CERTIFIED PUBLIC ACCOUNTANT

ADVANCED LEVEL 2 EXAMINATION

A2.2: STRATEGIC PERFORMANCE MANAGEMENT

DATE: THURSDAY 27, AUGUST 2026

MARKING AND ANSWER GUIDE

SECTION A

QUESTION ONE

Marking Guide

Description	Allocated Marks
(a) Assessment the financial performance of using Return on Investment (ROI) and Residual Income (RI)	
Award 0.5 Mark for adding back central admin cost and 0.5 mark for HO share of Depreciation and 1 mark for well calculated controllable profit for each division, max: 4 Marks	4
Award 2 Mark for well calculated average controllable net assets for each division, max: 2 Marks	4
Award 1 Marks for a well calculated ROI for each division Max: 2 Marks	2
Award 1 Marks for a well calculated RI for each division Max: 2 Marks	2
Comment on the results of the two performance measures and explain whether residual income	
Award 2 Marks for a well interpreted and explained result of ROI and RI, Max: 2 Marks	2
(b) Calculate the seat profit under each of the three categories under both traditional and ABC	
Traditional Costing system	
Award 1.5 Mark for a well calculated total overheads, Max: 1.5 Mark	1.5
Award 0.5 Marks for a well calculated overhead per seat for each category (max 1.5 marks)	1.5
Award 0.5 Marks for a well calculated profit per seat for each category, Max: 1.5 Marks	1.5
Activity Based Costing (ABC)	
Award 1.5 Marks for well calculated overhead per seat, and well allocated OH for each activity Max: 4.5 Marks	6
Award 0.5 Marks for a well calculated profit per seat for each category, Max: 3 Marks	1.5
(C) Calculate and interpret the following variance for Black Panthers Basketball Club's three seat categories	
Sales Price variance	
Award 1.5 Marks for well calculated variance and 0.5 Marks for a good interpretation, Max: 2 Marks	2
Sales Volume Profit Variance	
Award 1.5 Marks for well calculated variance and 0.5 Marks for a good interpretation, Max: 2 Marks	2
Sales Mix Profit Variance	
Award 2.5 Marks for well calculated variance and 0.5 Marks for a good interpretation, Max: 3 Marks	3
Sales Quantity Profit Variance	
Award 2.5 Marks for well calculated variance and 0.5 Marks for a good interpretation, Max: 3 Marks	3
(d) Calculate direct materials mix and yield variances for the month of July 2025	
Material mix variance	
Award 1 Mark for each well calculated variance, Max: 3 Marks	3
Material yield variance	
Award 1 Mark for each well calculated variance, Max: 3 Marks	3
(e) The four perspectives of the Balanced Scorecard and its benefits over ROI and RI	
Award 1 Mark for the definition of the Balance Scorecard, Max: 1 Mark	1

Award 1 Mark for each well explained perspective of the Balance Scorecard, Max: 4	4
Award 1 Marks for a well explained benefits of the Balance Scorecard, Max: 3	3
	50

Answer Guide

a) Assess the financial performance of using Return on Investment (ROI) and Residual Income (RI) for each of the two divisions of KIG manufacturing Limited

Step 1: Calculate Divisional Controllable Profit

Controllable profit excludes:

- Depreciation relating to Head Office controlled assets (35%)
- Head Office allocated costs

Details	Division P	Division C
	FRW'000	FRW'000
Divisional profit	2,370	3,750
Fixed costs	1,980	2,630
Depreciation	280	620
Depreciation relating to Head Office assets	35%	35%
Depreciation relating solely to division	98	217
Head office costs	540	760
Controllable profit	3,008	4,727

Step 2: calculate divisional average controllable net assets

Details	Division P	Division C
	FRW'000	FRW'000
Opening divisional controllable net assets	15,000	20,000
Closing divisional controllable net assets	17,000	24,000
Average Controllable Net Assets	16,000	22,000

Calculation of divisional ROI and RI

Return on Investment (ROI)

$$ROI = \frac{\text{Controllable Profit}}{\text{Average Controllable Net Assets}} \times 100$$

Details	Division P	Division C
controllable profit-FRW (A)	3,008	4,727
Average Controllable Net Assets-FRW (B)	16,000	22,000
Return on Investment (A/B)	18.80%	21.50%

Division C exceeds the target return on investment of 20% as it has 21.5%. Division P falls slightly below the target with 18.8%.

Residual Income (RI)

$$RI = \text{Controllable Profit} - (\text{Cost of Capital} \times \text{Average Assets})$$

Details	Division P	Division C
controllable profit-FRW	3,008	4,727
Average Controllable Net Assets-FRW (A)	16,000	22,000
Cost of capital (B)	14%	14%

Cost of capital*Average assets	2,240	3080
Residual Income	768	1,647

- Briefly comment on the results of the two performance measures and explain whether residual income is likely to encourage better investment decisions than ROI.
- Both divisions generated positive residual income**,** indicating that they earned returns greater than the company's 14% cost of capital and therefore created value for KIG Manufacturing Limited.
- Division C performed better than Division P under both ROI and RI financial performance measures. It achieved a higher ROI (21.5%) and generated a larger residual income (FRW 1,647,000).
- Although ROI is useful for comparing the efficiency of divisions, it can encourage managers to reject profitable projects if those projects reduce the division's overall ROI. This may lead to decisions that are not in the best interests of the company (goal incongruence).
- Residual Income overcomes this problem because managers are encouraged to accept any investment that earns more than the company's cost of capital. Therefore**,** RI is more likely to promote goal congruence and better long-term investment decisions than ROI**.**
- It reduces dysfunctional behaviour: Managers assessed solely on ROI may reject profitable investments if those investments reduce the division's percentage ROI. Similarly, managers focused only on RI may overlook important non-financial factors such as customer satisfaction or product quality. The Balanced Scorecard encourages managers to balance financial performance with customer service, operational excellence, and employee development, thereby reducing dysfunctional behaviour.

b) Calculate the seat profit under each of the three categories under both traditional and Activity Based Costing System

Traditional costing system
Step1 : calculation of toatal annual overhead
Overhead Absorption Rate (OAR) under the traditional costing system was calculated at FRW 24,000 per event labour hour. Therefore, with these data, the total annual overheads can be calculated as

Seat category	Total event labor hours per category	OAR	Total overhead
	Hours	FRW	FRW
Classic seats	400	24,000	9,600,000
Lowe bowl seats	280	24,000	6,720,000
Upper bowl seats	160	24,000	3,840,000
Total Overheads			20,160,000

Step 2: calculation of overhead per seat (ticket)

Seat category	Total overhead	Budgeted seats to be sold	O/H per ticket
	FRW		
Classic seats	9,600,000	1,600	6,000
Lowe bowl seats	6,720,000	800	8,400

Upper bowl seats	3,840,000	1,200	3,200
Total Overheads	20,160,000	3,600	

Step 3: calculation of seat/ ticket profit

Details	Classic seats	Lowe bowl seats	Upper bowl seats
	FRW	FRW	FRW
Net revenue per ticket	26,300	20,000	13,000
O/H per ticket	-6,000	-8,400	-3,200
Profit per ticket	20,300	11,600	9,800

Activitiy Based Costing (ABC)

Step1 : calculation of OAR per each unit of cost driver

Cost pools	Allocated Overheads (A)	Cost drivers	Units of cost drivers (B)	OAR per cost driver
Stadium maintenance	6,451,200	Maint. event-days	85 days	75,896
Utilities	2,620,800	Arena oper. hours	285 oper. hours	9,196
Pitch/court management	1,814,400	Court prep hours	420 prep hours	4,320
Match security	2,419,200	Attendees	3,600 tickets	672
Other staff	6,854,400	Events labor hours	840 labor hours	8,160
Total	20,160,000			

Step2: calculation of overhead per ticket

Details		Classic seats		Lowe bowl seats		Upper bowl seats	
	OAR	No of units	Total		Total	No of units	Total
Stadium maintenance	75,896	40	3,035,859	30	2,276,894	15	1,138,447
Utilities	9,196	120	1,103,495	90	827,621	75	689,684
Pitch/court management	4,320	200	864,000	140	604,800	80	345,600
Match security	672	1600	1,075,200	800	537,600	1200	806,400
Other staff	8,160	400	3,264,000	280	2,284,800	160	1,305,600
Total			9,342,554		6,531,715		4,285,731
Budgeted number of units			1,600		800		1,200
O/H per ticket/seat			5,839		8,165		3,571

Step3: profit per seat using Activity Based Costing system

Details	Classic seats	Lowe bowl seats	Upper bowl seats
	FRW	FRW	FRW
Net revenue per ticket	26,300	20,000	13,000
O/H per ticket	5,839	8,165	3,571
Profit per ticket	20,461	11,835	9,429

c) Calculation and interpretation of the variances for Black Panthers Basketball Club's three seat categories

i)Sales Price variance (SPV)
SPV=(AP-SP) *AQ
Where:
AP: Actual selling price
SP: Standard selling price
AQ: Actual quantity

Details	Classic seats	Lowe bowl seats	Upper bowl seats
Actual Selling Price per ticket-FRW	60,000	40,000	15,000
Standard Selling Price per ticket-FRW	50,000	35,000	22,000
(AP-SP)-FRW	10,000	5,000	-7,000
Actual quantity sold-Tickets	1,200	660	1,540
Sales Price Variance-FRW	12,000,000	3,300,000	-10,780,000
Favorable/Adverse	Favorable	Favorable	Adverse

Interpretation: The sales price variance of (FRW 10,789,000) shows that the Black Panthers Basketball Club sold tickets at relatively lower prices compared to the standard tickets, resulting in an overall loss of FRW 10,789,000

ii)Sales Volume Profit Variance

Details	Classic seats	Lowe bowl seats	Upper bowl seats
Budgeted tickets	1,600	800	1200
Actual tickets sold	1,200	660	1,540
(AQ-BQ)	-400	-140	340
Standard Profit**-FRW	20,461	11,835	9,429
Sales Volume Variance-FRW	-8,184,362	-1,656,950	3,205,709
Favorable/Adverse	Adverse	Adverse	Favorable

Standard Profit**: The Standard profit was extracted from the standard profit per unit under the Activity Based Costing.
Interpretation: The sales volume profit variance of FRW 3,205,709 shows that the Black Panthers Basketball Club more tickets than expected, as a result, it increased the overall profit by FRW 3,205,709

iii)Sales Mix Profit Variance

Product	Standard Mix	AQSM**	AQAM	Difference	Standard Profit	Variance	F/A
	Tickets	Tickets	Tickets	Tickets	FRW	FRW	
Classic seats	1,600	1,511	1,200	311	20,461	6,365,614.59	A
Lowe bowl seats	800	756	660	96	11,835	1,130,934.02	A
Upper bowl seats	1,200	1,133	1,540	-407	9,429	-3,834,279.96	F
Total	3,600	3,400				3,662,268.65	A

AQSM**: Actual quantity in Standard Mix
AQAM**: Actual quantity in Actual Mix
SP** The Standard profit was extracted from the standard profit per unit under the Activity Based Costing.

Interpretation: The club earned FRW 3,662,268.65 less profit than it would have earned if the actual total sales volume had been achieved using the standard sales mix.

iv)Sales Volume Profit Variance

Product type	B.Qty	A.Qty sold	Std Profit	Sales QTY variance	comment
Classic Suites	1600	1,200	20,461	8,184,362	Adv
Lower Bowl	800	660	11,835	1,656,950	Adv
Upper Bowl	1200	1,540	9,429	3,205,710	Fav
Total	3600	3,400		6,635,602	Adv

Interpretation: This adverse sales volume profit variance of FRW 6,635,602 indicates that the actual sales volume generated FRW 6,635,602 less profit than budgeted, mainly because the actual number and/or mix of tickets sold produced lower profit than expected.

d) Calculation of direct material mix and yield variances vor rthe month of July 2025

Direct materials mix variance

Input materials	Standard Mix	AQAM	AQSM	Difference	SP	Variance	F/A
	Kilograms	Kilograms	Kilograms	Kilograms	FRW	FRW	
Sorghum	45,000	45,000	47,250	-2,250	300	-675,000	F
Maize	180,000	190,000	189,000	1,000	260	260,000	A
Wheat	75,000	80,000	78,750	1,250	220	275,000	A
Total	300,000	315,000	315,000			-140,000	F

Direct materials yield varaince

Input materials	AQSM	SQSM	Difference	SP	Variance	F/A
	Kilograms	Kilograms	Kilograms	FRW	FRW	
Sorghum	47,250	45,000	2,250	300	675,000	A
Maize	189,000	180,000	9,000	260	2,340,000	A
Wheat	78,750	75,000	3,750	220	825,000	A
Total	315,000	300,000	-615,000		3,840,000	A

e)Discuss the four perspectives of the Balanced Scorecard and outline its benefits over the purely financial measures used in requirement (a)

Four Perspectives of the Balanced Scorecard

The Balanced Scorecard (BSC) is a strategic performance management framework developed by Kaplan and Norton. It measures organisational performance from both financial and non-financial perspectives, ensuring that day-to-day activities are aligned with the organisation's long-term strategy.

- Financial perspective: This perspective assesses whether the company's strategy and operations contribute to improved financial performance and shareholder value. Typical measures include: revenue growth, profit margin, ROI, (RI), cash flow etc....
- Customer perspective: This perspective measures how customers perceive the organisation and whether it is successfully delivering value to its target market. Its measures include: customer satisfaction, customer complaints, market share, customer retention etc.....
- Internal business process perspective: This perspective evaluates how efficiently the organisation performs the activities that create value for customers. Typical measures include: production efficiency, manufacturing cycle time, inventory turnover, product defects, waste levels etc....
- Learning and growth perspective: This perspective focuses on developing the organisation's people, technology, and culture to support continuous improvement and future success. Typical measures include: employee training hours, employee engagement, staff turnover, innovation, information systems capability, number of improvement suggestions etc....

Benefits of the Balanced Scorecard Compared with ROI and RI

- The Balance Scorecard provides a balanced view of performance: ROI and RI focus only on financial outcomes. The Balanced Scorecard combines financial and non-financial measures, giving management a more comprehensive picture of organisational performance.
- The Balance scorecard aligns performance with strategy: The BSC translates strategic objectives into measurable performance indicators across all business functions. While the ROI and RI only focus on financial measures.
- It identifies problems earlier: Financial measures are lagging indicators**,** showing results only after events have occurred. The BSC incorporates leading indicators**,** such as employee training, product quality, and customer satisfaction, enabling management to detect and address issues before they affect financial performance.
- Encourages continuous improvement: The BSC promotes continuous improvement in operations, innovation, product quality, customer service, and employee capability rather than focusing solely on short-term profits.
- It improves decision-making: Managers make decisions using operational, customer, employee, and financial information rather than relying exclusively on accounting figures. This leads to more informed and balanced decisions.
- It promotes goal congruence: The BSC aligns departmental objectives with corporate strategy, ensuring that employees across all functions work towards common organisational goals.

SECTION B

QUESTION TWO

Marking Guide

Description	Allocated Marks
Assessment of appropriate pricing strategy for each product	
Award 1 Mark for well identified each pricing and 1 Mark for each reason, Max: 8Marks	8
Preparation of a flexible budget for October 2025	
Award 0.5 Marks for well calculated Sales Max: 1.5 Marks	1.5
Award 0.5 Marks for each well calculated direct material cost, Max: 1.5 Marks	1.5
Award 0.5 Marks for each well calculated Direct labour cost, Max: 1.5 Marks	1.5
Award 0.5 Marks for each well calculated Sales commission, Max: 1.5 Marks	1.5
Award 0.5 Marks for well calculated Patent royalty, Max: 1.5Marks	1.5
Award 0.5 Marks for each well calculated Manufacturing overhead, Max: 1.5 Marks	1.5
Award 0.5 Marks for each well calculated Fixed marketing costs, Max: 1.5 Marks	1.5
Award 0.5 Marks for each well calculated Budgeted Operating profit/loss, Max: 1.5 Marks	1.5
Benefits of adoption of BPR	
Award 1 Mark for a well defined BPR, Max: 1 Mark	1
Award 1 Mark for each well explained benefit of adopting BPR, Max: 4 Marks	4
Total	25

Model Answer

a)Identify the most appropriate pricing strategy for each of SmartWash Eco Detergent and VisionPro X1 Smart Glasses and justify your recommendation using evidence from the case

For SmartWash Eco Detergent, **penetration pricing** strategy should be used**.** This pricing involves introducing a product at a low initial price to quickly attract customers and gain a large market share.

This strategy is appropriate because of the following circumstances:

- Highly competitive market: The detergent market already contains many local and international brands. A low introductory price helps attract customers away from competitors.
- Price-sensitive customers: Market research shows consumers are willing to switch brands if offered lower prices. This indicates that demand is highly price elastic, making low prices an effective competitive tool.
- Large market potential: Demand is expected to increase significantly if prices remain affordable. Low pricing encourages mass adoption.
- Economies of scale: The company has invested in a large production plant with spare capacity. Producing large quantities reduces the cost per unit, making low prices sustainable.
- Objective of rapid market share growth: Management wants to build market share quickly before competitors enter. Penetration pricing helps establish customer loyalty early.
- Discouraging new entrants: Low prices reduce the attractiveness of the market for potential competitors because profit margins become smaller.

For VisionPro X1 Smart Glasses, the appropriate pricing strategy would be **price skimming** pricing strategy. This pricing strategy involves launching a product at a high initial price and gradually lowering the price over time as new customer segments are targeted. This is because of the following reasons:

- Highly innovative product: The smart glasses offer unique features not currently available in the regional market. Customers perceive the product as highly differentiated.
- Customers willing to pay premium prices: Technology enthusiasts and high-income professionals are eager to purchase despite high prices. Early demand is therefore relatively price inelastic.
- Recovery of R&D investment: The company invested heavily in research and development. High initial prices enable faster recovery of these development costs.
- Short product life cycle: Technology products become obsolete quickly. Maximizing profits early is therefore important.
- Uncertain price sensitivity: Since customer price responsiveness is unknown, charging a premium initially allows the company to test demand while maximizing margins.
- Future market segmentation: The company plans to introduce less sophisticated, lower-priced versions later. This is a classic feature of price skimming, where prices are gradually reduced to reach additional customer segments.
- Need for early cash flow: Premium pricing generates strong early cash inflows that can finance further research and future product development.

b) Prepare a flexible budget for October 2025, showing budgeted amount at each three output levels of production of 4,000 boxes, 5,000 boxes and 6,000 boxes.

Step1: classify costs into variable and fixed
Using the August 2025 data (4,500 boxes):

Cost Item	**Total (FRW)**	**Cost Behaviour**	**Cost per Box (FRW)**
Direct materials	900,000	Variable	200
Direct manufacturing labor	67,500	Variable	15
Manufacturing overhead	507,000	Fixed	-
Selling commission	550 per box	Variable	550
Patent royalty	200 per box	Variable	200
Fixed marketing costs	813,500	Fixed	-

Item	Basis	October rate/Amount
Selling price/box	(1600*1.10)	1 760
Direct materials/box	(200*1.10)	220
Direct manufacturing labour/box	unchanged	15
Patent royalty/box	unchanged	200
Marketing commission/box	unchanged	550
Fixed manufacturing costs (monthly)	507,000+(1,200,000/12)	607 000
Fixed marketing costs (monthly)	813,500+(1,500,000/12)	938 500

Innovate Africa Ltd: Flexible Budget for October 2025

Details	4,000 boxes	5,000 boxes	6,000 boxes
	FRW	FRW	FRW
Revenue (1,760/box)	7 040 000	8 800 000	10 560 000
Variable costs			
Direct materials (220/box)	880 000	1 100 000	1 320 000
Direct manufacturing labour (15/box)	60 000	75 000	90 000
Patent royalty (200/box)	800 000	1 000 000	1 200 000
Marketing commission (550/box)	2 200 000	2 750 000	3 300 000
Total variable costs	3 940 000	4 925 000	5 910 000
Contribution margin	3 100 000	3 875 000	4 650 000
Fixed costs:			
Fixed manufacturing costs	607 000	607 000	607 000
Fixed marketing costs	938 500	938 500	938 500
Total fixed costs	1 545 500	1 545 500	1 545 500
Budgeted operating income	1 554 500	2 329 500	3 104 500

c)As a Business Process Re-engineering consultant appointed by Prime Health Supplies Ltd, discuss how the adoption of BPR would improve the company's operations Introduction

Business Process Re-engineering (BPR) is the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical performance measures such as cost, quality, service, and speed. Rather than making small incremental improvements, BPR redesigns entire processes to eliminate non-value-adding activities and improve organizational performance.

For Prime Health Supplies Ltd (PHSL), implementing BPR would address the current operational inefficiencies and significantly improve customer service, productivity, and competitiveness.

How BPR Would Improve PHSL's Operations

- Combination of several jobs into one: Currently, customer orders pass through numerous departments, each performing only a small task. Under BPR, Cross-functional teams would handle the entire order fulfilment process and One employee or team would process orders from receipt to delivery. This would benefit PHSL by eliminating unnecessary handovers, reducing delays, improving accountability, and speeding up order processing.
- Empower employees to make decisions: At present, employees must obtain supervisory approval even for minor decisions. BPR would empower frontline employees to make routine operational decisions and reduce dependence on managers. This would benefit PHSL by fastening decision-making, reducing waiting time, improving customer responsiveness and it would ensure greater employee motivation and job satisfaction.
- Perform Activities in Their Natural Order: Currently, orders are repeatedly checked by different departments. BPR redesigns the workflow so that activities occur only once, information is captured once and shared throughout the process and work follows a logical

sequence. This would benefit PHSL by eliminating duplication, reducing paperwork, shortening processing time and improving efficiency.

- Reduce Unnecessary Checks and Controls: PHSL currently requires multiple signatures and repeated verification. BPR would remove unnecessary approvals, retain only essential controls and use automated validation where appropriate. This would benefit PHSL by fastening processing, lowering administrative costs, reducing bureaucracy, ensuring greater operational flexibility.
- Build Quality into the Process: Quality inspections are currently performed only after packing, leading to rework. BPR promotes quality checks during each stage of processing and prevention rather than detection of errors. This would benefit PHSL by reducing rework, lowering quality costs, fewer customer complaints will be received and there would be higher product accuracy.
- Assign a Single Point of Contact: Customers currently receive conflicting information because several departments handle enquiries. BPR introduces a case manager or customer relationship officer responsible for each order. This would benefit PHSL through consistent communication, faster response to enquiries, improved customer satisfaction and greater accountability.
- Eliminate Functional Silos
- Make Greater Use of Information Technology
- Reduce Order Fulfilment Time
- Reduce Operating Costs
- Improve Customer Satisfaction
- Improve Employee Motivation
- Improve Organizational Accountability
- Increase Organizational Competitiveness

QUESTION THREE

Marking Guide

Description	Allocated Marks
Application of TQM and types of quality costs	
Award 1 Mark for a well explained TQM concept, Max: 1 Mark	1
Award 0.5 Marks for each explained application of TQM to RCMHS, Max: 3 Marks	3
Award 0.5 Marks for each explained quality cost Max: 2 Marks	2
Limiting Factor and shadow price	
Award 1 Mark for a well identified limiting factor, Max: 2 Mark	2
Award 0.5 Marks for a well calculated contribution per unit, Max: 1.5 Marks	1.5
Award 0.5 Marks for each calculated contribution per Specialist Hour and Ranking, Max: 1.5 Marks	1.5
Award 1 Mark for well calculated production plan, Max: 3 Marks	3
Award 2 Mars for a well calculated total profit, Max: 2 Marks	2
Award 2 Marks for a well calculated and 1 Mark for well interpreted and commented shadow price	3
Evaluation of the Two Options Using Expected Value Analysis	
Award 0.5 Marks for each well calculated condition for option A, Max: 1.5 Marks	1.5
Award 0.5 Marks for each well calculated condition for option B, Max: 1.5 Marks	1.5
Award 1 Mark for options comparison and recommendation, Max: 1 Marks	1
Limitations of Expected Value Analysis in Decision-Making Under Uncertainty	
Award 1 Mark for each well explained limitation of expected values, Max: 2 Marks	2
Total	

Model answer

a)Discuss how Rwanda Community Health Services can apply TQM principles to improve the quality of its healthcare services AND briefly explain the four categories of quality costs using examples from the case study.

Application of Total Quality Management (TQM) at Rwanda Community Health Services (RCHS)
Total Quality Management (TQM) is a management philosophy that focuses on continuously improving the quality of products and services by involving all employees in meeting or exceeding customer expectations. TQM emphasizes prevention of errors rather than correction, continuous improvement, teamwork, customer focus, and employee involvement. For Rwanda Community Health Services (RCHS), implementing TQM would improve service quality, reduce operational errors, increase patient satisfaction, and lower the costs associated with poor quality.

Application of TQM Principles at RCHS

- Customer (Patient) Focus: The primary objective of TQM is to satisfy customers by understanding and meeting their needs. TQM can be applied at RCHS by regularly collecting patient feedback through surveys and suggestion boxes, monitoring patient complaints and social media reviews, reducing waiting times and improve communication with patients and improving billing accuracy and timely delivery of laboratory results.
- Continuous Improvement (Kaizen): TQM promotes continuous improvement of all organizational processes. The TQM can be applied by continuously review admission, consultation, laboratory, pharmacy, and discharge processes, analyze causes of delays and

service failures and to introduce performance indicators such as waiting times and laboratory turnaround times.

- Employee Involvement and Empowerment: All employees should participate in quality improvement initiatives. TQM shall encourage doctors, nurses, pharmacists, laboratory technicians, and administrative staff to identify quality problems, it will also create quality improvement teams and empower staff to suggest process improvements.
- Training and Education: Employees should receive continuous training on quality standards and best practices. It will help to provide comprehensive orientation for new employees and ensure conduct regular refresher training on patient safety, billing procedures, infection control, communication skills, and medical ethics.
- Prevention Rather than Detection: TQM emphasizes preventing errors instead of correcting them after they occur. This would regularly calibrate medical equipment, verify patient records before treatment, double-check prescriptions before dispensing medication and validate billing information before issuing invoices.
- Teamwork: Quality improvement requires cooperation across departments. TQM would encourage collaboration between doctors, nurses, laboratory staff, pharmacists, finance staff, and administrators, as well as holding multidisciplinary meetings to resolve operational problems.

The four categories of cost of quality, illustrated from the case:

- Prevention costs: costs incurred to prevent defects/errors before they occur, e.g. staff quality-standards training/orientation, planned equipment calibration designing better record-keeping procedures.
- Appraisal costs: costs of checking and inspecting to detect errors before they reach the patient, e.g. conducting quality audits, reviewing patient records for accuracy checking laboratory results before release.
- Internal failure costs: costs of errors caught and corrected before the patient is affected/discharged, e.g. reworking a misfiled record or a billing error detected internally repeating a laboratory test found to be flawed before results are issued.
- External failure costs: costs arising after the patient has been affected, as described in the case: refunds, legal claims, additional corrective medical treatment, and reputational damage/lost new patient registrations following social media complaints.

b)Optimal Allocation of Doctor Hours and Maximum Profit

Step1 : identification of limiting factor

Details	Maximum demand	Specialist doctor hours		Generalist doctor hours	
		Per unit	Total	Per unit	Total
Cardiology Consultation	2,000	2	4,000	1	2,000
Maternity Care Package	1,200	5	6,000	6	7,200
Diagnostic Imaging	4,000	1	4,000	2	8,000
Total required hours			14,000		17,200
Total available hours			8,000		20,000
Surplus/(Deficit)			-6,000		2,800

The specialist doctors are the limiting factor because demand requires 14,000 hours but only 8,000 are available. Generalist hours are sufficient.

Step2: calculation of contribution per service

Contribution per service= selling price-variable costs

Details	**Cardiology**	**Maternity**	**Diagnostic Imaging**
Selling price	120,000	250,000	80,000
Variable cost	-50,000	-150,000	-30,000
Contribution /unit	70,000	100,000	50,000
Specialist hrs/unit	2	5	1
Contribution/ limiting factor	35,000	20,000	50,000
Ranking	2nd	3rd	1st

Step 3: Allocation of 8,000 specialist hours available

Rank	Service	Demand	Hrs required	Hrs allocated	Cumulative hrs	Units produced
1	Diagnostic Imaging	4,000	4,000	4,000	4,000	4,000 (full demand)
2	Cardiology	2,000	4,000	4,000	8,000	2,000(full demand)
3	Maternity	1,200	6,000	0	8,000	0

All 8,000 specialist hours are exhausted after Diagnostic Imaging and Cardiology; no capacity remains for Maternity Care

Step4: maximum total profit

Service	Units	Contribution/unit	Total Contribution (FRW)
Diagnostic Imaging	4,000	50,000	200,000,000
Cardiology	2,000	70,000	140,000,000
Maternity Care	0	100,000	0
Total Contribution			340,000,000
Less: Fixed Costs			-250,000,000
Maximum Profit			90,000,000

Step 5: Advise the management of healthcare on the appropriate labour rate to pay the part time doctors, this will be given by the calculation of shadow Price of Specialist Doctor hours
The shadow price is the additional contribution earned from one extra unit of the limiting resource. The next service that cannot be provided due to the shortage of specialist hours is Maternity Care.

Details	Amount-FRW
Contribution per maternity service	100,000
Specialist hours required	5
Shadow price (per specialist doctor hour)	20,000

This means that each additional specialist doctor hour would increase contribution by FRW 20,000, provided the current optimal mix and demand remain unchanged.
Part-time specialist doctors are charging FRW 30,000 per hour, yet the shadow price is FRW 20,000 per hour. Since FRW 30,000 > FRW 20,000. The additional contribution generated (FRW 20,000) is far less than the cost of hiring the part-time doctor (FRW 30,000).
Therefore**,** RCHS should not hire part-time specialist doctors at FRW 30,000 per hour because the cost exceeds the economic value (shadow price) of the additional specialist hour. The maximum rational rate the hospital should be willing to pay is FRW 20,000 per specialist hour; paying more would reduce overall profit.

c)Evaluation of the Two Options Using Expected Value Analysis
Step 1: Expected Value Formula
Expected Value (EV) = $\sum$(Probability × Expected Cash Benefit)
The option with the highest expected value provides the highest expected financial return.

Option A: Develop In-house Telemedicine Platform

Outcome	Prob	Expected Net Cash Benefit (FRW)	Probability × Benefit (FRW)
High patient adoption	0.4	600,000,000	240,000,000
Moderate patient adoption	0.35	250,000,000	87,500,000
Low patient adoption	0.25	-100,000,000	-25,000,000
Expected Value of Option A			302,500,000

Option B: Partner with Technology Provider

Outcome	Prob	Expected Net Cash Benefit (FRW)	Probability × Benefit (FRW)
High patient adoption	0.4	350,000,000	140,000,000
Moderate patient adoption	0.35	200,000,000	70,000,000
Low patient adoption	0.25	50,000,000	12,500,000
Expected Value of Option B			222,500,000

Comparison of Expected Values

Option	Expected Value (FRW)
Option A: Develop in-house platform	302,500,000
Option B: Partner with technology provider	222,500,000
Difference	80,000,000

Recommendation to RCHS Management: Based on expected value analysis, RCHS should select Option A: Develop the in-house telemedicine platform.

d)Limitations of Expected Value Analysis in Decision-Making Under Uncertainty

- Probabilities may be unreliable or difficult to estimate: Expected value analysis depends on assigning probabilities to different outcomes. However, in this case: The probability of high, moderate, or low patient adoption may be uncertain, there may be limited historical data on telemedicine adoption in rural Rwanda and management estimates may be based on assumptions rather than reliable evidence. If probabilities are inaccurate, the calculated expected values may lead to the wrong decision.
- Expected value ignores the decision maker's attitude toward risk: Expected value considers only the average financial outcome and does not consider whether managers are risk-averse or risk-seeking. In this case: option A has a higher expected value but also carries a possibility of losing FRW 100 million, while option B has a lower expected value but guarantees a positive return even under low adoption. A risk-averse Board may prefer Option B despite its lower expected value because it reduces financial risk.
- Not meaningful for one-off, non-repetitive decisions. EV represents a long-run average outcome that would emerge if the same decision were repeated many times. Since this telemedicine investment is a single, non-repeated decision, the actual outcome realized will be one specific value (e.g., either 600m, 250m, or 100m for Option A), not the calculated average of 302.5m, meaning the EV may never actually be achieved in practice

QUESTION FOUR
Marking Guide

Description	Allocated Marks
a)Key features of the Just in Time (JIT) Production system AND calculation the net benefits	
Award 1 Mark for a well-defined JIT principle and 1 Mark for each application of JIT, Max: 3 Marks	3
Calculation of Net Benefit	
Award 0.5 Marks for well calculated reduced inventory holding cost, Max: 0.5 Marks	0.5
Award 0.5 Marks for well calculated reduction in insurance, space, handling and setup costs, Max: 0.5Marks	0.5
Award 0.5 Marks for well calculated reduced rework costs, Max: 0.5 Marks	0.5
Award 0.5 Mars for well calculated 1dditional revenue from price increase, Max: 0.5 Marks	0.5
Award 1 Mark for well calculated total Net Benefits, Max: 1 Mark	1
b)The minimum annual cash flow from additional revenues that will cause the company to invest in CIM on the basis of the NPV criterion	
Award 1 Mark for well calculated annual cash benefits, Max: 1 Mark	1
Award 1 Mark for well calculated terminal cash flow, Max: 1 Mark	1
Award 2 Marks for calculated minimum annual additional cash flow from revenues required	2
Award 1 Mark for a well computed NPV, Max: 1 Mark	1
c)Cash budget	
Award 0.5 Marks for each well calculated opening cash balance	1.5
Award 0.5 Marks for each well calculated cash sales	1.5
Award 0.5 Marks for each well calculated credit sales collection	1.5
Award 0.5 Marks for each well calculated sale of old delivery van	0.5
Award 0.5 Marks for each well calculated bank loan	0.5
Award 0.5 Marks for well posted recovery of previously written off	0.5
Award 0.5 Marks for each well calculated payments to suppliers	1.5
Award 0.5 Marks for each well calculated running expenses	1.5
Award 0.5 Marks for each well calculated new delivery van instalment	1
Award 0.5 Marks for each well calculated Bank loan repayment	0.5
Award 0.5 Marks for each well calculated closing cash balance	1.5
Award 2 Marks for correct advice	2
Total	25

Model Answer

a)Key Features of Just in Time (JIT) Production System and Net Benefits to Makanika incorporation Limited

Key Features of Just in Time (JIT) Production System

Just in Time (JIT) is a production management philosophy that aims to produce goods only when they are needed, in the required quantity, and with minimum waste. The main objective of JIT is to reduce inventory costs, improve quality, increase efficiency, and eliminate activities that do not add value. The system was developed from Japanese manufacturing practices, particularly those used by Toyota, and focuses on creating a smooth flow of production while minimizing unnecessary resources. The following are the key features of the JIT philosophy:

- Minimal Inventory Levels: JIT aims to reduce the amount of raw materials, work-in-progress, and finished goods held by a company. The company would reduce average stock from FRW 9 million to FRW 2 million, lower inventory reduces: storage costs, insurance costs, risk of obsolete stock and capital tied up in inventory.
- Pull-Based Production System: Under JIT, production is based on actual customer demand rather than producing large quantities in advance.
- Continuous Improvement (Kaizen): JIT promotes continuous efforts to improve processes and eliminate waste.
- High Quality Standards: JIT requires products to be produced correctly the first time because there are limited inventories available to absorb errors.
- Strong Supplier Relationships: JIT requires reliable suppliers who can deliver materials:
- Reduced Setup Times: JIT emphasizes quick machine changeovers and efficient production processes.
- Employee Involvement and Empowerment: JIT involves employees in identifying problems and improving processes.
- Waste Elimination: JIT focuses on removing non-value-adding activities such as: excess inventory, waiting time, overproduction, defective products, unnecessary movement.

Calculation of Net Benefits from Implementing JIT

Step 1: Reduction in Inventory Holding Cost

Details	Amount/ FRW
Current stock	9,000,000
New stock	2,000,000
Reduction	7,000,000
Required return on stock investment	12%
Annual saving (Benefits)	840,000

Step 2: Reduction in Insurance, Space, Material Handling and Setup Costs: The current cost is FRW 2,000,000. The JIT would reduce these cost at a rate of 30% which is FRW 600,000. The benefit will be FRW 600,000

Step 3: Reduction in Rework Costs: The current cost is FRW 3,500,000. The JIT would reduce these cost at a rate of 20% which is FRW 700,000 The benefit will be FRW 700,000

Step 4: Increase in Sales Revenue from Improved Quality: Price increase per unit is FRW 3,000 and the annual sales volume is 30,000 units. The additional revenue will be FRW 3,000* 30,000 units which will give the benefit of FRW 90 million.

Step 5: Calculation of total Annual Benefits

Benefit	Amount (FRW)
Reduced inventory holding cost	840,000
Reduction in insurance, space, handling and setup costs	600,000
Reduced rework costs	700,000
Additional revenue from price increase	90,000,000
Total Annual Benefits	92,140,000
Annual JIT Tooling Costs	(52,500,000)
Total Net Benefits	39,640,000

Recommendation: The implementation of a Just in Time production system would provide Makanika incorporation Limited with significant financial and operational benefits. The company would achieve annual net benefits of approximately FRW 90.64 million after considering the additional tooling costs. Therefore, Makanika incorporation Limited should implement the JIT system because it would reduce inventory investment, lower operating costs, improve product quality, reduce waste, increase customer value through higher-quality products and improve profitability and competitiveness. However, successful implementation would require strong supplier relationships, employee training, reliable production processes, and effective quality management systems to avoid disruptions caused by very low inventory levels.

b)Minimum Annual Cash Flow from Additional Revenues Required for Makanika incorporation Limited to Invest in CIM Using NPV Criterion

Step 1: Determine Initial Investment in CIM

- Cost of new CIM system: FRW 45,000,000
- Opportunity cost of old production line: The old machine has a current disposal value of FRW 5,000,000**.** If Makanika incorporation Limited replaces the old machine, it loses the opportunity to sell it. Therefore: opportunity cost is equal to FRW 5,000,000
- Working capital investment: The current working capital is FRW 6,000,000 and the new is CIM working capital FRW 2,000,000, therefore the reduction in working capital will be FRW 4,000,000 which is a cash inflow.
- Net Initial Investment: As a result, net initial investment will be FRW 46 million (FRW 45 million and FRW 5 million less FRW 4 million)

Step 2: Calculate Annual Operating Cash Flow (excluding additional revenue)
Annual cash benefits:

Item	Annual Cash Flow (FRW)
Software and CIM maintenance cost	-1,500,000
Reduction in lease payments	1,000,000

Reduction in defects and rework	4,500,000
Net annual savings	4,000,000

Now, let the additional annual cash revenue be **X**, Therefore:
Annual cash flow $= 4{,}000{,}000 + X$

Step 3: Calculate Terminal Cash Flow
At the end of year 10: The CIM disposal value will be FRW 14 million, while the working capital recovery will be FRW 2 million. Therefore, the total terminal cashflow will be FRW 16 million.

Step 4: Calculate Present Value Factors
- Required rate of return = 14%
- Annuity factor for 10 years at 14%
- $AF = 5.216$
- Discount factor for year 10 at 14%
- $DF = 0.270$

Step 5: NPV Calculation
- $NPV = -46{,}000{,}000 + (4{,}000{,}000 + X)(5.216) + (16{,}000{,}000 \times 0.270)$
- For investment to be acceptable: NPV need to be equal to zero. Therefore:
- 0=-46 million+(4 million) *(5.216) +FRW 4.320 million
- Therefore:
  X=FRW 3,990,798
- The minimum annual additional cash flow from revenues required for Makanika incorporation Limited to invest in CIM is approximately: FRW 3.99 million per year. If the CIM system is expected to generate additional annual cash revenues of at least FRW 3.99 million, the project will have a positive or zero NPV and should be accepted.

c)Kayonza Rice PLC - Cash Budget, Three Months to 31 March 2025

Details	25-Jan	25-Feb	25-Mar
Opening cash balance	15,000,000	21,540,000	72,960,000
Receipts:			
Cash sales (net of discount)	14,550,000	15,520,000	16,490,000
Credit sales collections	50,240,000	54,000,000	57,760,000
Sale of old delivery van	-	3,500,000	-
Bank loan (net of 2% arrangement fee)	-	29,400,000	-
Recovery of previously written-off debt	-	-	1,200,000
Total receipts	64,790,000	102,420,000	75,450,000
Payments:			
Payments to suppliers	-41,250,000	-44,000,000	-46,750,000
Running expenses	-7,000,000	-7,000,000	-7,000,000
New delivery van instalment	-10,000,000	-	-10,000,000
Bank loan repayment (capital + interest)	-	-	-5,450,000
Total payments	(58,250,000)	(51,000,000)	(69,200,000)
Net cash flow for the month	6,540,000	51,420,000	6,250,000
Closing cash balance	21,540,000	72,960,000	79,210,000

Workings - cash sales (20% of total sales, 3% discount for immediate settlement):

Sales	**Jan-2025**	**Feb-2025**	**March-2025**
Total budgeted sales	75,000,000	80,000,000	85,000,000
Cash sales (20%)	15,000,000	16,000,000	17,000,000
Net of 3% discount	14,550,000	15,520,000	16,490,000

*Credit sales (80% of total monthly sales): Oct 48,000,000; Nov 52,000,000; Dec 56,000,000; Jan 60,000,000; Feb 64,000,000; Mar 68,000,000.
*Collections: 50% in the month following sale (2% discount), 30% in the second month following, 15% in the third month following, 5% written off as bad debts.

Credit collections	25-Jan	25-Feb	25-Mar
50% of prior month's sales (less 2% discount)	Dec: 56,000,000*50%*98% =27,440,000	Jan: 60,000,000*50%*98% =29,400,000	Feb: 64,000,000*50%*98%=31,360,000
30% of second-prior month's sales	Nov: 52,000,000*30%=15,600,000	Dec: 56,000,000*30%=16,800,000	Jan: 60,000,000*30%=18,000,000
15% of third-prior month's sales	Oct: 48,000,000*15%=7,200,000	Nov: 52,000,000*15%=7,800,000	Dec: 56,000,000*15%=8,400,000
Total credit collections	50,240,000	54,000,000	57,760,000

*Purchases (one month's stock held in advance; cost of sales = 55% of the sales value of the month the stock is bought for suppliers paid one month after purchase):

Purchases	Purchase made in	Amount (FRW)	Paid in
For January sales	Dec-24	55% *75,000,000 = 41,250,000	Jan-25
For February sales	Jan-25	55% *80,000,000 = 44,000,000	Feb-25
For March sales	Feb-25	55% *85,000,000 = 46,750,000	Mar-25

*****Bank loan received 1 February 2025: net proceeds = 30,000,000 *(1-2%) = FRW 29,400,000
*****First repayment due March 2025: capital FRW 5,000,000 + interest at 1.5% on the outstanding gross balance at the start of March (still the full FRW 30,000,000, as total March repayment = FRW 5,450,000.

Advice to the Finance Director: Kayonza Rice PLC's projected cash position is strong and improving throughout the quarter. The opening balance of FRW 15,000,000 rises to FRW 21,540,000 by end-January, FRW 72,960,000 by end-February (boosted substantially by the net loan proceeds and van sale receipts) and FRW 79,210,000 by end-March. No cash shortfall arises in any month, so no additional short-term financing is required over this period; management should, however, monitor closely the timing of the February loan inflow, as the company's cash position before its receipt (i.e. excluding the loan) would still have been comfortably positive, meaning the loan is being drawn to fund investment/growth (e.g. the delivery van and future working capital needs) rather than to cover a cash shortfall.

End of Model Answer and Marking Guide.