INSTRUCTIONS TO CANDIDATES

General Instructions

1. This examination has a total of 100 points. It consists of a morning session (worth 60 points) and an afternoon session (worth 40 points).
   a) The morning session consists of 5 questions numbered 1 through 5.
   b) The afternoon session consists of 4 questions numbered 6 through 9.

The points for each question are indicated at the beginning of the question. All questions pertain to the Case Study, which is enclosed inside the front cover of this exam booklet.

2. Failure to stop writing after time is called will result in the disqualification of your answers or further disciplinary action.

3. While every attempt is made to avoid defective questions, sometimes they do occur. If you believe a question is defective, the supervisor or proctor cannot give you any guidance beyond the instructions on the exam booklet.

Written-Answer Instructions

1. Write your candidate number at the top of each sheet. Your name must not appear.

2. Write on only one side of a sheet. Start each question on a fresh sheet. On each sheet, write the number of the question that you are answering. Do not answer more than one question on a single sheet.

3. The answer should be confined to the question as set.

4. When you are asked to calculate, show all your work including any applicable formulas.

5. When you finish, insert all your written-answer sheets into the Essay Answer Envelope. Be sure to hand in all your answer sheets because they cannot be accepted later. Seal the envelope and write your candidate number in the space provided on the outside of the envelope. Check the appropriate box to indicate morning or afternoon session for Exam CFESDM.

6. Be sure your written-answer envelope is signed because if it is not, your examination will not be graded.

Recognized by the Canadian Institute of Actuaries.

Tournez le cahier d’examen pour la version française.
CASE STUDY INSTRUCTIONS

The case study will be used as a basis for some examination questions. Be sure to answer the question asked by referring to the case study. For example, when asked for advantages of a particular plan design to a company referenced in the case study, your response should be limited to that company. Other advantages should not be listed, as they are extraneous to the question and will result in no additional credit. Further, if they conflict with the applicable advantages, no credit will be given.
**BEGINNING OF EXAMINATION**

Morning Session

---

**Question 1 pertains to the Case Study.**
**Each question should be answered independently.**

1. **(8 points)** Information on Big Ben can be found in section 6 of the case study.

   Six key drawbacks of using simple liquidity ratios as described in the Matz and Neu Note Liquidity Risk Measurement and Management; A Practitioner’s Guide to Global Best Practices are:

   I. Financial Statements are missing a time dimension (e.g., assets are considered only liquid or illiquid)
   II. Accounting rules do not necessarily reflect underlying economic risk
   III. Off balance sheet commitments may have significant liquidity risk
   IV. Marketability of securities e.g. are haircuts necessary
   V. Commercial paper is unsecured money markets funding and can therefore be volatile
   VI. Non-bank deposits may not be sticky

   (a) **(6 points)** Describe how each of the drawbacks (I to VI) affect the analysis of Big Ben Bank’s liquidity.

   (b) **(2 points)** Identify two potential Black Swan events related to liquidity that may affect Big Ben.
Question 2 pertains to the Case Study.
Each question should be answered independently.

2. (14 points) Information on Blue Jay Tire Co. can be found in section 3 of the case study.

Pierre Beaudry of Blue Jay Tire Co. (BJT) has made 2 recommendations:

A. Increase the prices of their tires as there has been no increase in competition at the current price levels
B. Ask their rubber supplier to decrease the price of rubber

(a) (2 points)

(i) Evaluate recommendation A in terms of the Bargaining Power of Buyers (Customers).

(ii) Evaluate recommendation A in terms of Threats of Potential New Entrants.

(iii) Evaluate recommendation B in terms of the Bargaining Power of Suppliers.

Pierre is considering increasing production of the RU42WD tire at the Montgomery, Alabama plant in the USA to spread fixed costs over more units and therefore increase margins. The accounting department has provided the information below on the production of tires at the plant:

<table>
<thead>
<tr>
<th></th>
<th>RU42WR</th>
<th>RU42WD</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selling Price</td>
<td>$45.00</td>
<td>$58.00</td>
<td></td>
</tr>
<tr>
<td>Direct materials &amp; labor / unit</td>
<td>$20.00</td>
<td>$25.00</td>
<td></td>
</tr>
<tr>
<td>Variable overhead / unit</td>
<td>$5.00</td>
<td>$15.00</td>
<td></td>
</tr>
<tr>
<td>Units Sold</td>
<td>900,000</td>
<td>2,000,000</td>
<td></td>
</tr>
<tr>
<td>Units Produced</td>
<td>1,000,000</td>
<td>2,200,000</td>
<td></td>
</tr>
<tr>
<td>Fixed manufacturing overhead</td>
<td></td>
<td></td>
<td>3,800,000</td>
</tr>
</tbody>
</table>

(b) (2 points)

(i) Calculate the profit of each tire model using absorption costing. Show your work.

(ii) Explain which tire model has a higher incentive to overproduce. Justify your answer.
2. Continued

(c) (3 points)

(i) Calculate the profit of each tire model using variable costing when overhead is assigned using direct material labor cost. Show your work.

(ii) Calculate the profit of each tire model using variable costing when overhead is assigned using all costs except for fixed overhead. Show your work.

(iii) Compare and contrast the previous two methods in assigning overhead costs for determining which tire model to produce at the Montgomery plant.

Rather than purchase a third production plant, Pierre wants to increase production at the Montgomery plant. Unit cost will drop by over 15% once increased production has reached a steady state.

(d) (2 points)

(i) Explain a possible problem of using a unit cost assumption derived from the above historical cost/benefit analysis.

(ii) Propose an alternative cost/benefit analysis that could be used to improve the analysis. Justify your response.

Based on a cost-leadership strategy, BJT has forecasted their unit cost to be 10% lower than the previous year. Amelia, the Executive VP from the Manufacturing division, proposes that to further increase profitability, the transfer price of the tires used by the Warranty division should be left unchanged from the previous year. Her compensation is as follows:

- Salary of $300K,
- Annual bonus of 100% if she reaches her divisional target, and
- Stock options that are valued at $300K yearly and vest after 8 years.

(e) (5 points)

(i) Discuss the merits of Amelia’s proposal addressing the areas of profitability and the compensation structure.

(ii) Identify the transfer price that maximizes BJT’s total profit.

(iii) Propose a management compensation design, which is equivalent in terms of dollar amount to the Amelia’s current level that could better avoid agency costs for BJT.
3. (13 points)

(a) (1 point) Define discrete optimization.

Information on Blue Jay Air (BJA) can be found in Section 2 of the Case Study.

As part of its international expansion strategy, BJA is assessing how to maximize profit margins by strategically designing seating arrangements for its international flights.

International flights will have two ticket types: Economy Class, and Comfort Class. The following information is known about the international flight strategy:

| Average Ticket Price | Economy Class: $500  
| Comfort Class: $900 |
| Plane Capacity       | 300 Economy Class seats OR  
| 200 Comfort Class seats OR  
| Any combination in between |

The goal is for BJA to maximize the amount of revenue received from ticket sales per flight. However, BJA’s internal policy is to ensure that all flights have at least 280 total seats available.

Additionally, in order to ensure that demand is met, BJA believes that there should be at least 3 times more Economy Class seats available than Comfort Class seats per flight. Industry research suggests that there is negligible risk of underselling a flight if this condition is met.

(b) (2 points)

(i) State the objective function.

(ii) State the constraint functions.

(c) (4 points) For the optimization problem defined in part (b):

(i) Sketch the feasible region with binding constraints clearly labelled.

(ii) Calculate the optimal solution. Show your work.
3. Continued

In an effort to further boost profit margins, BJA is considering removing the internal requirement of having a 280-seat capacity per flight. However, there are additional regulatory restrictions in place that require every commercial flight to have a total seat capacity of at least 80% of the total possible seat capacity.

(d) (1 point) State the new constraint functions.

(e) (1 point) Calculate the optimal solution for the optimization problem defined in part (d). Show your work.

(f) (2 points)

(i) Explain how linear optimization can be used to approximate solutions to discrete optimization problems.

(ii) Describe two additional considerations to adapt the answer from part (e) into a practical solution.

(g) (2 points) Critique whether the decision models in parts (b) and (d) are appropriate for BJA. Provide a recommendation and justify your answer.
4. (13 points) Information on BJT is found in section 3 of the case study.

The following activities are performed at BJT:

I. Distributor relations
II. Finance and accounting
III. Labor relations
IV. Social media management

(a) (3 points) Identify two core competencies of BJT from the list of activities (I – IV). Justify your answer.

(b) (1 point) Identify the activity (I – IV) that is most likely to be outsourced. Justify your answer.

An internal announcement is being prepared to notify all employees being laid off as a result of the outsourcing of the activity in part (b).

(c) (2 points)

(i) Describe two individual barriers to effective communication that may negatively impact how the memo is received by the employees.

(ii) Propose one action to overcome each barrier identified in part (i). Explain your proposal.

(d) (2 points)

(i) Describe two organizational barriers to effective communication that may negatively impact how the memo is received by the employees.

(ii) Propose one action to overcome each barrier identified in part (i). Explain your proposal.
4. **Continued**

(e) *(2 points)* Explain how using appropriate communication styles will impact the following risks for BJT with respect to the layoff decision:

(i) Legal

(ii) Reputational

(f) *(3 points)* Sketch a diagram of the first two levels for the internal announcement about the layoff using the Top-Down Approach from the Pyramid Principle.
5. (12 points) Information about Big Ben Bank can be found in Section 6 of the Case Study.

In order to manage interest rate risk on the liabilities associated with their new Long Term Principal Preservation Fund (LTPPF) product, Big Ben Bank enters into an interest rate swap agreement with ABC Bank, under which Big Ben Bank receives floating cash flows and ABC Bank receives fixed cash flows. Payments are netted and made quarterly.

Due to concerns about ABC Bank’s credit quality, a one-way Credit Support Annex (CSA) agreement is reached under which ABC Bank will post additional collateral in the form of company shares to Big Ben Bank. As part of the agreement, collateral must be posted at the time of quarterly payments if Big Ben Bank has positive exposure. The parameters of the collateral agreement one year from the agreement date are outlined below:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTM</td>
<td>500,000</td>
</tr>
<tr>
<td>Threshold</td>
<td>75,000</td>
</tr>
<tr>
<td>Minimum Transfer Amount</td>
<td>50,000</td>
</tr>
<tr>
<td>Rounding</td>
<td>50,000</td>
</tr>
<tr>
<td>MTM of collateral held by Big Ben Bank</td>
<td>250,000</td>
</tr>
<tr>
<td>Initial Margin</td>
<td>0</td>
</tr>
</tbody>
</table>

(a) (1 point) Calculate the amount of collateral that can be called by Big Ben Bank. Show your work.

(b) (4 points)

(i) Describe three problems with the CSA agreement from Big Ben Bank’s perspective.

(ii) Recommend changes to the CSA agreement based on your answer in (i).
Big Ben Bank has decided to discontinue the swap strategy. Consider the following three alternate interest rate risk mitigation strategies:

I. Limiting the total amount of withdrawals per year for LTPPF to a maximum of 10% of the account value of the pool for the first 10 years. Withdrawals over this threshold will have a haircut applied.

II. Implementation of a cap on interest credited.

III. Diversifying with introduction of fixed benefit products through online distribution channels.

(c) (3 points) Evaluate each of the three strategies I to III based on Big Ben Bank’s business objectives and exposure to secondary risks.

(d) (1 point) Recommend a strategy for Big Ben Bank to pursue based on your answer in part (c).

Your coworker has sent you an email with his opinion about the best strategy:

“Everyone does online global platforms nowadays. This is the way of the future. Look at all the companies that are on-line, they are all doing great. A company XYZ has done it and they made a great profit last year. Innovation is always the way to go, else you just go extinct, like dinosaurs.”

(e) (3 points) Identify the biases that your coworker exhibits. Justify your answer.