ACTUARIAL SOCIETY OF SOUTH AFRICA

EXAMINATION

20 October 2023 (am)

Subject F207|B200 — Banking Fellowship Applications

Time allowed: *Three hours and twenty minutes (which includes five minutes for downloading and uploading your answer document)*

Total marks: *100*

INSTRUCTIONS TO THE CANDIDATE

1. *Ensure that you are logged in and authenticated through Examity before you attempt the examination.*
2. *The question paper is only available in the ASSA Exam Platform as a PDF download and may not be printed. Copy/paste of questions or parts thereof is allowed from the question paper to your Word answer document only.*
3. *Download the Word answer document template from the ASSA Exam Platform. Save this Word answer document on your desktop using your Candidate Number as filename. You are required to submit your answers in Word format ONLY using this document. No answers in any other format (e.g., handwritten) will be accepted. Save work regularly.*
4. *Ensure that your Candidate Number appears in the "header" of your Word answer document. [Double-click on the header at the top of the Word document, input your Candidate Number only in the header, then press "Esc" to close the header.]* ***Do not use your name or member number anywhere in your Word answer document.***
5. *You may not access any file from your computer, use any other computer program (e.g., Email or Excel), or open any other browser during the examination. The use of Grammarly and Grammarly Premium or similar is also not permitted in examinations.*
6. *You may not use any other material (e.g., a Formulae and Tables book) during the examination. Any such information that may be required will be provided to you within the examination.*
7. *You are strongly encouraged to use the first 15 minutes as reading time only, however, you may start answering the paper whenever you are ready.*
8. *Mark allocations are shown in brackets.*
9. *Attempt all questions.*
10. *Show calculations where appropriate. You may use blank paper to carry out rough work calculations. You may use a calculator from the approved list only.*
11. *Upload your Word answer document only into the ASSA Exam Platform. Once you have uploaded your document, you must click on* ***Finish Attempt*** *to save your document. You will still be allowed to go back and make changes (****Review Attempt****) if you have time.*
12. *Once you are satisfied with your uploaded document, click* ***Finish attempt*** *and* ***Finish all and Submit****. Once you have submitted you will not be able to make any changes.*
13. ***You must submit your Word answer document BEFORE the end of the allotted examination time.*** *You must stop writing and start uploading during the last five minutes. Take this into account when planning your review and submission. There will be no time announcements.*

Note: The Actuarial Society of South Africa will not be held responsible for loss of data where candidates have not followed instructions as set out above.

END OF INSTRUCTIONS

QUESTION 1

You are part of the Internal Audit function of PeeWee Bank – a full-service Retail bank. After completing the results for Q2 2022, the CFO of the Loans division approaches you with the statistics for the division, shown in the table below.

These are income statement and balance sheet items, as well as the actual and predicted values for the 3 variables that are the inputs for the macroeconomic linkage model used for estimating the forward-looking PD (Probability of Default) (used in the SICR (Significant Increase in Credit Risk) calculations).

The CFO is concerned there may be an error in the provisioning numbers and is uncertain what the cause might be. The bank's financial period runs in line with a calendar year i.e. from 1 Jan to 31 Dec.

Summarised Statistics From The Loans Portfolio & Forward Looking PD Model Input Variables								
	2021 Financial Year				**2022 Financial Year**			
	Q1	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**
Balance Sheet Size - Loans ($bn)	$150,0	$152,3	$154,5	$156,9	$159,2	$161,6		
Total Provisions Held ($bn)	$16,0	$16,5	$17,0	$15,6	$16,0	$16,2		
Coverage Ratio	10,7%	10,8%	11,0%	9,9%	10,0%	10,0%		
Year To Date Profits In Each FY ($bn)	$3,8	$7,6	$11,6	$17,1	$4,0	$8,1		
Actual Inflation Rate (Annual)	4,5%	4,6%	4,0%	2,9%	3,0%	3,1%		
Predicted Future Inflation Rate							3,0%	3,1%
GDP Growth (Annual)	3,0%	3,2%	3,1%	2,9%	3,0%	3,0%		
Predicted Future GDP Growth							3,1%	3,2%
Jobs Created As % Employed Population (Annual)	2,7%	2,6%	2,7%	2,5%	2,7%	2,6%		
Predicted Jobs Created As % Employed Population							2,8%	2,7%

i. Detail the additional information you would require in order to perform a full audit on the provisioning results for the last 4 quarters.

[8]

An investigation confirms that the provisioning models and calculations over the period were stable and there were no material changes. However, you do discover that the basket of goods used to calculate the inflation rate for the country changed during Q4 of 2021 and that this new inflation basket was used from that point onwards (even for the predicted inflation rates) as inputs into the macroeconomic linking model.

ii Discuss the steps that the bank should follow in order to rectify the financials for the relevant quarters.

[9]

[Total 17]

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QUESTION 2

You are the head of risk for Trust Bank. Trust Bank is a large multi-national bank that offers a full suite of personal and business banking products and services. The model development team plans to build and implement a real-time, AI-based tool to improve detection and prevention of fraudulent transactions. This tool would make use of a machine learning algorithm to determine whether a transaction is likely to be fraudulent and, if so, would block the transaction from being processed.

"Machine learning" (ML) uses statistical methods to enable machines to learn from data and improve their performance on specific tasks over time.

i. Outline the risks associated with the incorporation of machine learning into models and suggest ways in which the bank can ensure that an appropriate governance framework for machine learning models is in place.

[4]

ii. Suggest types of data that should be considered for use in development of the ML algorithm, outlining why this data may be relevant in the context of fraud detection, and discuss the considerations that should be applied when selecting, extracting and preparing the data.

[10]

iii. Describe the risks associated with implementing the proposed tool as suggested, and propose ways in which these risks can be managed or mitigated

[12]

[Total 26]

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QUESTION 3

CorpCoBank is a large multinational bank that focuses on the corporate lending market. Loan applications in CorpCoBank's international portfolio are assessed using a purely qualitative scorecard. This assessment is performed centrally out of the bank's head office. As part of CorpCoBank's continuing expansion, the bank's management have become concerned about the bank's ability to appropriately assess credit experience in this portfolio, especially in light of global macroeconomic uncertainty, rising inflation and rising interest rates.

The bank has engaged you as an independent consultant and the Head of Credit Risk has asked you to explore the use of a more statistical approach to credit assessment at origination.

i. Briefly discuss the data challenges associated with building models for corporate portfolios.
[8]

ii. As part of moving to a more quantitative modelling approach, the bank has requested that you explore making use of "Facility Rating" approach in underwriting and pricing.

A facility rating approach is one where the overall rating is based on a dual-matrix approach, which incorporates both probability of default and loss given default and the overall rating is based on expected loss. The table below illustrates a potential facility rating model.

Facility rating table:

Borrower rating	**LGD dimension**				
	[0%-10%]	**[10%-20%]**	**……**	**[50%-60%]**	**……**
AAA	0.0005%	0.0038%		0.0149%	
AA+	0.0005%	0.0038%		0.0230%	
AA	0.0019%	0.0160%		0.0636%	
……..					
B	0.2675%	2.0521%		8.6511%	
C	1.0896%	9.2042%		25.3492%	

Where:

Expected Loss	
Low risk	
Moderate Risk	
High Risk	

Discuss the key considerations in moving to a Facility Rating approach.
[13]

iii. Outline the considerations to ensure a successful implementation of this model in the application process.
[11]

[Total 32]

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QUESTION 4

Green Leaf Bank is a full-service bank based in an emerging market. You are the Actuarial Head overlooking the lending divisions of the bank, both retail and commercial market segments.

Two solar installation companies have independently approached the bank, requesting that a commercial arrangement is set up between Green Leaf Bank and the companies in order to facilitate finance arrangements for their customers.

Currently solar installation customers pay in full once the installations are completed, with neither company offering credit terms. Both companies have completed customer surveys and discovered many customers cannot afford the quote and often resort to loans in order to finance the cost.

Both solar installation companies believe that their news business turn-over would materially increase should Green Leaf provide favourable finance terms, both from a price and an "access to finance" perspective.

The solar companies will compile and send applications for finance to Green Leaf for a fee per application (the fee will still need to be negotiated) and the companies will promote the bank on their websites and other marketing initiatives as their partner of choice.

Both companies are banked with a competitor in the local market.

Your team has gathered the below information from the two companies.

Information on quotes provided

	# Employees	# Quotations in 2022	Total Value Of Quotations In 2022 ($'m)	Average Quotation Value	Smallest Quotation Value	Largest Quotation Value
Sunny Solar	500	33 750	6 075	180 000	100 000	3 200 000
New Age Solar	50	9 000	1 080	120 000	45 000	90 000
Totals	550	42 750	7 155	167 368		

Information on installations completed provided

	# Employees	# Installations In 2022	Total Value Of Installations In 2022 ($'m)	Average Installation Value	Smallest Installation Value	Largest Installation Value
Sunny Solar	500	18 750	2 531	135 000	80 000	1 300 000
New Age Solar	50	3 000	240	80 000	35 000	75 000
Totals	550	21 750	2 771	127 414		

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The table below reflects the current balance sheet size of the Retail asset book of Green Leaf

Summarised Balance Sheet Of Green Leaf Bank

Retail Division	Book Size In $'m	# Active Facilities	Average Facility Size
Credit Card Portfolio	68 000	2 000 000	34 000
Unsecured Loans Portfolio	44 000	790 000	55 696
Mortgage Portfolio	700 000	360 000	1 944 444
Overdraft Portfolio	22 000	550 000	40 000
Total Retail Credit Book	834 000		

i. Detail the benefits to Green Leaf of entering into an arrangement with these companies.

[5]

ii. Explain how to estimate the size of the credit business opportunity.

[5]

iii. Detail any additional risks one would need to consider before entering into a relationship with these two providers.

[3]

iv. Outline how the new business process could be set up between Green Leaf and the solar companies.

[5]

v. Detail how the pricing may differ on this offering versus the standard offerings provided by the bank.

[5]

vi. Outline the considerations (from a customer point of view) in deciding between a traditional finance product as compared a solar specific loan, to finance such installations.

[2]

[Total 25]

[GRAND TOTAL 100]

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END OF EXAMINATION