recursive equations.

**008.13 Explain the Principles of Digital Systems - Difference Equation Diagrams**

- a. Introduction;
- b. Difference Equation Diagram Elements;
- c. Non-recursive Difference Equations; and
- d. Recursive Difference Equations.

**008.14 Explain the Principles of Typical Digital System Responses**

- a. Introduction;
- b. Impulse Response;
- c. Finite Impulse Response;
- d. Infinite Impulse Response; and
- e. Step Response.

**008.15 Explain the Principles of Convolution**

- a. Introduction;
- b. Convolution; and
- c. Boundary Effects.

**008.16 Explain the Principles of Correlation, Autocorrelation, and MAF Filters**

- a. Introduction;
- b. Correlation; and
- c. Moving Average Filter.

**008.17 Explain the Principles of Z-Transform and Digital System Stability 10 hrs**

- a. Introduction;
- b. Z Transform;
- c. Transfer Function; and
- d. System Performance Evaluation.

**008.18 Explain the Principles of Frequency Characteristics of Digital Signals/Systems**

- a. Introduction;
- b. Important Properties of DTFT;
- c. Frequency Responses;
- d. Signal Spectra; and
- e. System Order and Performance Discussion.

---

**008.19 Explain the Principles of Windowing**

- a. Introduction;
- b. Windowing;
- c. Frequency Leakage; and
- d. Windows.

**008.20 Explain the Principles of Discrete Fourier Transform and Fast Fourier Transform**

- a. Introduction;
- b. Discrete Fourier Series (DFS);
- c. Discrete Fourier Transform (OFT); and
- d. Fast Fourier Transform (FFT).

**008.21 Explain the Principles of Hardware for Digital Signal Processing**

- a. Introduction;
- b. Significant Features of DSP Chips;
- c. DSP Architectures; and
- d. DSP Hardware Units.

**Final Exam: To make a final review of the topics covered and assessment of each student's knowledge of the subject:**

**Assessment:**

Achieving a 50% mark on the Final Exam: To make a final review of the topics covered and assessment of each student's knowledge of the subject; and  
Achieving an overall final grade of 60% determined from the following:

- 1) Recommend the use of Hand-in assignments to monitor progress no more than 10%
- 2) Recommend the use of Progress tests to monitor students' progress no more than 30%
- 3) Recommend the use of Labs monitor students' progress no more than 10%
- 4) Final Exam: To make a final review of the topics covered and assessment of each student's knowledge of the subject= 50%

**009 APPLY NETWORKING FUNDAMENTALS**

**009.01 Explain the Principles of Network Architecture**

- a. Network topologies;
- b. Physical media;
- c. Common network device overview; and
- d. Network Types.

**009.02 Explain the Principles of the OSI Model**

- a. OSI Reference Model.

**009.03 Explain the Principles of Network Protocols**

- a. TCP/IP Stack;

- b. Point-to-Point;
- c. Transmission Control;
- d. Internet Protocols;
- e. Application Protocols;
- f. Ports and Sockets;
- g. Name Resolution Methods; and
- h. IP Addressing.

**009.04 Explain the Principles of TCPIP Utilities**

- a. Address resolution methods;
- b. TP2 Network Connectivity and Statistics; and
- c. Troubleshooting tools.

**009.05 Explain the Principles of Network Access and Security Protocols**

- a. Accessing network Client;
- b. User account and password security;
- c. Firewalls;
- d. Threats; and
- e. DND policies and regulations.

**009.06 Explain the Principles of International Standards**

- a. IEEE Ethernet;
- b. Ethernet II;
- c. IPv4; and
- d. IPv6.

**009.07 Explain the Principles of Physical Layer Devices**

- a. Cabling;
- b. Network Interfaces;
- c. Bridges; and
- d. Gateways.

**009.08 Explain the Principles of Data Link Layer Devices**

- a. Cisco Switches;
- b. Device Start-up;
- c. Frame Transmission;
- d. VLANs; and
- e. Troubleshooting.

**009.09 Explain the Principles of Network Layer Devices**

- a. Cisco Routers;
- b. Start-up;
- c. Packet Transmission;
- d. Interfacing;
- e. Routing;
- f. Traffic Management;
- g. Troubleshooting; and
- h. Point-to-Point Connections.

**009.10 Explain the Principles of VOIP**

- a. VOIP Introduction; and
- b. VOIP in Action.

**009.11 Explain the Principles of Network Operating System**

- a. Role of Operating Systems;
- b. Understanding Multi-User, Multi-Tasking Operating Systems;
- c. Major Components of An Operating System;
- d. Development of UNIX;
- e. Main Features Of Multiuser/Multi-tasking Operating Systems;
- f. Structure Of The UNIX Operating System;
- g. Unix kernel;
- h. File and Directory Structures and Storage Media;
- i. File Attributes and Access Permissions;
- j. Unix/Linux Directory Standards and Structure;
- k. Processes, Process Management and Multitasking;
- l. Inputs and Outputs - Devices and Software;
- m. Structure Of I/O Software;
- n. Installation Process;
- o. The Boot Process;
- p. Logging in;
- q. Operating System, Commands and the UNIX, Command Line Structure;
- r. Paths, Directory Organization and Features;
- s. File and Directory Management;
- t. Viewing and Modifying File Permissions;
- u. File Display Commands;
- v. Managing Users and Groups;
- w. Users, Groups and File System Security; and
- x. System Resource Commands.

**009.12 Explain the Principles of Network Operating System Administration**

- a. User Commands;
- b. UNIX Text Editors;
- c. UNIX Shells;
- d. Redirection, Pipes and Filters;
- e. Text Processing, Conversion and Expressions;
- f. File manipulation commands;
- g. Archiving, Compression and Backup;
- h. Removable Storage, Data Conversion and Data Management;
- i. Shell Scripting, Conventions and Execution;
- j. System Logs, Viewing and Interpretation; and
- k. UNIX Networking.

**Final Exam: To make a final review of the topics covered and assessment of each student's knowledge of the subject:**

**Assessment:**

---

Achieving a 50% mark on the Final Exam: To make a final review of the topics covered and assessment of each student's knowledge of the subject; and  
Achieving an overall final grade of 60% determined from the following:

- 1) Recommend the use of Hand-in assignments to monitor progress no more than 10%
- 2) Recommend the use of Progress tests to monitor students' progress no more than 30%
- 3) Recommend the use of Labs monitor students' progress no more than 10%
- 4) Final Exam: To make a final review of the topics covered and assessment of each student's knowledge of the subject= 50%

## **010 WRITE CORRESPONDENCE**

### **010.01 Organize Written and Graphic Information**

- a. Applying ethics in technical writing;
- b. Gathering data from technical documents;
- c. Applying research strategies;
- d. Identifying the purpose of technical illustrations;
- e. Interpreting components of technical illustrations; and
- f. Organizing data.

### **010.02 Report Equipment/ System Information**

- a. Applying the mechanics of writing
- b. Applying word processing software;
- c. Applying ethics in technical writing

**Final Exam: To make a final review of the topics covered and assessment of each student's knowledge of the subject:**

### **Assessment:**

Achieving a 50% mark on the Final Exam: To make a final review of the topics covered and assessment of each student's knowledge of the subject; and  
Achieving an overall final grade of 60% determined from the following:

- 1) Recommend the use of Hand-in assignments to monitor progress no more than 15%
- 2) Recommend the use of Progress tests to monitor students' progress no more than 35%
- 3) Final Exam: To make a final review of the topics covered and assessment of each student's knowledge of the subject= 50%

## **011 REPORT TECHNICAL INFORMATION**

### **011.01 Reports Technical Information**

- a. Analyzing gathered information for an equipment / system report;
- b. Applying the mechanics of writing to identify the components of the introduction, body and conclusion of an equipment/ system report (1000 words in length plus or minus 250 words);

- c. Applying ethics in technical writing; and
- d. Producing a brief, based on the technical information report, that is 5 minutes in length (plus or minus one minute) that includes an introduction, body and conclusion.

**Final Exam: To make a final review of the topics covered and assessment of each student's knowledge of the subject:**

**Assessment:**

Achieving an overall final grade of 60% determined from the following:

- 1) Hand-in assignments/Progress tests= 20%
- 2) Technical Information Brief = 30%
- 3) Technical Information Paper = 50%

**012 PRESENT TECHNICAL INFORMATION**

**012.01 Produce a Technical Service Paper**

- a. Producing a technical service paper that:
  - (1) is 2000 words in length (plus or minus 250 words);
  - (2) includes:
    - (a) an introduction and body;
    - (b) an options analysis;
    - (c) recommendations;
    - (d) conclusion;
  - (3) Applies the mechanics of writing to the Technical Service Paper; and
  - (4) Applies ethics in technical writing.

**012.02 Present a Technical Information Brief**

- a. summarizing equipment/ system information within 15 min (plus or minus 3 minutes);
- b. Utilizing presentation strategies, discuss the following:
  - (1) introduction;
  - (2) body (including options analysis);
  - (3) conclusions; and
  - (4) recommendations;
- c. Applying ethics in technical writing; and
- d. Applying presentation software principles

**Final Exam: To make a final review of the topics covered and assessment of each student's knowledge of the subject:**

**Assessment:**

Achieving an overall final grade of 60% determined from the following:

- 1) Hand-in assignments/Progress tests= 20%
- 2) Technical Information Brief = 30%
- 3) Technical Service Paper = 50%

## **013 APPLY FIBRE OPTIC THEORY**

### **013.01 Fibre Optic Safety**

- a. Explain all safety precautions when installing fibre optics; and
- b. Explain the safe procedure for handling of tools.

### **013.02 Fibre Optic Background and Advantages**

- a. History of communication of light;
- b. Why fibre optics are used;
- c. Where fibre optics are used;
- d. Wavelength and frequency of light;
- e. Use of decibels in fibre optics systems; and
- f. Advantages and Disadvantages of fibre optics.

### **013.03 Principles of Fibre Optic Transmission**

- a. Propagation of light in fibre;
- b. Refraction and reflection;
- c. Higher and lower order modes;
- d. Types of fibre (Classification by material/mode);
- e. Numerical Aperture/Modal Dispersion/Chromatic Dispersion;
- f. Characteristics; and
- g. Lasers (VCSEL and Edge-Emitters).

### **013.04 Fibre Optic Structure and Losses**

- a. How fibre is made;
- b. Losses and Attenuation;
- c. Scattering and absorption;
- d. Micro-bends and Macro-bends; and
- e. Minimum bend radius rule.

### **013.05 Fibre Optic Cable Types**

- a. Cable classifications;
- b. Simplex and Duplex cable;
- c. Breakout and Distribution cable;
- d. Outside Plant/Direct Burial;
- e. Ribbon;
- f. Hybrid/Composite; and
- g. Cable Markings and Color Codes.

### **013.06 Fibre Optic Connector Identification**

- a. Obsolete connectors; and
- b. Most common connectors used today.

### **013.07 Fibre Optic Testing and Losses**

- a. Measurement Standards;
- b. Test Instruments;
- c. OTDR Operation; and
- d. Loss Specifications.

013.08 Fibre Optic Termination/Splice/Patch Panels

- a. Termination Types;
- b. Splice Types; and
- c. Patch Panels/Fibre Optic Switches.

**Final Exam: To make a final review of the topics covered and assessment of each student's knowledge of the subject:**

Assessment:

Achieving a 50% mark on the Final Exam: To make a final review of the topics covered and assessment of each student's knowledge of the subject; and  
Achieving an overall final grade of 60% determined from the following:

- 1) Recommend the use of Hand-in assignments to monitor progress no more than 10%
- 2) Recommend the use of Progress tests to monitor students' progress no more than 30%
- 3) Recommend the use of Labs monitor students' progress no more than 10%
- 4) Final Exam: To make a final review of the topics covered and assessment of each student's knowledge of the subject= 50%

**REFERENCES**

The Contractor to use the most up to date version of reference materials available.



## ANNEX B

### BASIS OF PAYMENTS

The Bidder must complete Table 1.1, 1.2 and 2.1 for all line items.

The Bidder's Total Price is for evaluation purposes and does not represent a commitment on the part of Canada.

#### 1.0 Firm Serial Course Prices

The Bid prices are calculated as follows:

All estimated costs and rates must include the furnishing of all labour, materials, equipment, including tools, services, permit fees, and incidental costs, necessary or proper for the completion of the work, except as may be otherwise expressly provided in the Contract. All costs for overhead, profit, financing, general requirements, contingencies, etc. are to be included in the Contract amounts.

"Extras" will not be allowed. It is the responsibility of the Contractor to take into account traffic, weather and other common mitigating factors.

**Table 1.1 – Courses January 2022 to December 2022**

Description	Monthly Cost	# of Months	Serial Cost
<b>WENG TECH SPECIALIST COURSES</b> 20 Students Including technology changes.	\$	8	\$
Course texts and lab supplies	\$		\$
<b>(1.1 Bid Price) Total Bid Price (GST Excluded):</b>			\$
<b>(if applicable) Total GST:</b>			\$
<b>Contract Year 1 Total Estimated Contract Value:</b>			\$

**Table 1.2 – Courses January 2023 to December 2023:**

Description	Monthly Cost	# of Months	Serial Cost
<b>WENG TECH SPECIALIST COURSES</b> 20 Students Including technology changes.	\$	8	\$
Course texts and lab supplies	\$		\$
<b>(1.2 Bid Price) Total Bid Price (GST Excluded):</b>			\$
<b>(if applicable) Total GST:</b>			\$
<b>Contract Year 2 Total Estimated Contract Value:</b>			\$

#### 2.0 Optional Goods and/or Services Pricing

Pricing for optional goods and/or services (if exercised) shall be at costs identified in Annex B -Table 1.2 of this contract plus/minus the Consumer Price Index adjustment based on changes between most recently published two (2) years at the time of exercising the option under "All-items" with a geographical restriction of "British Columbia" from Statistics Canada. [Table 18-10-0005-01 Consumer Price Index.](#)

Solicitation No. - N° de l'invitation  
W0103-229031/A  
Client Ref. No. - N° de réf. du client  
W0103-229031

Amd. No. - N° de la modif.  
File No. - N° du dossier

Buyer ID - Id de l'acheteur  
VIC258  
CCC No./N° CCC - FMS No./N° VME

[annual average, not seasonally adjusted](https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1810000501)  
(<https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1810000501>)

**Table 2.1 Option Year 1: January 2024 to December 2024**

Description	Monthly Cost	# of Months	Serial Cost
<b>WENG TECH SPECIALIST COURSES</b> 20 Students Including technology changes.	\$	8	\$
Course texts and lab supplies	\$		\$
<b>(2.1 Bid Price) Total Bid Price (GST Excluded):</b>			<b>\$</b>
<b>(if applicable) Total GST:</b>			<b>\$</b>
<b>Option Year 1 Total Estimated Contract Value:</b>			<b>\$</b>

### 3.0 Bid Price for Evaluation Purposes

The bidder should fill out the following table to calculate the total Bid price for evaluation purposes:

**Table 3.1**

1.1 Bid Price	\$
1.2 Bid Price	\$
2.1 Bid Price	\$
<b>Total Bid Price for Bid Evaluation Purposes</b>	<b>\$</b>

## ANNEX C

### TECHNICAL EVALUATION CRITERIA

#### B-1 GENERAL

- B-1.1** The general requirement for the Bidder's Technical Bid is stated at Part 3 of the Bid Solicitation.
- B-1.2** The Evaluation Procedure is stated at Part 4 of the Bid Solicitation. The evaluation procedure indicates the composition of the evaluation team. This Annex gives the detailed Technical Evaluation Criteria and Scoring Procedure.
- B-1.3** In order that a complete technical evaluation of the Bid can be conducted, the Bid must be compliant with all of the bid deliverable requirements, which are summarized under Part 3 of the Bid Solicitation. It is the Bidder's responsibility to clearly demonstrate their capabilities and capacity to complete all of the Work and other requirements stated in the Bid Solicitation, the Statement of Work and other attachments. Bidders should describe their capabilities, how they will comply with mandatory requirements, and how they will deliver any other requested goods and/or services.
- B-1.4** It is requested at Article 3.1 that the Bidder present topics in the order of these evaluation criteria and under the same headings and numbering scheme. Alternatively, the Bidder should include in their Technical Bid an applicability matrix wherein they identify, by page number, where each of the criteria is addressed in their Bid.

#### B-2 MANDATORY TECHNICAL CRITERIA

- B-2.1** The Mandatory Technical Criteria are detailed in **Table B-1 Mandatory Criteria**. Mandatory Criteria will be assigned either a Pass or Fail by the evaluation team. Any Bid which fails to comply with any Mandatory Criterion will be declared non-responsive.
- B-2.2** The Bidder should provide, as part of its Technical Proposal, all documents essential to clearly demonstrate compliance with each technical mandatory requirement, including, without limitation, course materials, photographs, statements, resumes and, other such evidence.
- B-2.3** The Bidder must provide a filled out filled out **Table – B-1 Mandatory Criteria** providing references by page and section to their Technical Proposal where each requirement is addressed.

#### B-3 POINT-RATED TECHNICAL CRITERIA

- B-3.1** The Point-Rated Technical Criteria are detailed in **Table B-2**.
- B-3.2** Point rating of Criteria, for their technical merit, will be conducted in accordance with Scoring Procedure given under Part 4 of the bid solicitation.
- B-3.3** Partial points will not be awarded.

**Table B-1 Mandatory Technical Criteria**

Item#	Description	Evidence or documentation required to substantiate	Pass	Fail	Reference to location in bid.
1	Bidder must submit the <b>DND WENG TECH Systems Maintainer Curriculum</b> report described in the SOW at 2.1 to demonstrate they achieve training to the requirements included in Appendix 1.	The Bidder must submit the <b>DND WENG TECH Systems Maintainer Curriculum</b> report with the bid using Appendix 1 to cross reference with their existing courses and explain and demonstrate how they will meet the remaining DND requirements.			
2	Training Facility must be accredited by a regulating body. Bidder must submit written documentation supporting accreditation.	The Bidder must provide a letter or proof of accreditation from their provincial or state regulating body.			
3	Instructors must be accredited by a regulating body. Bidder must submit written documentation supporting accreditation.	The Bidder must provide a letter or proof of academic accreditation along with the resume of a minimum of two instructors who will be performing the Work.			
4	Bidder must demonstrate how instruction will begin on the date the Bidder indicates in their project plan that describes the project activities in detail.	The Bidder must submit a project plan in sufficient detail to validate the project timelines and activities including a detailed work breakdown structure and project timelines applied to those activities.			
5	Bidder must provide the Institution's academic integrity policy.	The Bidder must submit their academic integrity policy and a description.			
6	The Bidder's Facility must have a commute time no greater than 1 hour and no more than 80km radius from CFB Esquimalt. Google maps will be used to calculate driving distance.	Bidder must provide the address of the facility along with a Google Maps/Map Quest etc., printout of driving directions from CFB ESQUIMALT to the facility.			

**Table B-2 Point-Rated Technical Criteria**

Item # Description and points		Evidence or documentation required to substantiate	Max Score 5	Min Score Each	Your Score	Reference to location in bid.
1	The Bidder has up to 5 years of experience instructing students on weapons systems engineering technical training within the past five years. >5 years experience in the past 5 years = 5pts <5 and >4 years experience in the past 5 = 4 pts <4 and >3 years experience in the past 5 years = 3 pts <3 and >2 years experience in the past 5 years = 2pts Less than 2 years experience will result in no points being awarded.	The Bidder should provide details of past projects including client name, project value, project timeline up to the month and a fulsome description of the course.	5	2		
The Bidder must achieve a minimum of 2 points to be deemed compliant.						

Solicitation No. - N° de l'invitation  
W0103-229031/A  
Client Ref. No. - N° de réf. du client  
W0103-229031

Amd. No. - N° de la modif.  
File No. - N° du dossier

Buyer ID - Id de l'acheteur  
VIC258  
CCC No./N° CCC - FMS No./N° VME

---

## **ANNEX D to PART 3 OF THE BID SOLICITATION**

### **ELECTRONIC PAYMENT INSTRUMENTS**

The Bidder accepts any of the following Electronic Payment Instrument(s):

- ☐ ( ) VISA Acquisition Card;
- ☐ ( ) MasterCard Acquisition Card;
- ☐ ( ) Direct Deposit (Domestic and International);
- ☐ ( ) Electronic Data Interchange (EDI);
- ☐ ( ) Wire Transfer (International Only);
- ☐ ( ) Large Value Transfer System (LVTS) (Over \$25M)

---

## ANNEX E to PART 5 OF THE BID SOLICITATION

### FEDERAL CONTRACTORS PROGRAM FOR EMPLOYMENT EQUITY - CERTIFICATION

I, the Bidder, by submitting the present information to the Contracting Authority, certify that the information provided is true as of the date indicated below. The certifications provided to Canada are subject to verification at all times. I understand that Canada will declare a bid non-responsive, or will declare a contractor in default, if a certification is found to be untrue, whether during the bid evaluation period or during the contract period. Canada will have the right to ask for additional information to verify the Bidder's certifications. Failure to comply with any request or requirement imposed by Canada may render the bid non-responsive or constitute a default under the Contract.

For further information on the Federal Contractors Program for Employment Equity visit [Employment and Social Development Canada \(ESDC\)-Labour's](#) website.

Date: \_\_\_\_\_ (YYYY/MM/DD) (If left blank, the date will be deemed to be the bid solicitation closing date.)

Complete both A and B.

A. Check only one of the following:

- ☐ A1. The Bidder certifies having no work force in Canada.
- ☐ A2. The Bidder certifies being a public sector employer.
- ☐ A3. The Bidder certifies being a [federally regulated employer](#) being subject to the [Employment Equity Act](#).
- ☐ A4. The Bidder certifies having a combined work force in Canada of less than 100 permanent full-time and/or permanent part-time employees.

A5. The Bidder has a combined workforce in Canada of 100 or more employees; and

- ☐ A5.1. The Bidder certifies already having a valid and current [Agreement to Implement Employment Equity](#) (AIEE) in place with ESDC-Labour.

**OR**

- ☐ A5.2. The Bidder certifies having submitted the [Agreement to Implement Employment Equity](#) (LAB1168) to ESDC-Labour. As this is a condition to contract award, proceed to completing the form Agreement to Implement Employment Equity (LAB1168), duly signing it, and transmit it to ESDC-Labour.

B. Check only one of the following:

- ☐ B1. The Bidder is not a Joint Venture.

**OR**

- ☐ B2. The Bidder is a Joint Venture and each member of the Joint Venture must provide the Contracting Authority with a completed annex Federal Contractors Program for Employment Equity - Certification. (Refer to the Joint Venture section of the Standard Instructions)

## ANNEX F

### STATUS AND AVAILABILITY OF RESOURCES - CERTIFICATION

The Supplier certifies that, should it be issued a supply arrangement as a result of the request for supply arrangements, every individual proposed and listed below in the arrangement or individuals with similar qualifications and experience will be available for the term of the supply arrangement.

If the Supplier has proposed any individual who is not an employee of the Supplier, the Supplier certifies that it has the permission from that individual to propose his/her services in relation to the Work to be performed and to submit his/her résumé to Canada with a written confirmation, signed by the individual, of the permission given to the Supplier and of his/her availability.

Name of Resource	Date	Work Category and Level
Name of Resource	Date	Work Category and Level
Name of Resource	Date	Work Category and Level
Name of Resource	Date	Work Category and Level
Name of Resource	Date	Work Category and Level
Name of Resource	Date	Work Category and Level
Name of Resource	Date	Work Category and Level



Solicitation No. - N° de l'invitation  
W0103-229031/A  
Client Ref. No. - N° de réf. du client  
W0103-229031

Amd. No. - N° de la modif.  
File No. - N° du dossier

Buyer ID - Id de l'acheteur  
VIC258  
CCC No./N° CCC - FMS No./N° VME

---

## **ANNEX G**

### **COVID-19 VACCINATION REQUIREMENT CERTIFICATION**

# COVID-19 Vaccination Requirement Certification Form

**Instructions:** The Certification form is to be completed and signed by the representative of the contractor, and submitted using the online Federal Supplier Vaccination Attestation portal. Upon completion of the online submission, the contractor will be provided with a confirmation number and an option to download details of their submission.

Should accommodation and mitigation measures be required, contact the contracting authority to discuss the contract in question, at your earliest convenience. The Certification form will only be considered complete once accommodation and mitigation measures have been approved by the contracting authority, as required.

Certifications must be completed and submitted as soon as possible in order to avoid follow-ups or delays. The final deadline for submissions is November 12, 2021.

## Certification

I, \_\_\_\_\_ (*first and last name*), as the representative of  
\_\_\_\_\_ (*name of business*) pursuant to the  
Contract(s) identified below, warrant and certify that all personnel that \_\_\_\_\_  
(*name of business*) will provide on the below listed Contract(s) who access federal government workplaces where they  
may come into contact with public servants will be:

- (a) fully vaccinated against COVID-19 with Health Canada-approved COVID-19 vaccine(s) as of  
November 15, 2021; or
- (b) for personnel that are unable to be vaccinated due to a certified medical contraindication, religion or other  
prohibited grounds of discrimination under the *Canadian Human Rights Act*, subject to accommodation  
and mitigation measures as of November 15, 2021 that have been presented to and approved by Canada; or
- (c) partially vaccinated against COVID-19 for a period of up to 10 weeks from the date of their first dose and  
subject to temporary measures that have been presented to and approved by Canada, immediately after  
which period the personnel will meet the conditions of (a) or (b) or will no longer access federal government  
workplaces where they may come into contact with public servants under this Contract;

until such time that Canada indicates that the vaccination requirements of the Government of Canada's COVID-19  
Vaccination Policy for Supplier Personnel are no longer in effect.



Contract(s) (list all Contract(s) with this department/agency where personnel access federal government workplaces where they may come into contact with public servants. If the box below is insufficient to list all Contracts, please add the remaining Contracts in the space provided on the last page of this document):

Accommodation and mitigation measures have been presented to and approved by Canada on the following Contract(s):

Temporary measures for partially vaccinated personnel have been presented to and approved by Canada on the following Contract(s):

I certify that all personnel provided by \_\_\_\_\_ (*name of business*) have been notified of the vaccination requirements of the Government of Canada's COVID-19 Vaccination Policy for Supplier Personnel, and that the \_\_\_\_\_ (*name of business*) has certified to their compliance with this requirement.

I certify that the information provided is true as of the date indicated below and will continue to be true for the duration of all Contracts. I understand that the certifications provided to Canada are subject to verification at all times. I also understand that Canada will declare a contractor in default if a certification is found to be untrue, whether made knowingly or unknowingly, during the contract period. Canada reserves the right to ask for additional information to verify the certifications. Failure to comply with any request or requirement imposed by Canada will constitute a default under the Contract.

This certification supersedes any previous certification submitted to the Government of Canada regarding compliance with the vaccination requirements of the Government of Canada's COVID-19 Vaccination Policy for Supplier Personnel under the aforementioned contract(s).

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

***Optional***

For data purposes only, initial below if your business already has its own vaccination policy or requirements for employees in place. Initialing below is not a substitute for completing the mandatory certification above.

Initials: \_\_\_\_\_

Information you provide on this Certification Form and in accordance with the Government of Canada's COVID-19 Vaccination Policy for Supplier Personnel will be protected, used, stored and disclosed in accordance with the *Privacy Act*. Please note that you have a right to access and correct any information on your file, and you have a right to file a complaint with the Office of the Privacy Commissioner regarding the handling of your personal information. These rights also apply to all individuals who are deemed to be personnel for the purpose for the Contract and who require access to federal government workplaces where they may come into contact with public servants.

**Additional contracts**