ADVANCED
MANAGEMENT ACCOUNTING

REVISION KIT

ACKNOWLEDGMENT

We gratefully acknowledge permission to quote from the past examination papers of the following bodies: **Kenya Accountants and Secretaries National Examination Board (KASNEB); Chartered Institute of Management Accountants (CIMA); Association of Chartered Certified Accountants (ACCA)**.

We would also like to extend our sincere gratitude and deep appreciation to **Mr. Cyrus Iraya** for giving his time, expertise and valuable contribution,which were an integral part in the initial development of this Revision Kit. He holds the following academic honours, **MBA, B.COM (Accounting),CPA**, currently pursuing his **Phd in Finance at the University of Nairobi**.He is a senior lecturer at Strathmore University, School of Accountancy.

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PART I: INTRODUCTION

APPROACH TO EXAMINATIONS

No amount of examination room technique will enable you to pass unless you have prepared yourself thoroughly before hand. The period of preparation may be months or even years and must include a good grasp of the course content and a proper familiarity with the type of examination questions that have been set in the past. It is no use expecting to pass with a feverish last minute reliance on this revision kit.

By the end of your study of this revision kit, you should be able to answer every question in a typical examination set-up. The Mock questions provided at the end are to be worked out on a simulated exam scenario.

Before the examination:

a) Make sure you know the exact time, date and location of examination.
b) Carefully check your travel arrangements. Leave yourself adequate time.
c) Check over your examination equipment: Calculator? Spare battery? Pens? Pencils? Watch?
d) Check your examination number.

In the examination room:

You need to be calm and confident in the examination room. Before you start writing

- Carefully read the whole examination paper including the rubric
- Decide the sequence you will tackle the questions. Generally, answer the easiest questions first.
- Decide the time allocation for each question. In general the time allocation should be in direct proportion to the marks for each question.
- Read the questions you are answering again. Do you know exactly what the examiner is asking? Underline the key words in the question and keep these in mind when answering.

1. Dealing with questions:

a) Make sure you plan each question first. Make a note of the main points or principles involved. If you are unable to finish the question you will gain some marks from these points.
b) Attempt all questions required under each part of each question.
c) Do not let your answer rumble on. Be as brief as possible consistent with covering all the points you know.
d) Follow a logical sequence in your answers.
e) Write neatly, underline headings and if the question asks for a particular sequence of answer then follow that sequence.
f) If diagrams, tables or graphs are required give them plenty of space, label them neatly and comprehensively, and give a key to symbols. A simple clear diagram showing the main points can often gain a good proportion of the marks for a question.

When you have finished writing:

a) Check that you have followed the examination regulations regarding examination title.

b) Make sure you include all the sheets you require to be marked.

c) If you have time carefully read each and every part of each answer and check each calculation.

In general;

- Concentrate on answering the questions set not some related topic, which you happen to know something about.
- Do not leave the examination room early. Use every minute for checking and rechecking or adding points to questions answered.

Always attempt every question set and every part of each question.

SYLLABUS

PAPER NO. 14 MANAGEMENT ACCOUNTING

OBJECTIVE

To ensure that the candidate can apply modern tools of analysis in the solution of management problems in different functional areas.

14.0 SPECIFIC OBJECTIVES

A candidate who passes this subject should be able to:

- Determine costs for an organization‟s operations
- Analyze managerial functions which require decision making
- Evaluate organizational processes with a view to determining the most efficient and effective means of resource utilization.
- Design management accounting systems.

CONTENT

14.1 Managerial Decisions and Information

- Value of information in decision-making: perfect and imperfect information.

14.2 Cost Estimation and Forecasting

- An overview of the methods of cost estimation and prediction: Engineering, simulation and statistical methods, simple and multiple regression, the statistical properties of regression. Time series models, smoothing and extrapolation, stochastic time series, linear time series models, forecasting with time series models
- Application of the methods in solving management accounting problems

14.3 Short Term Planning Decisions

- Cost-Volume-profit analysis under uncertainty, sensitivity analysis, statistical analysis, probability tree simulation
- Cost - Volume -profit analysis with multiple products
- Risk assessments
- Application of marginal costing
- Product mix decisions, special orders
- Make or buy decisions, pricing decisions and other similar short-run decisions
- Learning curves and estimating learning effect

14.4 Advanced Budgeting and Variance Analysis

- Motivational aspects
- Advanced variances

14.5 Inventory Control Decisions

- Cost of holding stock
- Stock replenishment models

- Quantity discounts
- Timing of replenishment
- Shortage cost models
- Stochastic inventory models
- Pareto analysis
- Simulation of reorder models
- ABC analysis

14.6 Resource Allocation and Optimization Decisions

- Decision making through utilization of the following quantitative techniques: Decision tree and sequential processes; mathematical programming (linear, non-linear; integer programming; transportation model

14.7 Strategic Decisions

- Application of game theory to management: Collective bargaining, negotiations, tendering, diversification and retrenchment
- The use of Markov analysis in the formulation of strategic moves

14.8 Performance Evaluation Decisions

- Responsibility accounting and responsibility systems
- Methods of evaluating responsibility center performance such as return on investment and residual income
- Evaluation of foreign based centers such as foreign exchange gains and losses
- Transfer pricing and risk-sharing in decentralized firms
- International transfer pricing in foreign centers
- Managerial incentives schemes
- Strategic cost management
- Activity based costing

PART II: PAST PAPER QUESTIONS AND ANSWERS

QUESTIONS

JULY 2008 **TIME ALLOWED: 3 HOURS**

QUESTION ONE

A processing company, Timao Co. Ltd., is extremely busy. It has increased its output and sales from 12,900 kg in 1st quarter of the year to 17,300 kg in the 2nd quarter. Although demand is still rising, it cannot increase its output more than an additional 5% from its existing labour force, which is now at its maximum.

Data for its four products in 2nd quarter were:

	Product P	Product Q	Product R	Product S
Output (Kg)	4560	6960	3480	2300
Selling price (Sh. Per kg)	162	116.40	99.20	136.80
Costs (Sh. Per kg)				
Direct labour @ Sh.60 per hour)	19.60	13.00	9.90	17.00
Direct materials	65.20	49.00	41.00	54.20
Direct packaging	8.40	7.40	5.60	7.00
Fixed overhead (Absorbed on basis of direct labour cost)	39.20	26.00	19.80	34.00
	132.40	**95.40**	**76.30**	**112.20**

The Kagocho Company has offered to supply 2000 kg of product Q at a delivered price of 90% of Timao"s Co. Ltd. Selling price. Timao Co. Ltd., will then be able to produce extra of product P instead of product Q to the plant"s total capacity.

Required:

a) State with supporting calculations, whether Timao Co. Ltd should accept the Kagocho Company"s offer. (15 marks)

b) Which would be the most profitable combination of subcontracting 2000kg of one product at a price of 90% of its selling price and producing extra quantities of another product up to the plant total capacity?
Assume that the market can absorb the extra output. (5 marks)

(Total: 20 marks)

QUESTION TWO

"Control theory offers valuable insights into the design and operation of management accounting information systems, but only under circumstances where an organization"s environment is stable and predictable and outcomes are clearly measurable."

Required:
Comment on the relevance and validity of this statement within the analysis or established control theory systems within a business organization. **(Total: 20 marks)**

QUESTION THREE

a) The Z division of XYZ Ltd., produces a component which it sells externally, and can also be transferred to other divisions within the organization. The division has set a performance target for the coming financial year of residual income of Shs. 5,000,000. The following budgeted information relating to Z division has been prepared for the coming financial year.

1. Maximum production/sales capacity 800,000 units.
2. Sales to external customers: 500,000 units at Sh.37.
3. Variable cost per component Sh.25.
4. Fixed costs directly attributable to the division Sh.1,400,000.
5. Capital employed: Sh.20,000,000 with cost of capital of 13%

The X division of XYZ Ltd has asked Z division to quote a transfer price for units of the component.

Required:

i Calculate the transfer price per component which Z division should quote to X division so that its residual income target is achieved. (6 marks)

ii Explain why the transfer price calculated in (i) above may lead to sub -optimal decision making from the point of view of XYZ Ltd taken as a whole. (4 marks)

b) A manufacturer produces and sells two products, A and B. The unit variable cost is sh.12 and sh.8 for A and B respectively. A review of selling prices is in progress and it has been estimated that, for each product and increase in the selling price would result in a fall in demand of Sh.500 units per every Sh.1 increase in price and similarly a decrease of Sh.1 in price would result in an increase in demand of 500 units.

The current sales prices and sales demand are:-

	Price (Sh.)	Demand (Units)
A	30	15,000
B	58	21,000

Required:
Calculate the profit-maximizing price for reach product. (10 marks)

QUESTION FOUR

Muthothi Ltd. Operates a conventional stock control system based on re-order levels and Economic Order Quantities (EOQ). The various control levels were set originally based on estimates which did not allow for any uncertainty and this has caused difficulties because, in practice, lead times, demands and other factors to vary.

As part of a review of the system, typical stock item, part no. X 206, has been studied in detail as follows:

Data for Part No. X 206

Lead times (Days)	**Probability**	**Demand (units)**	**Probability**
15	0.2	5000	0.4
20	0.5	7000	0.6
25	0.3		

The company works for 360 days per year and it costs Sh.1,000 to place an order. The holding cost is estimated at Sh.0.025 for storage plus 10% opportunity cost of capital. Each unit is purchased at Sh.2. The re-order level for this part is currently 150,000 units and it can be assumed that the demands would apply for the whole of the appropriate lead-time.

Required:

a) Calculate the level of buffer stock implicit in a re-order level of 150,000 units. (5 marks)
b) Calculate the probability of stock-outs. (2 marks)
c) Calculate the expected annual stock-outs in units. (4 marks)
d) Compute the stock-out costs per unit at which it would be worthwhile raising the re-order level to 175,000 units. (3 marks)
e) Discuss the possible alternatives to a re-order level EOQ inventory system and their advantages and disadvantages. (6 marks)

(Total: 20 marks)

QUESTION FIVE

Watt Lovell Ltd. (WLL) is trying to decide whether or not to drill for oil on a particular site in North Eastern Kenya. The Chief Engineer has assessed the probabilities that there will be oil as follow, based on past experience.

Oil	0.2
No oil	0.8

It is possible for WLL to hire a firm of international consultants to carry out a complete survey of the site. WLL has used the firm many times before and has made the following estimates:

1. If there really is oil, then there is a 95% chance that the report will be favourable.
2. If there is no oil then there is only a 10% chance that the report will indicate that there is oil.

The following additional information is also provided:

- The cost of drilling is Sh.10 million.
- The value of the benefits if oil is found is Sh.70 million
- The cost of obtaining information is Sh.3 million.

Required:

a) Advise the company on whether to acquire additional information from the consultants (16 marks)
b) Compute the value of imperfect information. (4 marks)

(Total: 20 marks)

DECEMBER 2008 **TIME ALLOWED: 3 HOURS**

QUESTION ONE

a) Differentiate between a feedback control system and a feed forward control system. (4 marks)

b) In his study of: "the impact of budgets on people" C Argyris reported the following comment by a financial controller on the practice of participation in setting budgets in his company:
"We bring in the supervisors of budget areas, we tell them that we want their frank opinion, but most of them just sit there and nod their heads. We know they are not coming out with exactly what they feel. I guess budget scares them".
Explain why managers may be reluctant to participate fully in setting budgets, indicating the negative side effects, which may arise from the imposition of budgets by senior management. (10 marks)

c) A critic has suggested that budgets should be abolished because they introduce rigidity and hamper creativity. Discuss. (6 marks)

(Total: 20 marks)

QUESTION TWO

Sola Ltd. is a manufacturing company that requires component XLA20 in one of its production lines. The components are bought from outside suppliers. Form past experience, the company has determined that the demand for the component can be approximated by a normal distribution with a mean of 500 and a standard deviation of 10, over the range 470 to 530.

The unit is an initial stock of 2000 components and the company has decided to order in batches of 2500 whenever the stock level falls below 1500 components. Again, past experience indicates that the time between the order being placed and delivery varies as follows:

Lead time distribution

Lead time, weeks	1	2	3	4
Probability	0.02	0.50	0.25	005

The unit cost of holding stock is Sh.5 per week applied to the total stock held at the end of each week. The cost associated with placing an order is Sh.5.00 and the unit cost of being out of stock is Sh.200 per week. The company does all its accounting at the end of the week and all ordering and delivery occur at the beginning of a week.

Required:

Estimate the average cost per week of the above policy, using simulation analysis and the following random numbers:

For Demand:	034	743	738	636	964	736	614	698	637		
	162	332	616	804	560	111	410	959	774	246	762
For Leadtime:	95	73	10	76	51	74					

(Total: 20 marks)

Hint:

- Use 15 trial runs

- Round off the demand probabilities to 3 decimal places. (Estimate these probabilities in ranges of 5)

QUESTION THREE

1. Highlight how the transportation algorithm can be modified for profit maximization rather than minimization of costs. (3 marks)
2. The Executive Furnitures Ltd. (EFL) produces a unique type of computer desks. Four of EFL"s main outlets are S_1, S_2,S_3, and S_4.These outlets already have requirements inexcess of the combined capacity of its three production plants P_1,P_2, and P_3. The company needs to know how to allocate its production capacity to maximize profits.

Distribution costs (in Sh.) per unit from each production plant to each outlet are given in the following table:

		To			
		S_1 Sh.	**S_2 Sh.**	**S_3 Sh.**	**S_4 Sh.**
From	P1	220	240	220	360
	P2	240	200	180	280
	P3	260	200	260	240

Since the four outlets are in different parts of the country and as there are differing transportation costs between the production plants and the outlets along with slightly different production costs at different production plants there is a pricing structure which enables different prices to be charged at the four outlets. Currently, the price per unit charged is Sh.2,300 at S_1, Sh.2,350 at S_2, Sh.2,250 at S_3, and Sh.2,400 at S_4. The variable unit production costs are Sh.1,500 at plants P_1 and P_3 and Sh.1,550 at plant P_2. The demand at S_1,S_2, S_3 and S_4 are 850, 640, 380 and 230 desks respectively while the plant capacity at plant P_1, P_2 and $P_3$are 625, 825 and 450 desks respectively.

Required:

Using the transportation algorithm, determine the contribution to profit for the optimal allocation. (17 marks)

(Total: 20 marks)

QUESTION FOUR

1. Alvis Kiptoo has budgeted that output and sales of his single product will be 100,000 units in the coming year. At this level of activity, his unit variable costs are budgeted at Sh.50 and his unit fixed costs at Sh.25. His sales manager estimates that the demand for the product would increases by 1000 units for every decreased of Sh.1 in unit selling price (and vice versa) and that at a unit selling price of Sh.200 demand would be nil.

   Information about two price increases has just been received from suppliers: one is for materials (which are included in Alvis Kiptoo"s variable costs) and one is for fuel (whichincluded in his fixed costs). Their effect will be to increase both the variable and fixed costs by 20% each over the budgeted figures.

   Alvis Kiptoo aims at maximizing profits from his business.

Required:

a. Calculate before the cost increases the budgeted contribution and profit at the budgeted levels of 100,000 units. (3 marks)

b. Calculate the level of sales at which profits would be maximized and the amounts of these maximum profits before the cost increases. (4 marks)

c. Show whether and by how much Alvis Kiptoo should adjust his selling price in respect to increases in:

- Fuel costs. (2 marks)
- Material costs. (2 marks)

2. Some businesses which supply two or more separate markets from a single source may decide to charge a higher price for sales to home markets than for export sales. The businesses may justify their pricing policy by stating that they need to earn foreign exchange from foreign markets and recover their research and development costs, plus production overheads against home demand.

Required:

i Critically explain briefly the rationale for such a differential pricing policy. (5 marks)
ii Should earning of foreign exchange be a factor in a firm"s pricing policy. (4 marks)

(Total: 20 marks)

QUESTION FIVE

a) Explain the advantages of using Value Added Statements (VAS) for interdivision for comparisons in decentralized firm. (8 marks)

b) ABC Lt. Is a manufacturing company that makes only three products P, Q, and R. Data for the period ended last month are as follows:

	P	**Q**	**R**
Units produced and sold	12,000	16,000	8,000
	Sh.	**Sh.**	**Sh.**
Sales price per unit	50	70	60
Direct material cost per unit	16	24	20
Direct labour cost per unit	8	12	8

Production overheads costs	**Total**	**Cost drivers**
	Sh.	
Machining costs	102,000	Machine hours
Production scheduling	84,000	Machine hours
Set-up costs	54,000	Number of production runs
Quality control	49,200	Number of production runs
Receiving materials	64,800	Number of components receipts
Packing materials	36,000	Number of customer orders
	390,000	

Information on the cost drier is given as follows:

	P	**Q**	**R**
Direct labour hours per unit	1	1½	1
Machine hours per unit	½	1	1½
Number of components per unit	3	5	8
Number of component receipts	18	80	64
Number of customer orders	6	20	10
Number of production runs	6	16	8

Required:

Using activity based costing (ABC) show the cost and gross profit per unit for each product during the period. (12 marks)

(Total: 20 marks)

JUNE 2009 **TIME ALLOWED: 3 HOURS**

QUESTION ONE

Kanorer Enterprises Ltd has two divisions Mugaa and Gwashati. Mugaa division manufactures an intermediate product for which there is no external market. Gwashati division incorporates the intermediate product into a final product, which it sells. One unit of the intermediate product is used in the production of the final product. The expected units of the final product which Gwashati division estimates it can sell at various selling prices are as follows:

Net selling Price Sh.	Quantity sold Units
100	1000
90	2000
80	3000
70	4000
60	5000
50	6000

The variable and fixed costs of each division are as follows:

	Mugaa Sh.	Gwashati Sh.
Variable cost pr unit	11	7
Fixed cost per annum	60,000	90,000

The transfer price is Sh.35 for the intermediate product, and is determined on a full cost-plus basis.

Required:

a) Profit statements for each division and the company as a whole for the various selling prices. (12 marks)

b) Which selling prices maximize the profits of Gwashati division and the company as a whole? Comment on why the selling price (which is selected by the company) is not selected by Gwashati division. (3 marks)

c) It has been argued that full cost is an inappropriate basis for selling transfer prices. Outline the objections which can be raised against this basis. (5 marks)

(Total: 20 marks)

QUESTION TWO

K.K Limited manufactures security systems for homes. To enable the company offer a better quality product at a lower cost than its competitors, the company has decided to expand its present facility to accommodate a new line. A project team has been formed within the company to direct and coordinate the plant expansion.

This team met weekly to monitor the status of the project.

Prior to the start of the plant expansion, the management developed the following list of required activities:

	Activity	Predecessor	Normal Time in weeks	Costs (Sh) „000"	Crash Time in weeks	Crash Cost (Sh) „000"
A	Prepare architectural plan	-	10	10,000	7	12,000
B	Construct building	A	35	50,000	33	52,000
C	Develop equipment Specifications	A	4	7,000	3	6,000
D	Design and construct Equipment	C	25	20,000	25	26,000
E	Install/Test equipment	B,D	5	5,000	4	4,500
F	Develop staffing plan	C	2	4,000	2	4,000
G	Hire staff	F	4	30,000	2	30,000
H	Train staff	G	2	15,000	1	25,000
I	Pilot production run	E,H, L	1	4,000	1	4,000
J	Market research	-	8	12,000	4	24,000
K	Complete product development	-	12	24,000	10	20,000
L	Complete package design	J,K	4	6,000	2	2,000
M	Complete marketing plan	J	8	10,000	6	8,000

Required:

a) Determine the critical path and list the critical activities. (8 marks)

b) Determine the minimum time and minimum cost network. (7 marks)

c) K. K Ltd knows that other companies are working on a competing product. The company estimates that the delay of every week beyond the 40^{th} week in bringing out the new line will cost the firm sh. 1,000,000 in lost profit..
What will be the cost to the firm if the project is completed in 50 weeks? (3 marks)

d) Is it advisable to crash the profits from 51 to 45 weeks? Why? (2 marks)

(Total: 20 marks)

QUESTION THREE

Explain why a high correlation between the independent and dependent variables may or may not necessarily prove that a change in the independent variables may or may not necessarily prove that a change the independent variable causes a change in the dependent variable. (3 marks)

Kelele Company Ltd. manufacturers crockery. The company is considering the use of simple and multiple linear regression analysis to forecast annual sales for they are 2001 because previous forecasts have been inaccurate. The sales forecast will be used to initiate the budgeting process and to identify more accurately the underlying process that generates sales.

The financial controller of the company has considered many possible independent variables and equations to predict sales and has narrowed his choices to four equations. He used annual observations from twenty prior years to estimate each of the four equations.

The following is a statistical summary of the four equations and definitions of the variables used in the exercise.

		Equation I	Equation II	Equation III	Equation IV
Dependent variable		Y_t	Y_t	Y_t	Y_t
Independent variable		Y_t 1	Z_t	Z_t 1	N_{tt} Z_t Z_{tt}
Intercept	(sh)	2,500,000	5,000,000	4,500,000	3,000,000
Coefficient of independent variable		5.5	0.00005	0.00006	*
T-statistic		11.00	50.00	25.00	*
Standard error of estimate	(sh)	2,500,000	2,550,000	2,600,000	2,450,000
Coefficient of determination		0.94	0.90	0.81	0.96

The other statistics for Equation IV were estimated as follows:

Variable	$N_t - 1$	Z_t	$Z_t - 1$
Coefficient	50	0.00001	0.000015
T-statistic	20.00	7.50	15

Where: Y_t = forecast sales (in shillings) for the company in time period t
$Y_t - 1$ = actual sales (in shillings) for period t – 1
Z_t = forecast Kenya gross national product in time period t
$Z_t - 1$ = actual Kenya gross national product in time period t – 1
$N_t - 1$ = company"s net income in time period t – 1

Required:

a) Using the relationship T = a + bx, write Equations II and IV (3 marks)
b) If the actual sales for the year 2000 were sh.7,500,00, what would be the forecast sales for the year 2001? (2 marks)
c) Explain the meaning and significance of the coefficient of determination. (4 marks)
d) Explain why the Financial Controller might prefer Equation III to Equation II.(2 marks)
e) Explain the advantages and disadvantages of using Equation IV to forecast annual sales. (6 marks)

(Total: 20 marks)

QUESTION FOUR

Skyline Ltd. operates daily round-trip flights on the Nairobi-Mogadishu route using a fleet of three light aircraft. These three aircraft are Skyline 1, "Skyline 2 and Skyline 3. The standardquantity of fuel used on each round-trip over this twelve-month period has a mean of 100 KL and a standard deviation of 10 KL. (1 KL = 1,000 litres)

James Thuo, the operations manager of Skyline Ltd., uses a statistical quality control (SQC) approach in deciding whether to investigate the variances from the standards fuel usage per round-trip flight. He investigates all those flights with fuel usage greater than two standard deviations from the mean. In addition, James Thuo monitors trends in the SQS charts to determine if additional investigations decisions should be made.

James Thuo received the following reports for round-trip fuel usage for the month of May 2001 from the pilots of the three planes operating on the Nairobi-Mogadishu route:

Flight	**Skyline 1**	**Skyline 2**	**Skyline 3**
	KL	**KL**	**KL**
1	104	103	97
2	94	94	104
3	97	96	111
4	101	107	104
5	105	92	122
6	107	113	118
7	111	99	126
8	112	106	114
9	115	101	117
10	119	93	123

Required:

a) Using the $\pm 2\sigma$ rule, indicate the variance investigation decisions which should be made. (5 marks)
b) Present the SQC charts for round-trip fuel usage by each of the three aircraft I May 2001. (6 marks)
c) What inferences can be made from the three SQC charts developed in (b) above? (5 marks)

(Total: 16 marks)

QUESTION FIVE

a) Mount Sinai Health Centre specializes in the provision of sports/exercise and medical/dietary advice to clients. The service is provided on a residential basis and clients reside for whatever number of days that suit their needs.

Budgeted estimates for the year ending 300 June 2002 are as follows:

1. The maximum capacity of the center is 50 clients per day for 350 days in the year.
2. Clients will be invoiced at a fee per day. The budgeted occupancy level will vary with the client fee level per day and is estimated at different percentages of maximum capacity as follows:

Client fee per day (sh)	Occupancy level	Occupancy as a percentage of maximum capacity
3,600	High	90%
4,000	Most likely	75%
4,400	Low	60%

3. Variable costs are also estimated at one of the three levels per client day. The high most likely and low levels per client per day are Sh.1,900, Sh.1,700 ad Sh.1,400 respectively.
4. The range of cost levels reflects only the possible effect of the purchase prices of goods and services.

Required:

i. A summary which shows the budgeted contribution to be earned by Mount Sinai Health Centre for the year ended 30 June 2002 for each of the nine possible outcomes. (11 marks)

ii. State the client fee strategy for the year to end 30 June 20002 which will result from the use of each of the following decision rules.

(a) Maximax;
(b) Maximin;
(c) Minimax regret. (8 marks)

b) The probabilities of variable costs levels occurring at the high, most likely and low levels provided in the question are estimated at 0.1, 0.6 and o.3 respectively

Required:

Compute the maximum amount you would be willing to pay to acquire perfect information. (5 marks)

(Total: 24 marks)

MANAGEMENT ACCOUNTING

DECEMBER 2009 **TIME ALLOWED: 3 HOURS**

QUESTION ONE

Kiko Ltd. is a large cash and carry warehouses which sells electronics. Kiko Ltd. Purchases the most popular model of calculators (FX 100) directly form the manufacturer at a cost of Sh.250 each. Average sales per a 300 day year are 475 calculators. Whenever an order with the manufacturers is placed, Kiko Ltd, Incurs a cost of Sh.50. The stock holding costs are estimated at Sh.12.50 plus 10% opportunity cost of capital. The lead-time is three days. During the last 50 stock cycles, the demand during the lead-time has generated the following frequency distribution:

Lead time demand	0	1	2	3	4	5	6	7	8
Number of stock cycles	1	2	6	8	10	8	8	5	2

Each time the warehouses runs out of stock, an emergency order is placed with an extra cost of Sh.20 per calculator.

Required:

a) The economic order quantity (EOQ) and the reorder level. (16 marks)
b) The total annual relevant costs for the order quantity in (a) above. (4 marks)
(Total: 20 marks)

QUESTION TWO

Boots Ltd. manufactures a range of five similar products, A, B, C, D and E. the table below shows the quantity of each of the required inputs necessary to produce one unit of each product, together with the weekly inputs available and selling prices of each product.

Inputs	A	**B**	**C**	**D**	**E**	**Weekly inputs available**
Raw materials (Kg)	6.0	6.5	6.1	6.1	6.4	35,000 Kgs
Forming (hours)	1.00	0.75	1.25	1.00	1.00	6,000 hours
Firing (hours)	3.00	4.50	6.00	6.00	4.50	30,000 hours
Packing (hours)	0.50	0.50	0.50	0.75	1.00	4,000 hours
Selling price (Sh.)	40	42	44	48	52	

The costs of each input is as follows:

Material	Sh.2.10 per Kg
Forming	Sh.3.00 per hour
Firing	Sh.1.30 per hour
Packing	Sh.8.00 per hour

Required:

a) Formulate this problem as a Linear Programming problem. (7 marks)
b) The problem has been solved using a computer package and the following final table of a simplex solution has been produced:

Basis	A	B	C	D	E	X	S	T	U	Value
A	1	1.18	1.04	0.46	0	0.36	0	0	-2.29	3,357
B	0	-0.34	0.23	0.02	0	-0.18	1	0	0.14	321
T	0	1.37	2.97	2.28	0	-0.27	0	1	-2.79	9,482
E	0	-0.09	-0.02	0.52	0	-0.18	0	0	2.14	2,321
Zj	0	1.26	1.06	0.51	0	2.02	0	0	8.81	105,791

Where A, B, C, D and E are the weekly production levels for the five products; X is the amount of raw material that falls short of the maximum available; S, T an U are the respective number of hours short of maximum weekly input of forming, firing and packing time.

i Use this table to find the optimum weekly production plan. (4 marks)

ii Describe the implications of using this plan in terms of unused resources and overall contribution to profit. (3 marks)

iii In the context of this problem explain the meaning of "The dual or shadow price of a resource" (3 marks)

iv There is a proposition that the company manufactures an additional product which would sell at Sh.50 per unit. Each unit will need 6 kg of raw material, one hour of forming time, five hours of firing time and one hour of packing time. Is it a worthwhile proposition? (3 marks)

(Total: 20 marks)

QUESTION THREE

(a) Briefly explain four ways in which competitive situations (or games) can be classified. (8 marks)

(b) Kamau and Njoroge are two cousins specializing in hawking business along River road. Kamau specializes in second hand shirts while Njoroge specializes in cheap electronic goods. However, sales have been decreasing partly due to the harsh economic condition in Kenya and partly due to restrictions by the City Council.

Each of the cousins is considering expanding to include in their lines of business, items on which their rivals now have a monopoly. Each knows that the other is considering this expansion and this influences each of their decisions.

Kamau figures out that if he does not expand his business and his cousin does, it will hurt his trade by Sh.500 of profit per day. If neither of them expands inventory to include the extra product, Kamau thinks it will boost his net profit by Sh.500 per day due to his superior location. If he expands and his cousin does also, he believes the combination of location and expanded inventory will increase his profits by Sh.1,000 per day. However, if he alone expands and his cousin does not, this will result in no net increase in business.

Required:

i Prepare a game matrix and show that a pure strategy does not exist. (4 marks)

ii Solve the above game to determine the average winnings (or losses) each of the cousins would expect. (8 marks) **(Total: 20 marks)**

QUESTION FOUR

1. Mega Techniques Ltd. makes special purpose equipment according to customer specifications. During the past year, one of its loyal customers, Pawa Ltd., ordered a specialized equipment to be fabricated for it. Mega Techniques Ltd. Finished

construction the equipment only to be notified that Pawa Ltd. Had recently gone into liquidation and will not therefore take the equipment.

The original price to Pawa Ltd. had been agreed at Sh.9,108,000 which included an estimated normal profit mark-up of 10 per cent on total costs. The costs incurred to manufacture the machine were

	Sh.
Direct materials	3,420,000
Direct wages	2,160,000
Overheads:	
Variable	540,000
Fixed; production	1,800,000
Fixed; selling and administration	360,000
	8,280,000

After a sustained search, the sales manager of Mega Techniques Ltd. Has managed to locate one potential buyer, Zimwi Systems Ltd, which has indicated that it could buy the machine if certain conversion work could be carried out.

Mega Techniques Ltd"s production department has made a preliminary assessment which reveals that conversion would entail extra work costed as follows:

Direct materials	Sh.576,000
Direct wages:	
Department X:	3 men for 4 weeks at Sh.27,000 per man/week
Department Y:	1 man for 4 weeks at Sh.21,600 per man/week
Variable overhead:	
20 per cent of direct wages	
Fixed production overhead:	
Department X: 75 per cent of direct wages.	
Department Y: 25 per cent of direct wages.	

The following additional information is provided:

2. In the original machine, there were three types of basic materials:
   i Type P could now be sold to a scrap merchant for Sh.540,000.
   ii Type Q could be sold to a scrap merchant for Shs. 360,000 but it would take 120 hours of labour paid at Shs. 270 per hour to put it into a suitable condition for sale.
   iii Type R would need to be scrapped at a cost to Mega Techniques Ltd. of Shs.108,000

3. The materials for the conversion are at present in stock. If not needed for the conversion they could be used in the production of another machine in place of materials that would currently cost Sh.684,000.
4. The conversion would be carried out in two departments:

   Department X is currently extremely busy and it is estimated that its contribution overheads and profits is Sh.2.50 for every Sh.1 of labour.

   Department Y has idle staff, for organizational reasons its labour force cannot be reduced below its present level of four employees, all of whom are paid at the standard rate of Sh.21,600 per week.

5. The designs and specifications of the original machine could be sold in a neighbouring country for a sum of Sh.270,000 if the machine is scrapped.

6. An additional temporary supervisor would have to be engaged for the conversion work at a cost of Sh.162,000. It is the company"s normal practice to charge supervision to fixed overhead.
7. Pawa Ltd. Had paid Mega Techniques Ltd. A non-returnable deposits of 12% of the selling price.

Required:

a) The minimum price that Mega Techniques Ltd. should accept from Zimwi Systems Ltd. for the converted machine. Explain clearly how you arrive at your figure. (16 marks)
b) State clearly any assumptions that you have made in arriving at your conclusions in (a) above. (4 marks)

(Total: 20 marks)

QUESTION FIVE

Madoadoa Limited is a multi-division manufacturing company. The manufacture of M101. One of the company"s finished products involves two divisions; Mwanzo and Mwisho.Mwanzo division manufactures the chassis for M101 and transfers it to Mwisho division where it is reworked, fitted and assembled into the finished product. The two divisions are housed in the same building whose lease is due to expire in two years" time.

Data on the operations of the two divisions for the year just ended is as follows:

Mwanzo division

Quantity of units (chassis) transferred per year	30,000
Transfer price from Mwanzo to Mwisho	Sh.30000
Current level of operations	75% of full capacity
Loss for the year	Sh.90,000,000

Mwisho division

Quantity of units produced and sold	30,000
Price charged outsiders	Sh.150,000
Profit made for the year	Sh.610,000,000

Mr. Makini, the general manager of Mwisho division, has been considering the possibility of sourcing the chassis from outside suppliers. He has received a quotation from Samawati Ltd., a competitor of Mwanzo division offering to supply a minimum of 30,000 and a maximum of 40,000 units of chassis per year for two years with adequate guarantees as to quality and continuity of suppliers. The unit price would be Sh.22,000. Mr.Makini is of the opinion that his division should be allowed to take all its requirement (30,000 units per year) of chassis from Samawati Ltd., unless Mwanzo division agrees to cut the unit transfer price to Sh.22,000. He suggests that if Mwanzo division cannot reduce the price it would be better for it to cease operations and the space it now occupies be taken up by Mwisho division, which is currently seeking extra warehouse space.

The summarized profit and loss accounts of the divisions for the past year ended 31 October 2001 is as follows:

	Mwanzo division	Mwisho division
Production and sales (Physical units)	30,000	30,000
	Sh. „000"	Sh. „000"
Sales revenue	900,000	4,500,000
Direct materials	450,000	2,100,000
Chassis	-	900,000
Direct labour	90,000	240,000
Variable overhead	90,000	150,000
Fixed overhead (excluding depreciation)	285,000	300,000
Fixed overhead - depreciation	75,000	200,000
	990,000	3,890,000
	(90,000)	610,000
	900,000	4,500,000

You have been asked to investigate and advise on Makini"s proposal. You have gathered the following additional information:

The limitation of the proposed contract with Samawati Ltd. To a two-year period would be agreeable to Madoadoa Ltd. As the lease for the factory is unlikely to be renewed in two years" time and there is no wish to enter into firm commitments beyond that date. If Mwanzo division is closed, most of the work force could be productively absorbed by other divisions of Madoadoa Ltd., which operate in the vicinity at no additional cost to those divisions.

The manager of Mwanzo division complains that his division has to bear exceptionally heavy depreciation charges and fixed overheads (including central office charges) which are beyond his control. Without these expenses, he believes that Mwanzo division could match price quoted by Samawati Ltd., and still make a reasonable profit. He also believes that with a price of Sh.22,000, it should be possible to operate at full capacity, selling 25% of the output in the open market. The additional output would increase the direct materials cost and variable overhead proportionately but he estimates that the total direct labour cost would only increase by 10%.

The plant used by Mwanzo division has a book value of Sh.150,000,000. Its current resale is probably Sh.50,000,000. in two years it is estimated that it will have negligible value.

The storage space required by Mwisho division will probably cost Sh.10,000,000 per annum if rented.

Mwanzo division has in stock sufficient raw material for nine months" production if production is continued at the same level as he has achieved last year. If this raw material is sold off (following the decision to close Mwanzo division), it would probably fetch 25% of its cost.

Required:

a) Mwanzo division"s combined profit and loss account for the ensuring two-year period on the assumption that the division continues to operate after reducing its transfer price to Sh.22,000 and operating at full capacity as expected. (10 marks)

b) A statement of costs and benefits to Madoadoa Ltd. If a decision to adopt the proposal made by Mr. Makini rather than the plan put forward by the manager of Mwanzo division is taken. (10 marks)

(Total: 20 marks)

MAY 2010 **TIME ALLOWED: 3 HOURS**

Answer ALL questions.

QUESTION ONE

New Books Publishers (NBP) Ltd. are planning to introduce a new management accounting text book. The company"s management accountant estimates that the initial distribution for likely sales is normal with a mean of 20,000 books. In addition, it has been determined that there is a probability of 0.5 that the likely sales will lie between 16,000 and 24,000 books.

The textbooks will sell for Sh.1,000 per copy but the publishing company pays the author 10% of revenue in royalties while the fixed costs of printing and marketing the book are calculated at Sh.2.5 million. Using current printing facilities, the variable production costs are Sh.400 per book, however the NBP Ltd. Has the option of hiring a special machine for Sh.1.4 million which will reduce the variable production costs to Sh.250 per book.

Required:

a) Show the standard deviation (δ) of likely sales is approximately 6,000. (4 marks)

b) Using $\delta = 6000$, determine the probability that the company will at least break even if:

i Existing printing facilities are used. (3 marks)

ii The special machine is hired. (3 marks)

c) By comparing expected profits, decide whether or not the publishing company should hire the special machine. (3 marks)

d) By using the normal distribution, it can be shown that he following probability distribution may be applied to the book sales.

Sales Sh „000"	0 – 10	10 - 16	16 – 20	20 – 24	24 – 30	30 - 40
Probability	0.05	0.20	0.25	0.25	0.20	0.05

By assuming that the actual can only take the mid-points of theses classes, determine the expected value of perfect information and interpret it. (7 marks)

(Total: 20 marks)

QUESTION TWO

a) Describe the advantages and disadvantages of using simulation to investigate queuing situations compared with the use of queuing formulae. (4 marks)

b) Kisumu Municipal council operates a mini-bus service to take shoppers and tourist from the bus and the railway stations to various locations in the Municipality. The following data have been collected for the arrival of passengers at the bus stop outside the railway station:

Time between successive arrivals (minutes)	0	1	2	3	4	5	6
Probability	0.04	0.16	0.24	0.28	0.16	0.10	0.02

The mini-buses are scheduled to run every 10 minutes but variation in traffic conditions results in the following distribution.

Time between successive buses (minutes)	8	10	12	14	16
Probability	0.10	0.38	0.28	0.15	0.09

The number of empty seats on the bus is found to follow the distribution below:

Number of empty seats	0	1	2	3	4	5	6
Probability	0.06	0.18	0.27	0.34	0.11	0.03	0.01

Required:

i. Simulate the arrival of to passengers at the bus stop assuming that the simulation clock begins at time zero. Use the following random numbers: 18262318624207384092976446757444417165809 (12 marks)

ii. Estimate the average time a passenger must wait for a bus and the average length of queue (4 marks)

(Total: 20 marks)

QUESTION THREE

a) Discuss the three main elements of strategic costs management. (6 marks)

b) Explain the major characteristics of modern businesses that necessitate the introduction of a strategic cost management system. (6 marks)

c) "If a manager searches for a system that will provide the „true costs" of each service produced by his firm he is attempting the impossible". Discuss. (8 marks)

(Total: 20 marks)

QUESTION FOUR

Computer Games Ltd. (CGL) makes and sells three types of computer games for which the following budget/standard and actual information is available for a week period:

Model	Sales (Units)	Budget/standard Selling price Sh. Per unit	Variable cost Sh. Per unit	Actual Sales (Units)
A	15,000	3,900	3,120	18,000
B	25,000	3,120	1,950	21,000
C	10,000	2,730	1,716	9,000

Required:

a) Prepare a summary of sales variances for quantity, mix and volume for each model and in total, where individual product standard contribution per unit is used as the variance valuation base. (6 marks)

b) Prepare an alternative summary giving the same range of variances as in (a) above, but using the budgeted weighted averaged contribution per unit as the variance valuation base. (8 marks)

c) Prepare a report to the management which specifically comments on each of the following points:

i. Similarities between the variances calculated in (a) as compared with those calculated in (b) above. (4 marks)

ii. The arguments which may be put in favour of the individual product quantity and mix variances as calculated in (b) above. (4 marks)

iii. The relevance of the individual product, quantity and mix variances to management. (3 marks)

(Total: 25 marks)

QUESTION FIVE

Zimco Media Group has three major divisions: Newspapers.
Television.
Film studios.

Summary financial data (in millions of shillings) for years 2000 and 2001 is given as follows:

	Operating income		Revenue		Total assets	
Year	**2000**	**2001**	**2000**	**2001**	**2000**	**2001**
	Sh.	**Sh.**	**Sh.**	**Sh.**	**Sh.**	**Sh.**
Newspapers	900	1,100	4,500	4,600	4,400	4,900
Television	130	160	6,000	6,400	2,700	3,000
Film studios	220	200	1,600	1,650	2,500	2,600

The manager of each division has an annual bonus plan based on his division"s return oninvestment (ROI). The company defines ROI as operating income divided by total assets. Senior executives from divisions reporting increa ses in the division"s ROI from the prior year are automatically eligible for a bonus. Senior executives of division reporting a decline in ROI have to provide persuasive explanations for the decline. In order to be eligible for any bonus, and they are limited to 50% of the bonus paid to the division managers reporting an increase in ROI.

J. Kanyama, manager of the newspapers division is considering a proposal to invest Sh. 200 million in a fast speed printing process with colour options. The estimated increment to year 2002 operating income would be Sh. 30 million. The media group has a 12% required rate of return for investments in all three divisions.

Required:

a. Use the Dupont Method to explain differences among the three divisions in their 2001 ROI. (Use 2001 total assets as the denominator). (6 marks)

b. Explain whether J Kanyama should undertake the fast-speed printing press investments proposal. (3 marks)

c. T. J. Zimco the Chairman of the media group, has received a proposal to base senor executive compensation in each division on Residual Income (RI) defined as operating income less imputed interest charge. Compute the residual income (RI) of each division in the year 2001 (3 marks)

d. Would adoption of the residual income (RI) basis change J. Kanyama"s decision on the acceptance of the fast-speed printing press investment proposal? (3 marks)

(Total: 15 marks)

DECEMBER 2010 **TIME ALLOWED: 3 HOURS.**

QUESTION ONE

In all the Republic of Ramuka there are five coal mines, which have the following outputs and production costs:

Mine	Output Tonnes/day	Production Cost (Sh. „000"/tonne)
1	120	2.5
2	150	2.9
3	80	3.4
4	160	2.6
5	140	2.8

Before the coal can be sold, it must be cleaned and graded at one of the three coal preparation plants. The capacities and operating costs of these plants are as follows:

Plant	Capacity Tones/day	Operating Cost Sh. „000"/tonne
A	300	0.2
B	200	0.3
C	200	0.3

All coal is transported by rail at a cost of Sh.50 per tonne kilometer, and the distance (in kilometer) from each mine to the three preparation plants are:

	Mine				
Preparation Plant	1	2	3	4	5
A	22	44	26	52	24
B	18	16	24	42	48
C	44	32	16	16	22

Required:

a) Determine how the output of each mine should be allocated to the three preparation plants. (14 marks)

b) Following the installation of a new equipment at coal mine No.3, the production cost is expected to fall to Sh.3,000 per tonne.
What effect, if any, will have on the allocation of coal to the preparation plant? (3 marks)

c) It is planned to increase the output of coal mine No.5 to 180 tonnes per day, which can be achieved without any increase in production cost per tonne.
How will this affect the allocation of coal to the preparation plants? (3 marks)

(Total: 20 marks)

QUESTION TWO

a) Explain the advantages and disadvantages of the Just-In-Tie (JIT) inventory system. (6 marks)

b) A company has determined that the EOQ for its only raw material is 2000 units every 30 days. The company knows with certainty that a four-day lead time is required for ordering. The following is the probability distribution of estimated usage of the raw material for the month of December 2002.

Usage (units)	Probability
1800	0.06
1900	0.14
2000	0.30
2100	0.16
2200	0.13
2300	0.10
2400	0.07
2500	0.04

Stock-outs will cost the company Sh.100 per unit and the average monthly holding cost will be Sh.10 per unit

Required

i Determine the optimal safety stock (12 marks)
ii Compute the probability of being out of stock. (2 marks)
(Total: 20 marks)

QUESTION THREE

Tritech Ltd. has semi-automatic machine process in which a number of tasks are performed. A system of standard costing and budgetary control is in operation. The process is controlled by machine attendants who are paid a fixed rate per hour of process time. The process has recently been reorganized as part of an ongoing total quality management programme in the company.

The nature of the process is such that the machines incur variable costs even during non-productive (idle time) hours. Non-productive hours include time spent on the rework of products.

(Note: Gross machine hours = productive hours + non-productive hours)

The standard data for the machine process are as follows:

1. Standard non-productive (idle time) hours as a percentage of gross machine hour is 10%.
2. Standard variable machine cost per gross hour is Sh.270.
3. Standard output productivity is 100% that is one standard hour of work is expected in each productive machine hour.
4. Machine costs are charged to production output at a rate per standard hour sufficient to absorb the cost of the standard level of non-productive time.

Actual data for the period August to November 2002 have been summarized below:

	August	September	October	November
Standard hours of Output achieved	3,437	3,437	4,061	3,980
Machine hours (gross)	4,000	3,800	4,200	4,100
Non-productive machine hours	420	430	440	450
Variable machine costs Sh. „000"	1,100	1,070	1,247	1,247
Variance analysis	**Sh.**	**Sh.**	**Sh.**	**Sh.**
Productivity	42,900 (A)	?	?	99,000 (F)
Excess idle time	6,000 (A)	?	?	12,000 (A)
Expenditure	20,000 (A)	?	?	111,000 (A)

Variance analysis (in % terms)

	%	%	%	%
Productivity	4.2 (A)	?	7.4 (F)	?
Excess idle time	5.0 (A)	?	4.8 (A)	?
Expenditure	1.9 (A)	?	10.0 (A)	?

Required:

a) Calculate the machine variances for productivity, excess idle time and expenditure for each of the two months of September and October. (6 marks)

b) In order to highlight the trend of variances in the months from August to November 2002, express each as a percentage term as follows:

   i Productivity variance as a percentage of standard cost of production achieved. (3 marks)

   ii Excess idle time variance as a percentage of expected idle time. (4 marks)

   iii Expenditure variance as a percentage of hours paid for all standard machine cost. (3 marks)

c) Comment on the trend of variances in the August to November period and possible inter-relationships. Particularly in the context of the total quality management programme which is being implemented. (4 marks)

(Total: 20 marks)

QUESTION FOUR

Large service organizations such as banks and hospitals used to be noted for their lack of standard costing systems and their relatively unsophisticated budgeting and control systems compared to the practice in large manufacturing organizations. But this is changing any many large service organizations are now reversing their use of management accounting techniques.

Required:

a) Explain which features of large service organizations encourage the application of activity-based approaches to the analysis of cost information. (7 marks)

b) Explain which features of service organizations may create problems for the application of activity-based costing. (7 marks)

c) Explain the uses of activity-based cost information in service industries. (6 marks)

(Total: 20 marks)

QUESTION FIVE

A university offers a range of degree courses. The university"s organization structure consists of three faculties each with a number of teaching departments. In addition, there is a university administrative/management function and a central services function.

The following cost information is available for the year ended 30 June 2002

a) Occupancy costs total Sh.15,000,000. Such costs are apportioned on the basis of area used which is:

	Faculties	**Teaching Departments**	**Administrative/ Management**	**Central services**
Area (Square feet)	7,500	20,000	7,000	3,000

2. Administration/management costs:

   Direct costs: Shs.17,750,000
   Indirect costs: an apportionment of occupancy costs.
   Direct and indirect costs are charged to degree courses on a percentage basis.

3. Faculty costs:

   Direct costs: Shs. 7,000,000.
   Indirect costs: an apportionment of occupancy and central services costs.
   Direct and indirect costs are charged to teaching departments.

4. Teaching departments:

   Direct costs: Shs. 55,250,000.
   Indirect cost: an apportionment of occupancy costs and central services costs plus all faculty costs.
   Direct and indirect costs are charged to degree courses on a percentage basis.

5. Central services:

   Direct costs: Sh.10,000,000
   Indirect costs: an apportionment of occupancy costs.

6. Direct and indirect costs of central services have in previous years been charged to users on a percentage basis. A study has now been completed which has estimated what user areas would have paid external suppliers for the same services on an individual basis. For the year ended 30 June 2002, the apportionment of central services costs is to be recalculated in a manner which recognizes the cost/savings achieved by using the central services facilities instead of using external service companies. This is to be done by apportioning the overall savings to user areas in proportion to their share of the estimated external costs.

7. The estimated external cost of service provision are as follows:

		Sh. „000"
Faculties		2,400
Teaching departments		8,000
Degree courses:		
	Business studies	320
	Mechanical engineering	480
	Catering studies	320
	All other degrees	4,480
		16,000

Additional data relating to the degree courses are as follows:

	Business Studies	Mechanical Engineering	Catering studies
Number of graduates	80	50	120
Apportioned costs (as a % of total)			
Teaching departments	3%	2.5%	7%
Administrative/management	2.5%	5%	4%

Central services are apportioned as detailed in (5) above.

The total number of graduates from the university in the year to 30 June 2002 was 2,500

Required:

a) Prepare a flow diagram which shows the apportionment of costs to user areas. (No value needs to be shown). (3 marks)

b) Calculate the average cost per graduate for the year ended 30 June 2002, for the university and for each of the degree courses in business studies, mechanical engineering and catering studies (round your values to the nearest Sh.1,000) (13 marks)

c) Suggests reasons for any differences in the average cost per graduate from one degree course to another, and discuss briefly the relevance of such information to the university"s management. (4 marks)

(Total: 20 marks)

JUNE 2011 **TIME ALLOWED: 3 HOURS**

Answer ALL questions. Marks allocated to each question are shown at the end of the question. Show all your workings.

QUESTION ONE

Briefly explain three methods that can be used to analyze uncertainty in cost-volume-profit (C-V-P) analysis. (3 marks)

Aberdares Company Ltd. is a manufacturing company which produces and sells a single product known as T_1 at a price of Sh.10 per unit. The company incurs a variable cost of Sh.6 per unit and fixed costs of Sh.400,000. Sales are normally distributed with a mean of 110,000 units and a standard deviation of 10,000 units. The company is considering producing a second product, T_2 to sell at Sh.8 per unit and incur a variable cost of Sh.5 per unit with additional fixed costs of Sh.50,000. The demand for T_2 is also normally distributed with a mean of 50,000 units and standard deviation of 5,000 units. If T_2 is added to the production schedule, sales of T_1 will shift downwards to a mean of 85,000 units and standard deviation of 8,000 units. The correlation coefficient between sales of T_1 and T_2 is – 0.9.

Required:

i The company"s break-even point for the current and proposed production schedules. (7 marks)

ii The coefficient of variation for the two proposals. (8 marks)

iii Based on your computation"s in (i) and (ii) above advise the company on whether to add T_2 to its production schedule. (2 marks)

(Total: 20 marks)

QUESTION TWO

"It is now fairly and widely accepted that conventional cost accounting, distorts management"s view of business through unrepresentative overhead allocation and inappropriate product costing. This is because the traditional approach usually absorbs overhead costs across products solely on the basis of the direct labour involved in their manufacture. As direct labour cost expressed as a proportion of total manufacturing cost continues to fall, this leads to more an more distortion and misrepresentation of the impact of particular products on total overhead costs" (from Financial Times)

Required:

a) Briefly discuss the above statement and state what approaches are being adopted by management accountants to overcome such criticism. (8 marks)

b) Traditional budgeting systems are incremental in nature and tend to focus on cost centers. Activity based budgeting (ABB) links strategic planning to the overall performance measurement aimed at continuous improvement.

Required:

i Explain the weakness of traditional incremental budgeting systems. (4 marks)

ii Describe the main feature of activity based budgeting system and comment on its advantages. (8 marks)

(Total: 20 marks)

QUESTION THREE

Joan Odero, an independent movie producer, is negotiating with Roadshow Productions Limited on a contract for the production and marketing of her next film, titled "The rise and fall of a cock". The budget for the film is, Sh.100 million.

Roadshow Productions Limited is offering Joan Odero a choice of one of the three contracts.

Contract A

1. Roadshow Productions Limited will pay all the production and marketing costs.
2. Joan Odero will receive a fixed fee of Sh.10 million.
3. Joan Odero will receive 10% of gross revenue from the film in excess of Sh.1 billion (no payment is made for gross revenue up to Sh.1 billion).

Contract B

1. Roadshow Productions Limited will pay 80% of all the production and marketing costs up to Sh.100 million and 30% of production and marketing costs in excess of Sh.100 million
2. Joan Odero will receive 10% of all gross revenue for the film.

Contract C

1. Roadshow Productions Limited will pay 50% of production and marketing costs up to Sh.100 million.
2. Joan Odero will receive 30% of all gross revenue from the film.

Joan Odero estimates the following probabilities for the gross revenues:

P(high demand of Sh.2 billion)	0.1
P(medium demand of Sh.500 million)	0.3
P(low demand of Sh.100 million)	0.6

She estimates the following probabilities for the cost of production:

P(budgeted cost of Sh.100 million)	0.6
P(high cost of Sh.200 million)	0.4

Required:

a) The expected monetary value for Joan Odero under each contract for each of the six possible events.
(Hint: The possible events are high demand – budgeted costs, high demand – high costs, medium demand – budgeted costs, medium demand – high costs, low demand – budgeted costs, and low demand – high costs). (15 marks)

b) Joan Odero will choose the contract that maximizes her expected monetary value from the film. Which contract should she choose? (Show calculations). (2 marks)

c) What information might Joan Odero use in assessing the probability distribution for the production and marketing costs of "The rise an fall of cock" film? (3 marks)

(Total: 20 marks)

QUESTION FOUR

High-tex Engineering Company Limited wishes to set flexible budgets for each of its operating departments. A separate maintenance department performs all routine and major repair works on the company"s equipment and facilities. The company has determined that maintenance department performs all routine and major repair works on the company"s equipment and facilities. The company has determined that maintenance cost is primarily a function of machine hours worked in the various production departments.

The maintenance cost incurred and the actual machine hours worked during the months of January, February, March and April 2003 were as follows:

Month	Machine hours in Production departments	Maintenance department"s Costs Sh.
January	800	350
February	1,200	350
March	400	150
April	1,600	550

Required:

a) Determine the cost estimation function using:
   i High-low method. (5 marks)
   ii Regression analysis (5 marks)

b) Using the regression function estimate:
   i The maintenance costs that would have been incurred if the machine hours were expected to be 900 in the month of May 2003. (1 mark)
   ii The maximum machine hours that would have been worked If the maintenance cost incurred had been limited to Sh.400,000 for the month of May 2003. (6 marks)

c) Assuming that in the month of May 2003 machine hours were 900, establish a 95% confidence interval for this point estimate. (Assume t_c = 2.7764 and standard error of estimate, s_e = 63.25). (3 marks)

(Total: 20 marks)

QUESTION FIVE

a) Construct a flowchart to show the logic solution of a zero-sum game. (6 marks)

b) Two manufacturers compete in a market for a specialized calculator. Company A controls 75% of the market while company B controls 25% of the market. Company A is considering a vigorous annual marketing campaign which will cost Sh.35,000,000. The total market for the specialize calculator is 100,000 units per year. The profit contribution per unit is Sh.3,000.

Company B is debating how much money to invest in research and development every year. It is considering three alternatives: Sh.25,000,000, Sh.50,000,000 and Sh.80,000,000. It is estimated that if company A runs a vigorous annual marketing campaign, its share of the market after one yea will be either 79% or 73%, depending on company B"s investment in research and development (Sh.25,000,000, 50,000,000 and Sh.80,000,000 respectively).

On the other hand, if company A does not run the marketing campaign, company B"s share of the market will decrease by 1% of the total market if it invests Sh.25,000,000 in research and development, increase by 1% if it invests Sh.50,000,000 in research and development and increase by 3% if Sh.80,000,000 is invested.

Required:

i Using the share of the market percentages only, convert the above into a zero sum game, and hence solve for the optimal strategies for both companies. (6 marks)

ii Obtain a pay off table consisting of contribution to profit in monetary terms, and hence solve the game. (8 marks)

(Total: 20 marks)

December 2011 **Time Allowed: 3 hours**

Answer ALL questions. Marks allocated to each question are shown at the end of the question. Show ALL your workings

QUESTION ONE

Sanders Ltd is a manufacturing company producing two joint products P_1 and P_2 in the ratio of 3:1 at the split-off point. The two products are taken to the mixing plant for blending and refining after the split off point. The following information is also provided:

	Product P_1	Product P_2
Sales volume (litres)	300,000	100,000
Selling price per litre	Sh.3,500	Sh.7,000
Joint process costs*	Sh.300,000,000	Sh.100,000,000
Blending and refining costs	Sh.250,000,000	Sh.250,000,000
Other separable costs (all variable)	Sh.50,000,000	Sh.20,000,000

*Joint costs are apportioned on the basis of volume

The joint process costs are 70% fixed and 30% variable whereas the mixing plant costs are 30% fixed and 70% variable. There are only 5000 hours available in the mixing plant. Usually 4000 hours are taken in processing of Product P_1 and P_2, 2000 hours for each product while the remaining 1000 hours are used for other work that generates a contribution of Sh.100,000 per hour.

The company is now planning to change the production mix of the joint process to 3:2 for product P_1 and P_2 respectively. This change will result in an increase in the joint cost by Sh.500 for each additional litre of P_2produced.

Required:

(a) Advise the company on whether to change the production mix. (14 marks)

(b) Explain other qualitative factors that are important to consider before changing the production mix. (6 marks)

(Total: 20 marks)

QUESTION TWO

A sugar manufacturing company has two plants, one in Bungoma and the other one in Busia, producing equivalent grades of sugar. The Bungoma plant has been operating at 75% of its producing 270,000 tonnes of sugar per month. The Busia plant has been operating at 60% of its capacity producing 360,000 tonnes of sugar per month. The major raw material used in producing sugar is cane. For each 800 tonnes of sugar, 1000 tonnes of care is required. At the Bungoma plant, the local cane costs are Sh.1,875 per tonne but the supply is limited to 144,000 tonnes per month. At Busia plant, local cane costs sh.3000 per tonne and is limited to 400,000 tonnes per month. Additional cane must be purchased through brokers at sh.2,750 per tonne (delivered at either plant). The cost schedules for a typical month"s production are as follows:

Bungoma Plant	**Sh."000"**
Raw materials 249,600 tonnes of cane	468,000
Fixed cost per month	594,000
Variable cost	1,026,000
Total cost	2,088,000
Busia plant	
Raw materials 249,600 tonnes of cane	576,000
Fixed cost per month	1,080,000
Variable cost	1,404,000
Total cost	3,060,000

Required:

(a) (i) If the total combined production of both plants is to be maintained at a rate of 630,000 tonnes per month, would there be any apparent advantage in shifting part of the schedule production from one plant to the other? If so, which plant"s production should be increased and by how much? (10 marks)

(ii) What is the amount of the cost saving as a result of this switch? (5 marks)

(b) If production requirements increased to 910,000 tonnes, how much would you recommend to be produced at each plant? (5 marks)

(Total: 20 marks)

QUESTION THREE

Nzewani Electronic Ltd. manufactures and sells a brand of television sets called LD-TVs. The three closest competitor brands in the market are SUM-TVs, SON-TVs. Because of the custom manufacturing process and their inherent high costs, no other competitor has any effect on the current market. The year 2002 was an exceptionally good year in terms of gain-loss trade offs. The year"s activity is summarized in the following table:

Brand	Number of customers January 2002	Gain	Loss	Number of customers December 2002
LD-TV	2200	500	450	2250
SUM-TV	3000	600	700	2900
SON-TV	2300	250	250	2300
PAL-TV	2500	400	350	2550

Further analysis resulted in the gain – loss summary as follows:

	Number of customers Gain from				Number of customers Losses to			
	LD-TV	**SUM-TV**	**SON-TV**	**PAL-TV**	**LD-TV**	**SUM-TV**	**SON-TV**	**PAL-TV**
LD-TV	0	400	0	100	0	200	100	150
SUM-TV	200	0	250	150	400	0	50	250
SON-TV	100	50	0	100	0	250	0	0
PAL-TV	150	250	0	0	100	150	100	0

The market shares for LD-TV, SUM-TV, SON-TV and PAL-TV in January 2002 were 22,30,23 and 25 per cent respectively.

Required:

(a) Advise the management of Nzewani Electronic Ltd. on the expected market share for each brand at the end of December 2002. (10 marks)

(b) Assuming the same pattern of switching persists, what would be the long run market share for each brand? (5 marks)

(c) What are the assumptions of the technique you have used in (a) and (b) above? (5 marks)

(Total: 20 marks)

QUESTION FOUR

Marashi Company Ltd. is a merchandising company selling a 40ml bottle of perfume in four zones within Kenya. The variable cost per bottle is Sh.70 but the selling price is different in each of the four zones. The difference in the selling price is due to the transportation costs involved. The company has four salesmen available for an assignment in the four zones. The zones are not equally good in their sales potential. It is estimated that a typical salesman operating in each zone would bring the following annual sales:

Zone	**Mt. Kenya**	**Western**	**Nyanza**	**Eastern**
Annual sales in bottles	60,000	50,000	40,000	30,000
Selling price per bottle	100	110	130	120

The four salesmen also differ in their marketing ability. It is estimated that, working under the same conditions, the yearly sales would be proportionately shared as follows:

Salesman:	**Kariuki**	**Wafula**	**Oketch**	**Wambua**
Proportion:	6	5	5	4

The objective of Marashi Company Ltd. is to maximize contribution from each zone.

Required:

(a) Determine how the four salesmen can be assigned to the zones in order for the company to maximize the total contribution. (15 marks)

(b) Calculate the total contribution of the company after the assignment. (5 marks)

(Total: 20 marks)

QUESTION FIVE

(a) In preparing the cash budget for the next year, Kericho Tea Farm Limited finds that it has limited surplus funds of Sh.70,000,000 which the managing directors wishes to spend on one of two schemes.

Scheme A - Pay Sh.70,000,000 immediately to reputable sales promotion agency which would provide extensive advertising and planned „reminder" advertising over the next ten years. This is expected to increase the net operational cash flows by sh.200,000,000 per annum for the first five years and Sh.100,000,000 for the following five years. Thereafter, the effect would be zero.

Scheme B - Buy immediately labour saving machinery at a cost of Sh.70,000,000 which would reduce the operating cash outflows by sh.150,000,000 per annum for the next ten years, at the end of which the equipment will have a salvage value of zero.

Required

(i) The average accounting rate of return (ARR) per annum for each scheme over 10 years. (2 marks)

(ii) The net present value (NPV) for each scheme assuming the desired rate of return is 18%. (4 marks)

(iii) The internal rate of return (IRR) for each alternative. (4 marks)

(b) The paradox is that, "while cost plus pricing is devoid of any theoretical justification, it is widely used in practice".
Discuss the possible justification for its use. (6 marks)

(c) Explain the factors to be taken into consideration when establishing the length of a budget period. (4 marks)

(Total: 20 marks)

June 2012 **Time Allowed: 3 hours**

Answer ALL questions. Marks allocated to each question are shown at the end of the question. Show ALL your workings

QUESTION ONE

Nairobi Enterprise Ltd. (NEL) is a divisionalised enterprise. Among its divisions, are South and North. Both of these divisions have a wide range of independent activities. One product, Xcel, is made by South division for North division. South division does not have any external customers for the product.

The central management of NEL delegates all pricing decisions to divisional managers and the pricing of Xcel has been a contentious issue. It has been suggested that South division should give a transfer price schedule for the supply of Xcel based on South division"s own production costs and that all goods transferred would be made at South division"s marginal costs. The North division would then order the quantity it requires each month. South estimates its monthly total costs (TC) in shillings for producing Xcel using the following equation:

$TC_S = 1{,}000{,}000 + 550Q_S + 0.002Q_S^2$

Where Q_s is the quantity of Xcel manufactured.

North division total costs (TC_N) in shillings using Xcel, excluding transfer price are:

$TC_N = 1{,}500{,}000 + 1100Q_N + 0.001Q^2_S$

Where Q_N is the quantity produced by the North division which incorporates one unit of Xcel.

The North division estimates that the demand function for its product incorporating Xcel is:

$P_N = 4{,}500 - 0.0008Q_N$

Where P_N is the price per unit of the product incorporating Xcel.

Neither division holds any stocks of Xcel.

Required:

(a) (i) The quantity of Xcel which would maximize profits for NEL. (5 marks)

(ii) The transfer price in shillings corresponding to the maximum production in (i) above if South division"s marginal cost are adopted for transfer pricing. Show the resulting profit for each division. (5 marks)

(b) (i) The quantity of Xcel which North division would take (at South division"s marginal costs) if it wanted to maximize its own profits. (5 marks)

(ii) The transfer price in shillings corresponding to the quantity of Xcel that would maximize the profits of North division, and the resulting profit for each division. (5 marks)

(Total: 20 marks)

QUESTION TWO

(a) From past experience, a company operating a standard cost accounting system has accumulated the following information in relation to variances in its monthly management accounts:

1. Its variances fall into two categories:

Category	Percentage of total number of variances
Those which are not worth investigating	64
Those which are worth investigating	36
	100

2. For the first category corrective action has eliminated 70% of the variances, but the remainder have continued unchanged.

3. The cost of an investigation averages Sh.3,500 and that of correcting variances averages sh.5,500.

4. The average cost of any variance not corrected is Sh.5,250 per month and the company"s policy is to assess the present value of such costs at 2% per month for a period of five months.

Required:

(i) Two decision trees to represent the position if an investigation is carried out and the position when an investigation is not carried out. (6 marks)

(ii) Recommend with supporting calculations, whether or not the company should follow a policy of investigating variances as a matter of routine. (2 marks)

(iii) Explain briefly two types of circumstances that would give rise to variances in the first category and two types of circumstances that would give rise to variances in the second category. (4 marks)

(b) Kenya Fashions Ltd. sells a wide range of high quality customized outfits. One particular outfit is bought at Sh.800 and sold at Sh.1,300. Mean holding costs per season per outfit amounts to Sh.50 and it costs Sh.8,000 to order and receive goods into stock. The manufacturers require orders in advance and once a batch has been made, it is not possible to place a repeat order. Further, it is not possible for delivery to be staggered over the fashion season.

When a customer buys an outfit, she has a fitting, any alterations or adjustments are made, and then she collects the outfit a day or so later. Generally if an outfit is out of stock at one branch, it can be readily obtained from another branch, usually in a matter of hours. However, if the company as a whole runs out of an item, then the cost of the stock out is Shs. 200 per item. If the company over buys for a season, then it is expected that it will be able to dispose of the surplus outfits at Sh.500 each.

The problem facing the management accountant of the company is to decide how many outfits to order for the season ahead in order to maximize expected profit, bearing in mind the penalties for over and under ordering.

Required:

(i) Determine the number of outfits to order to maximize expected profits. (6 marks)

(ii) Compare and contrast the model that you have developed with the classical economic quantity model. (2 marks)

(Total: 20 marks)

QUESTION THREE

Mwamba Development Group (MDG) plans to undertake a project consisting of eleven (11) tasks. The expected completion time of each task is uncertain and this makes the project completion time uncertain. MDG has approached a consultancy firm for advice on the expected project completion time.

The consultancy firm intends to use simulation analysis to deal with the uncertainty of the project completion time. The following data were obtained by the consultancy firm, for the purpose of simulation analysis:

Activity	Immediate Predecessor	Duration in days and probabilities							
		Duration in days							
		3	4	5	6	7	8	9	10
		Probabilities							
A	-	-	0.10	-	0.70	-	-	0.20	-
B	-	-	-	0.40	-	0.20	-	-	0.40
C	A	0.10	-	-	-	-	0.90	-	-
D	B,C	-	0.50	-	0.40	-	0.10	-	-
E	B	-	-	0.80	-	-	-	-	0.20
F	E	0.50	-	0.30	-	0.20	-	-	-
G	C	0.40	0.20	-	0.20	-	-	0.20	-
H	G	-	-	0.20	-	0.30	-	-	0.50
I	F,D,H	-	0.50	-	-	-	0.50	-	-
J	I	-	-	0.60	-	0.20	-	-	0.20
K	J	-	0.70	-	0.30	-	-	-	-

Required:

(a) Explain the basic steps that can be used to solve this type of problem simulation technique. (6 marks)

(b) Draw the network for the project and determine the critical path of the project. Use the activity"s expected time to determine the expected completion time of the project. (4 marks)

(c) Carry out four simulation runs for each activity and using the results of the simulation, determine the expected project completion time. (6 marks)

(d) State two advantages and two disadvantages of the simulation technique. (4 marks)

Use the following random numbers.

95, 30, 59, 93, 28, 72, 09, 54, 66, 95, 36, 98, 56, 23, 60, 79, 14, 50, 61, 81, 84, 14, 24, 75, 85, 49, 05, 09, 53, 45, 60, 98, 90, 86, 74, 55, 69, 09, 10, 96, 40, 27, 15, 83

(Total: 20 marks)

QUESTION FOUR

(a) The current thinking in Management Accounting contends that Activity-Based Costing (ABC) provides better information concerning products costs and decision making than traditional management accounting techniques.

However, whereas ABC may give a different impression of product costs, it is not necessarily a good idea and it may be advisable to continue improving traditional cost accounting techniques before moving to ABC.

Required:

(i) Explain cost behaviour issues underlying the use of ABC. (4 marks)

(ii) Explain why ABC might, be more suitable for modern manufacturing environment than traditional cost accounting techniques? (3 marks)

(iii) Comment on the reported claim that ABC gives better information as a guide to decision making than the traditional product costing techniques. (3 marks)

(b) The Marima Manufacturing Company produces four products; W, X, Y and Z using the same plant and processes.

The following information relates to the company:

Product	**W**	**X**	**Y**	**Z**
Volume (units)	1,000	10,000	1,200	14,000
Material cost/unit (Sh.)	10	10	32	34
Direct labour/unit (hours)	1	1	4	3
Machine time/unit (hours)	½	½	2	3
Labour cost/unit (Sh.)	6	6	24	18

The cost accountant analysed the production overheads recorded under the following headings:

Overhead costs:	**Sh."000"**
Factory overhead (machine-oriented activity)	74,848
Set-up costs	8,710
Material costs:	
Cost of ordering materials	3,840
Materials handling costs	15,160
Administration costs for spare parts.	17,200

Overhead costs are absorbed by products on a machine hour rate of Sh.9.60 per hour giving an overhead cost per unit for the products as follows:

Product	**W**	**X**	**Y**	**Z**
Shillings	2.40	2.40	9.60	14.40

Investigations into the production overhead activities for the period reveal the following totals:

Product	**W**	**X**	**Y**	**Z**
Number of set-ups	2	12	4	16
Number of material orders	2	16	2	16
Number of times material was handled	4	20	6	24
Number of spare parts used	4	10	2	8

Required:

(i) Unit costs per product using activity-based costing tracing costs to production units by means of cost drivers. (6 marks)

(ii) Comment briefly on the differences disclosed between overheads traced by the present system and those traced by activity based costing. (4 marks)

(Total: 20 marks)

QUESTION FIVE

Various attempts have been made in the public sector to achieve a more stable, long-term planning base in contrast to the traditional short-term annual budgeting approach, with its emphasis on flexibility.

Required:

(a) Explain the deficiencies of the traditional approach to planning which led to the attempts to introduce planning programming budgeting system (PPBS). (6 marks)

(b) Give an illustration of how PPBS plan could be drawn up in respect of one sector of public authority activity. (6 marks)

(c) Discuss the problems which have made it difficult in practice to introduce PPBS. (8 marks)

(Total: 20 marks)

December 2012 **Time allowed: 3 hours**

QUESTION ONE

Maisha Meta Products Ltd. has prepared a schedule of estimated overhead costs for the coming year. The schedule was prepared on the assumption that production would amount to 800,000 units. Costs have been classified as either fixed or variable according to the judgement of the financial controller. The following overhead cost items and their classification as either fixed or variable form the basis for the overhead cost schedule:

Item	Total cost Sh. „000"
Indirect materials (variable)	37,500
Indirect labour (Sh. 171,000 fixed)	194,200
Rent (fixed)	236,420
Electricity (variable)	27,210
Equipment depreciation (fixed)	181,000
Equipment maintenance (Sh. 8,500 fixed)	24,330
Personal Property taxes (Sh. 6,350 fixed)	14,100
Data Processing (Sh. 9,470 fixed)	11,220
Technical support (fixed)	16,940
	742,920

The following additional information is provided:

1) In the past, the overhead cost have been related to production levels. However, price instability has made the management to suggest that an explicit consideration be given to include an appropriate price index in the cost equation.
2) For cost estimation purpose, it is estimated that the coming period"s value index will be the same as that of the last period, which is 113.
3) Following the management instructions, information was gathered on past costs, production levels and an appropriate price index. The information gathered is given below:

Overhead cost Sh. „000"	Production Units „000"	Price index
718,480	62,800	89
735,110	72,800	90
768,310	93,400	93
717,670	56,900	95
715,960	58,800	98
726,880	69,000	100
753,420	87,000	101
777,640	98,000	103
720,410	59,200	103
718,100	62,600	106
736,800	73,100	108
714,220	60,400	113

4) There have been no significant changes in operations over the period covered by the above information nor are there any significant changes expected in the incoming period.
5) When the information above was entered into a regression program using only the production level as the independent variable, the following results were obtained:

   Equation (figure in „000")

   Overhead = Sh. 626,547 + (Sh. 1.504 x production units) Statistical data for the above equation

Correlation coefficient	0.988
R-square	0.976
Adjusted R-square	0.974

6) When both predictors are entered in the regression program, the following results were obtained:

Multiple regression results:

Equation (figures in „000" except the index)

Overhead = Sh. 632,640 + (Sh.1.501 x production units) – (Sh.59.067 x index) Statistical data for the above equation:

Correlation coefficient (multiple R)	0.988	
R-square	0.976	
Adjusted R-square	0.972	
Correlation matrix::		
	Production	Index
Production	1.00	-0.087
Index	-0.087	1.00

Required:

a) Determine the cost estimation equation using the account analysis method (6 Marks)

b) Use the high-low method to estimate the cost of 800,000 units of production expected in the coming period. (4 Marks)

c) Using the simple linear regression, estimate the cost of 800,000 units of production. (4 Marks)

d) Use the multiple regression results to prepare an estimated cost for the 800,000 units in the incoming period. (4 Marks)

e) Comment on which of the methods is more appropriate under the above circumstances. (2 Marks)

(Total: 20 marks)

QUESTION TWO

Industrial Chemical Ltd. (ICL) produces chemical Y. the standard ingredients of 1 kilogram of Y are:

0.65 kilograms of ingredient F @ Sh. 40 per Kg
0.30 kilograms of ingredient D @ Sh. 60 per Kg.
0.20 kilograms of ingredient N @ Sh. 25 per Kg.

The following additional information is provided:

1. Production of 4,000 kilograms of chemical Y was budgeted for October 2004.
2. The production of chemical Y is entirely automated and production costs attributed to its production comprise only direct materials and overheads.
3. ICL"s production process works on a just-in-time (JIT) inventory system and noingredients or inventories of chemical Y are held.
4. Overheads budgeted for the production of Y in the month of October 2004 were as follows:

Activity	Total amount Sh.
Receipt of deliveries from suppliers (Standard delivery quantity is 460 kilograms)	40,000
Dispatch of goods to customers (Standard dispatch quantity is 100 kilograms)	80,000
	120,000

5. In October 2004, 4,200 kilograms of Y were produced and the cost details were as follows:

   Materials used

   2,840 kilograms of F, 1,210 kilograms of D and 860 kilograms of N at a total cost of Sh. 203,800.

   Actual overhead costs

   12 supply deliveries at a cost of Sh.48,000 and 38 customer dispatches at a cost of Sh. 78,000 were made.

6. ICL"s budget committee met recently to discuss the preparation of the cost control report for October 2004 and the following discussion took place:

   Chief accountant: "the overheads do not vary directly worth output and aretherefore by definition „fixed". They should be analyzed and reported accordingly".

   Management accountant: "the overheads do not vary with output, but they arecertainly not fixed. They should be analyzed and reported on an activity based basis."

Required:

Having regard to this discussion,

a) Prepare a variance analysis of the production costs of Y in October 2004. (Separate the material cost variance into price, mixture and yield components and the overhead cost variance into expenditure, capacity and efficiency components using consumption of ingredient F as the overhead absorption base). (12 marks)

b) Prepare a variance analysis of the overhead production costs on Y in October 2004 on an activity based basis. (8 marks)

Note:
In both parts (a) and (b) round you values to the nearest shilling. (Total: 20 marks)

QUESTION THREE

Farmers Limited had received an order for a piece of special machine from Naivasha Flowers Limited. Just as farmers completed the machine, Naivasha Flowers Limited was declared bankrupt, defaulted on the order, and forfeited 10% deposit paid on the selling price of Sh. 72,000,000. Farmers Limited engineering department manager identified the costs already incurred in the production of the special machine for Naivasha Flowers limited as follows:

	Sh. „000"	Sh. „000"
Direct materials used		16,600
Direct labour incurred		21,400
Overhead applied:	10,700	
Variable	5,350	
Fixed		16,050
Fixed administrative expenses		5,405
Total cost		59,455

The following additional information is provided:

1. Narok Corporation would be interested in buying the special machine if it is reworked to Narok"s corporation specifications. Farmers Limited has offered to sell the reworkedspecial machine to Narok Corporation as special order for a net price of Shs. 68,400,000. Narok Corporation has agreed to pay the net price when it takes delivery in two months time.
2. The additional identifiable costs to rework the machine to the specifications of Narok Corporation are as follows:

	Sh. „000"
Direct materials	6,200
Direct labour	4,200
	10,400

3. Farmers limited can convert the special machine to a standard model. The standard model sells for Sh. 62,500,000. The additional identifiable cost to convert the special machine to the standard model are:

	Sh. „000"
Direct materials	2,850
Direct labour	3,300
	6,150

4. Farmers Limited can sell the machine as it is (i.e. without modifications) for a net price of Sh.52,000,000. However, the potential buyer of the unmodified machine wants it after 60 days. They buyer offers Sh. 7,000,000 down payment with the final payment upon delivery.
5. The sales commission rate on sales of standard models is 2% while the sales commission rate on special orders is 3%. All sales commissions are calculated on the net price (i.e. list price less cash discount, if any).
6. Normal credit terms of sales of standard models are 2/10 net 30. Customers take the discounts except in rare instances. Credit terms for special orders are negotiated with the customer.
7. The applicant rates of the manufacturing overhead and the fixed selling and administrative costs are as follows:

Manufacturing:

Variable	50% of direct labour
Fixed	25% of direct labour

Selling and administrative: (fixed)
10% of the total of direct materials, direct labour and manufacturing overheads.

8. Normal time required for rework is one month.
9. A surcharge of 5% of the sales price is placed on all customer requests for minor modifications of standard models. Conversion of a special machine to a standard model is not a minor modification.

10. Farmers Limited normally sells a sufficient number of standard models for the company to operate at a volume in excess of a breakeven point.
11. Farmers Limited does not consider the time value of money in the analysis of special orders and projects whenever the time period is less than one year because the effect is not significant.

Required:

(a) Determine the total contribution in shillings for each of the three alternatives (12 marks)

(b) If Narok Corporation makes a counter offer, what is the lowest price farmers limited should accept for the reworked machine from Narok Corporation? Explain your answer. (3 marks)

(c) Discuss the influence that fixed factory overhead costs should have on the sales quoted by Farmers Limited for special orders when:
(i) A firm is operation at or below the breakeven point (3 marks)
(ii) A firm"s special orders constitute efficient utilization of unused capacity above the breakeven volume. (2 marks)

(Total: 20 marks)

QUESTION FOUR

(a) Explain the following terms as applied in competitive situations:
i) Degeneracy (2 marks)
ii) Pure strategy (2 marks)
iii) Mixed strategy (2 marks)
iv) Dominance rule (2 marks)

(b) Best Sell Ltd. has decided to launch a new product in addition to its range of products. The following information is available:

1. The new product may be distributed through any combination of the two company warehouses W_1 and W_2.
2. The available monthly production capabilities for the new products are:
   1000 units at plant A
   2000 units at plant B
   1000 units at plant C
3. Three major concentration points of customer demand are at locations E, F and G which are estimated to have a monthly demand of:
   900 units at E
   800 units at F
   900 units at G
4. The unit production costs amount to Sh.30, Sh.40, Sh.10 at A, B and C respectively.
5. The unit handling costs at the warehouses amount to Sh.20 and Sh.30 at W_1 and W_2.
6. The unit transportation costs from plant to warehouse and unit delivery cost from warehouse to customers are as shown below:

Transportation cost schedule.

	Warehouses	
	W1	**W2**
Plants	**Sh.**	**Sh.**
A	60	60
B	50	50
C	130	40

Delivery costs schedule
Locations

	E	F	G
Warehouses	**Sh .**	**Sh.**	**Sh.**
A	30	50	80
B	50	30	90

Required:

Determine the optimum production and distribution schedule to minimize total cost.
(12 Marks)
(Total: 20 Marks)

QUESTION FIVE

Equi -solutions Ltd. was formed ten years ago to provide business equipment solutions to local business. It has separate divisions for research, marketing, product design, technology and communication services, and now manufactures and supplies a wide range of business equipment. To date the company has evaluated its performance using monthly financial reports that analyze profitability by type of equipment. The managing director of Equi-solutions Ltd. has recently returned from a course in which it has been suggested that the "Balanced Scorecard" could be a useful way of measuring performance.

Required:

a) Explain the "Balanced Scorecard" and how it could be used by Equi-solutions Ltd. to measure its performance.
b) The managing director of Equi-solutions Ltd. also overheard someone mention how the performance of their company had improved after they introduced "Benchmarking."

Required:
Explain "Benchmarking" and how it could be used to improve the performance of Equi -solutions Ltd. (10 marks) (**Total: 20 marks)**

KENYA ACCOUNTANTS AND SECRETARIES NATIONAL EXAMINATIONS BOARD

CPA PART III

MANAGEMENT ACCOUNTING

June 2013 **Time Allowed: 3 hours.**

Answer ALL questions. Marks allocated to each question are shown at the end of the question. Show ALL your workings.

QUESTION ONE

Tony Kichumi, a financial analyst at Green City Bus Company Ltd. is examining the behaviour of the company"s monthly transportation costs for budgeting purposes. The transportation costs are a sum of a two types of costs:

1) Operating costs, such as fuel and labour.
2) Maintenance costs, such as overhaul of engines and spraying.

Kichumi collects monthly data on items 1 and 2 above and the distance covered by the buses. Monthly observations for the year ended 31 December 2004 were as follows:

Month	**Operating costs**	**Maintenance costs**	**Distance covered in kilometers (d)**
	Shs. „000"	**Shs. „000"**	**Shs. „000"**
January	471	437	3,420
February	504	388	5,310
March	609	343	5,410
April	690	347	8,440
May	742	294	9,320
June	774	211	8,910
July	784	176	8,870
August	986	210	10,980
September	895	280	4,980
October	651	394	5,220
November	481	381	4,480
December	386	514	2,980

Kichumi ran three linear regression equations based on the data above and came up with the following results:

Regression equation I
Operating costs = a + bd

Variable	**Coefficient**	**Standard error**	**t - value**
Constant	309.19	96.05	3.22
Distance covered in kilometers	0.054	0.014	3.86

r^2 = 0.61, Durbin – Watson statistic = 1.61

Regression equation II
Maintenance costs = a + bd

Variable	Coefficient	Standard error	t - value
Constant	531.55	46.95	11.32
Distance covered in kilometers	- 0.031	0.007	- 4.43

r^2 = 0.68, Durbin – Watson statistic = 1.72

Regression equation III
Total transportation costs = a + bd

Variables	Coefficient	Standard error	t - value
Constant	840.73	80.25	10.48
Distance covered in kilometers	0.023	0.011	2.09

r^2 = 0.29, Durbin – Watson statistic = 2.34

Required:

(a) Evaluate the three linear regression equations using:
- (i) Economic plausibility. (3 marks)
- (ii) Goodness of fit (3 marks)
- (iii) Significance of independent variables. (3 marks)
- (iv) Specifications analysis criteria (3 marks)

(Use a 95% confidence level where applicable).

(b) List three variables, other than distance covered, that could be important drivers of the company"s operating costs. (3 marks)

(c) Suggest an alternative database that Kichumi could have used to examine the drivers of the company"s maintenance costs. (2 marks)

(d) Explain three limitations of the linear regression analysis used by the company. (3 marks)

(Total: 20 marks)

QUESTION TWO

Nyali Ltd. is a distributor of an industrial chemical in the South Coast. The chemical is supplied in drums which have to be stored at a controlled temperature. The company"s objective is to maximize profits, however the management team disagrees on the stock control policy and holds the following different views:

The Managing Director"s view:

The company"s managing director (MD) wishes to improve the stock holding policy by applying the economic order quantity (EOQ) model. Each drum of the chemical costs Shs. 5,000 from a supplier and is sold for Shs. 6,000. The annual demand is estimated to be 10,000 drums which the MD assumes to be evenly distributed over the 300 working days in a year. The cost of delivery is estimated at Shs. 2,500 per order and the annual variable holding cost per drum at Shs. 4,500 plus 10% of the purchase price.

Using these data, the MD calculated the EOQ and proposes that it should be used as the basis for future purchasing decisions of the industrial chemical.

The Purchasing Manager"s view:

Provided in the employment contract of the company"s purchasing manager (PM), is a clause stating that he will receive a bonus (rounded at the nearest Shs. 100) calculate as follows:

$b = [1{,}000{,}000 – (O_C + H_C)] \times 0.1$

where: b is the annual bonus.

O_C is the annual ordering cost.

H_C is the annual holding cost.

Using the same assumption as the MD, the PM points out that in making his calculation, the MD has not only ignored the bonus but also the fact that suppliers offer quantity discounts on purchase orders, where if the order size is 200 drums or above, the price per drum for an entire consignment is only Shs. 4,990 compared to Shs. 5,000 when the order is between 100 and 199 drums and Shs. 5,010 when an order is between 50 and 99 drums.

The Finance Director"s view:

The company"s finance director (FD) accepts the need to consider quantity discounts and pay a bonus, but he also holds the view that the MD"s approach is too simplistic. He points out that there is a three days lead time for an order and that demand has not been entirely even over the past year. Moreover, if the company has no drums of the chemical in stock, it will lose specific orders as potential customers will source the chemical from competitors. He gives the frequency of lead time demand over the last year as follows:

Demand during lead time (No. of drums)	Frequency
106	4
104	10
102	16
100	40
98	14
96	14
94	2

Under the circumstances, the MD decided that he would seek further advice on the course of action to be taken by the company.

Required:

(a) The EOQ as originally determined by the company"s managing director. (2 marks)

(b) Determine the optimum order quantity, taking into consideration the MD"s assumptions and after allowing for the purchasing manager"s bonus and supplierquantity discount. (4 marks)

(c) The safety stock the company should maintain after applying the finance director"s assumptions and assuming further that the supplier"s contract requires that the order quantity be constant for all the orders in a year. (6 marks)

(d) As a consultant, write a brief report to the managing director on the company"s stock ordering and stock holding policies, referring where necessary to your answers in (a) to (c) above. The report should refer to other factors that should be considered when making the final decisions on stock ordering and holding policies. (8 marks)

(Total: 20 marks)

QUESTION THREE

(a) List five assumptions underlying the cost-volume-profit (CVP) analysis. (5 marks)

(b) Makazi Ltd. manufactures a hedge-trimming tool which has been selling at Shs. 1,600 per unit for a number of years. The selling price is to be reviewed and the following information is available on costs and the likely demand:

1. The standard variable cost of manufacturing the tool is Shs. 1,000 per unit and an analysis of the cost variances in the past 20 months shows the following pattern which the production manager expects to continue in the future.
    - Adverse variances of 10% of the standard variables cost occurred in ten of the twenty months.
    - Nil variances occurred in six of the twenty months.

- Favourable variances of 5% of the standard variable cost occurred in four of the twenty months.

2. Fixed costs have been Shs. 400 per unit at an average sales level of 20,000 units, but are expected to rise in the future.
3. The following estimates have been made of the total fixed cost:

	Shs.	Probability
Optimistic estimate	8,200,000	0.3
Most likely estimate	8,500,000	0.5
Pessimistic estimate	9,000,000	0.2

4. The demand estimates at the two proposed selling prices being considered are as follows:

Proposed selling price	Shs. 1,700 No. of units demanded	Shs. 1,800 No. of units demanded	Probability
Optimistic estimate	21,000	19,000	0.2
Most likely estimate	19,000	17,500	0.5
Pessimistic estimate	16,500	15,500	0.3

Assume that all the estimates and probabilities are independent.

Required:

(i) Based on the information given above, advise the management of Makazi Ltd. on whether they should change the selling price. Indicate the price you would recommend. (6 marks)

(ii) The expected profit at the price you have recommended in (i) above and the resulting margin of safety expressed as a percentage of expected sales. (4 marks)

(iii) Comment on the method of analysis you have used to deal with the probabilities given in the question. (2 marks)

(iv) Explain briefly how the use of a computer program would improve your analysis. (3 marks)

(Total: 20 marks)

QUESTION FOUR

(a) Identify and explain three types of decision making environments. (6 marks)

(b) Topcom Kenya International Limited (TKIL) is a telecommunications company situated in Nakuru. Recently, the company was faced with a workers strike which necessitated a renegotiation of the workers" salaries through their union. Themanagement with the help of a consultant, has prepared the pay-off matrix shown below:

Pay-off matrix

		Workers union strategies			
		U_1	**U_2**	**U_3**	**U_4**
	C_1	+ 2.5	+ 2.7	+ 3.5	- 0.2
Company strategies	**C_2**	+ 2.0	+ 1.1	+ 0.8	+ 0.8
	C_3	+ 1.4	+ 1.2	+ 1.5	+ 1.3
	C_4	+ 3.0	+ 1.0	+ 1.9	0

A positive sign represents a wage increase while a negative sign represents a wage decrease.

Required:

(i) Advise the management on the best strategies. (6 marks)

(ii) The value of the game (2 marks)

(c) Briefly explain the limitations of the use of fame theory in decision making. (6 marks)

(Total: 20 marks)

QUESTION FIVE

(a) State four objectives of a transfer pricing system.

(b) Transfer pricing of products between processes in a manufacturing company can be done at:

1. Cost or
2. Sales value at the point of transfer.

Required:

Discuss how each of the above methods could be used effectively in the operations of a responsibility accounting system. (8 marks)

(c) Shadow prices may be used in the setting of transfer prices between divisions in a company, where the intermediate products being transferred are in short supply.

Required:

Explain why the transfer prices thus calculated are more likely to be favoured by the management of the divisions supplying the intermediate products rather than the management of the divisions receiving the intermediate products. (8 marks)

(Total: 20 marks

KENYA ACCOUNTANTS AND SECRETARIES NATIONAL EXAMINATIONS BOARD

CPA PART III

MANAGEMENT ACCOUNTING

December 2013 Time Allowed: 3 hours

QUESTION ONE

(a) Manukato Ltd. produces a designer perfume called "Hint of Elegance." Production of the perfume involves the use of two ingredients, X_1 and X_2 represented by the production function given below:

$$Y = \sqrt{X_1 X_2}$$

Where Y = Number of bottles of designer perfume produced.
X_1 = Units of ingredient 1.
X_2 = Units of ingredient 2.

Currently, the company is operating at a level where the daily usage of X_1 and X_2 is set at 250 units and 360 units respectively.

The price of the designer perfume and the cost of ingredients X_1 and X_2 are random variables. The data below relate to the three random variables.

Selling price of Y (per bottle) Shs.	**Probabilities**
4,000	0.15
4,500	0.35
5,000	0.20
5,500	0.30

Cost of ingredient X_1 Shs.	**Probabilities**
1,000	0.10
1,500	0.05
2,000	0.35
2,500	0.50

Cost of ingredient X2 Shs.	**Probabilities**
1,500	0.20
2,000	0.25
2,500	0.15
3,000	0.40

Required:

(i) Calculate the daily expected profit of the company. (5 marks)

(ii) Simulate the company"s profit for 10 days using the following random numbers:
58, 71, 96, 30, 24, 18, 46, 23, 34, 27, 85, 13, 99, 24, 44, 49,
18, 09, 79, 49, 74, 16, 32, 23, 02, 56, 88, 87, 59, 41, 06 (8 marks)

(b) Nairobi Manufacturers Ltd. produces component X on machine Y at a rate of 4,000 units per month. Machine Z uses component X at the rate of 1,000 units per month, the remainder being put into stock. It costs Shs. 2,000 to set up machine Y while the stock holding cost is estimated at Shs. 2.50 per unit per annum plus a 20% opportunity cost of capital per annum. Each component costs Shs. 25 to produce.

Required:

(i) Compute the optimal batch size that should be produced using machine Y. (3 marks)

(ii) Assume that the actual set-up cost of machine Y is Shs. 1,000 instead of Shs. 2,000. Calculate the cost of prediction error. (4 marks)

(Total: 20 marks)

QUESTION TWO

Kutwa Ltd. is a manufacturing company with two divisions; A and B. Division A manufactures a single standard product K, some of which is sold externally and the remainder used as an input in division B in the manufacture of product M.

The unit production costs of product K are given below:

	Shs.
Direct material	40
Direct labour	20
Direct expense	20
Variable manufacturing overheads	20
Fixed manufacturing overheads	40
Selling and packaging expenses (variable)	10
	150

Annually, 10,000 units of product K are sold externally at a price of Shs. 300 per unit and 5,000 units are transferred to division B at an internal transfer price of Shs. 290 arrive at by deducting the selling and packaging expense from the external price of Shs. 300 which is not incurred for products transferred internally.

The unit production cost for product M which uses product K as an input is given below:

	Shs.
Cost of internally transferred products from division A to division B	290
Direct material	230
Direct labour	30
Variable overheads	120
Fixed overheads	120
Selling and packaging expenses (variable)	10
	800

The manager of division B has disagreed with the basis used in arriving at the transfer price. He argues that the transfer price should be arrived at by charging the variable cost plus an agreed mark-up. He also claims that division A would not be in a position to externally sell the extra units that are transferred to division B at the price of Shs. 300.

A survey on the relationship between the selling price and demand for each division was carried out by the company"s Sales Director. The results are shown in the table below:

Division A	Selling price (Shs.)	200	300	400
	Demand (units)	15,000	10,000	5,000
Division B	Selling price (Shs.)	800	900	1,000
	Demand (units)	7,200	5,000	2,800

The manager of division B suggests that based on the above results, a transfer price of Shs. 120 would offer division A a reasonable contribution towards its fixed cost and earn division B a reasonable profit. This would lead to an increase in the output and overall profitability of the company.

Required:

(a) Calculate the effect of the existing transfer pricing system on the company"s profits. (12 marks)

(b) Calculate the effect of adopting the transfer price of Shs. 120 on the company"s profits. (8 marks)
(NB: use the results of the Sales Director"s survey in your calculations).
(Total: 20 marks)

QUESTION THREE

(a) Explain the applications of the learning curve. (4 marks)

(b) Pwani Marine Ltd., a boat construction company, has developed a new type of speed boat called "Speed Surf."

The following information has been availed to you:

1. Boat construction is a continous assembling process carried out at the company"s yard.
2. Boat assembling is labour intensive involving the use of two classes of labour namely:
   - Skilled labour at a standard rate of Shs. 1,250 per hour.
   - Semi-skilled labour at a standard rate of Shs. 950 per hour.
3. Experience on boat construction from other models indicates that the use of skilled labour is associated with an 80% learning curve effect whereas use of semi-skilled labour is associated with a 90% learning curve effect.
4. Labour usage for the first speed boat assembled was as follows:
   - Skilled labour – 952 hours.
   - Semi-skilled labour – 650 hours.
5. In October 2005, the sixth and the seventh speed boats were assembled from start to finish. During the month, the following labour usage and costs were recorded:
   - Skilled labour – 680 hours at a total cost of Shs. 800,400.
   - Semi-skilled labour – 1,256 hours at a total cost of Shs. 1,281,200.

The management of Pwani Marine Ltd. is concerned about the cost variances and would like to learn more on the composition of the variances.

Required:

(i) Calculate the standard labour cost of the month of October 2005. (3 marks)

(ii) Reconcile the standard cost with the actual cost for the month of October 2005 showing the labour rate and labour efficiency variances. (5 marks)

(iii) Express the labour efficiency variance in terms of labour mix and labour output variances. (Value the labour mix variances using standard rates). (8 marks)

NB: The value of b in the formula for the learning curve is -0.322 for an 80% learning rate and -0.152 for a 90% learning rate. (Total: 20 marks)

QUESTION FOUR

Angels of Mercy Mission Hospital operates on charity basis. The hospital"s board ofdirectors has recently complained about the increasing size of the cost budget insisting that the management should cut down on costs.

The major concern of the board is the cost of maintaining patients at the intensive care unit (ICU).

The following information is available on the operations of the hospital:

1. The average cost of maintaining a patient at the ICU per week is Shs. 200,000 compared to Shs. 100,000 per week incurred in maintaining a patient at the high dependency unit (HDU) and Shs. 50,000 per week of maintaining a patient at the general ward (GW).
2. Past information on patients indicates that:
   - (i) 50% of the patients in ICU at the beginning of the week will remain in ICU at the end of the week and 50% will be transferred to HDU by the end of the week.
   - (ii) 10% of the patients in HDU at the beginning of the week will be transferred to ICU, 50% will remain in HDU, and 40% will be transferred to GW.
   - (iii) 85% of the patients in the GW at the beginning of the week will remain in GW at the end of the week, 10% will be transferred to HDU and 5% to ICU.
3. The board of directors believe that the criteria for maintaining patients in the ICU is too strict and should be relaxed so that only 40% of the patients in ICU at the beginning of the week remain there at the end of the week while 60% are transferred to HDU.
4. The staff at the hospital insist that if the proposed criterion is adopted:
   - (i) 20% of patients in HDU at the beginning of the week will be transferred to ICU, 50% will remain in HDU while only 30% will be transferred to GW.
   - (ii) No changes will be expected in the GW.
5. Past hospital records indicate that the hospital serves an average of 4,000 patients weekly.

Required:

(a) The steady state weekly costs under the current policy. (7 marks)

(b) The steady state weekly costs under the proposed policy. (7 marks)

(c) Advise the board on the best policy. (2 marks)

(d) State the assumptions of the quantitative technique used in solving problems (a) and (b) above. (4 marks)

(Total: 20 marks)

QUESTION FIVE

(a) Highlight the assumptions of cost-volume-profit (C-V-P) analysis, (4 marks)

(b) Mwito Club is a charitable organization based in Nairobi. For the last 20 years, the club has held an annual dinner and dance event with the primary aim of raising funds to help the less fortune members of the society.

This year, there is concern that an economic recession may adversely affect the success of the event with a fall in the number of guests attending and sale of advertising space in the published events programme.

A study of past experience, current prices and quotations shows that the following costs and revenues will apply for the event:

Revenue

- Dinner and dance

Sale of dinner and dance tickets: Shs. 5,000 per ticket.
Sale of raffle tickets: Shs. 800 per ticket.
Photographs: Shs. 100 per photograph.

- Events programme

Advertising space: Shs. 70,000 per page.

Costs

• Dinner and dance	**Shs.**
Hire of premises	210,000
Music band and entertainers	840,000
Raffle prizes	790,000
Hire of a photographer	50,000
Food per person (subject to a minimum of 4,000 guests)	2,400

- Events programme

A fixed cost of Shs. 4,000,000 and a variable cost of Shs. 5,000 per page.

A committee appointed to assess the likely outcome of the event has come up with the following data from the club"s records:

Number of tickets sold	Number of past events
2,500 to 3,500	4
3,501 to 4,500	6
4,501 to 5,500	8
5,501 to 6,500	2
	20

Number of events programme pages sold	Number of past events
240	4
320	8
400	6
480	2
	20

Required:

(i) The expected profit from the event. (Assume one raffle ticket and one photograph per attendant). (10 marks)

(ii) Describe how cost-volume-profit (C-V-P) analysis can be applied in absorption costing. (6 marks)

(Total: 20 marks)

Answers

JULY 2008

QUESTION ONE

(a) Existing capacity

				Kshs
	P	4560 x 19.6	=	89,376
	Q	6960 x 13.0	=	90,480
	R	3480 x 9.9	=	34,452
	S	2300 x 17.0	=	39,100
	Total Existing Capacity			253,408
	Add 5% increase to full Capacity 5% x 253,408			12,670.4
	Total Direct Labour of Full capacity			266,678.4

Switching of 2000 kg of Q releases Direct Labour cost by-: which is switch to P.

2000 x 13	26,000
Add 5% increase	12,670.4
Available cost to be switched	38,670.4

Labour cost of P = 19.6

Therefore units to be switched $= \frac{38,670.4}{19.6} = 1973$ Kg

Increased contribution therefore is: -

	Shs	Shs.
Sales 197 x 162		319,626
Less: Variable Cost		
Direct labour (1973 x 19.6)	38,670.8	
Direct materials (1973 x 65.20)	128,639.6	
Direct packaging 91973 x 8.4)	16,573.2	(183,883.6)
Contribution of P		135,742.4
Less: Lost contribution from		
Q = 2000{(0.9 x 116.40) – (13 + 49 + 7.4)}		(70,720)
Incremental Contribution		65,022.4

Decision

Timao Company Limited should subcontract 2000kg from Kagocho Company due to the incremental contribution of Kshs. 65,022.4

(b)

	P	Q	R	S
Timao"s selling prices (A)	162	116.40	99.20	136.80
Subcontracts price = (90% x 4)	145.80	104.76	89.28	123.12
Less: Variable cost of marking				
Direct labour	19.60	13.00	9.90	17.00
Direct materials	65.20	49.00	41.00	54.20
Direct packing	8.40	7.40	5.60	7.00
Total Variable cost	93.20	69.40	56.50	78.20
Lost Contribution	52.60	35.40	32.90	44.90

Switching of 2000kg to different products. This can be done in a matrix form as follows.

Additional Production (Kg) from switching direct labour cost.

Source of units	P	Q	R	S
Shs.39,200 from P (a)	0	3015 (e)	3959 (f)	2305 (g)
Shs.26,000 from Q (b)	1326 (h)	0	2626 (i)	1529 (j)
Shs.19,800 from R (c)	1010 (k)	1523 (l)	0	1164 (m)
Shs.34,000 from S (d)	1734 (n)	2615 (o)	3434 (p)	0
Extra 5 % of capacity Shs.12,670.4	646 (q)	974 (r)	1280 (s)	745 (t)

Workings

(a)	2000 x 19.60	(e)	39,200 ÷ 13	(i)	26,000÷ 9.9
(b)	2000 x 13.00	(f)	39,200 ÷ 9.9	(j)	26,000÷ 17
(c)	2000 x 9.90	(g)	39,200 ÷ 17	(k)	19,800÷ 19.6
(d)	2000 x 17.00	(h)	26,000 ÷ 19.6	(l)	19,800÷13
(m)	19,800 ÷17	(q)	12,670.4 ÷ 19.6		
(n)	34,000 ÷ 19.60	(r)	12,760.4 ÷ 13		
(o)	34,000 ÷ 13	(s)	12,670.4 ÷ 9.9		
(p)	34,000 ÷ 9.9	(t)	12,670.4 ÷ 17.00		

Extra contribution gained in Shs.

	P	Q	R	S
Contribution per Kg/Sh.	68.80	47	42.70	58.6
2000Kg of P subcontract	0	82,283(i)	118,500(ii)	73,530
2000Kg of Q subcontract	64,954	0	96,070	62,536
2000Kg of R subcontract	48,373	51,788	0	46,307
2000 Kg of S subcontract	73,900	78,843	111,448	0

Workings

Incremental contribution - lost contribution

i.e. (i) { (3015 + 974) 47 } – { (2000 x 52.6) } = 82,280

(ii) {(3959 + 1280) 42.7)} – {(2000 x 52.6)} = 118,500 etc

Decision

The best profitable contribution is to subcontract 2000kg of P and replace it with 5239kg (3959 + 1280) kg of R leading to the highest contribution of Shs. 118,500.

QUESTION TWO

Two important concepts in control theory are firstly, that a system must have a purpose and must have controls if it‟s to remain cohesive and secondly, that is a system can be divided into a number of sub-systems and sub-sub-systems, each with it‟s own purpose and controls. Controls provide the binding force, which kept every various elements within the system all working towards a common objective.

Control theory can be used to analyse or to establish control systems within a business organization. A model can be constructed and used as follow:

i. The system as a whole, and for each sub-system (and sub-sub-systems) one or more objectives are identified.
ii. Actual achievements of the system and sub-system are monitored.
iii. Actual achievements are compared with the objective.
iv. Reasons for any differences between the objectives and achievements are identified
v. Where suitable, corrective measures are taken to bring the system under control

- When actual achievements are measured as actual outcomes and results, the comparison of results with objectives is called a <u>feedback</u> control loop. When actual achievements are measured as what the system is not expected to achieve and future expectations are compared with objectives (Such as projected completion dates for a project) we have <u>feedforward control.</u>
- A control model can also be made to recognize environmental influences, and the ways in which environment can affect the system‟s achievements and objectives.
- The concepts of control theory can provide valuable insights into the design and operation of a management accounting information system (MAIS) because:-

    i. Business organizations need to be controlled by their management.
    ii. Management accounting provides an information system for control, based largely on a system of budgets. This information acts as a feedback loop.
    iii. The way in which a MAIS is structured and used can be determined by modeling techniques.

- A control model for a MAIS would: -

    i. Identify the sub-systems within the organization
    ii. Establish objectives for each sub-system, and for the system as a whole. These objectives must be measurable, and would usually take the form of budgets, with the control system being a budgetary control system.
    iii. Measure actual achievements for each sub-system, for the system as a whole.
    iv. Compare actual results with the objectives (budgets)
    v. Identify significant differences, and the reasons for them, indicating where control action should be taken.

- A MAIS cannot initiate control action itself, but can only indicate where control measures might see appropriate, control measures must be taken by managers, perhaps using their judgment. In this respect, a MAIS falls short of the ideals‟ of a cybernetic control model.
- The practical application of control principles to a MAIS, using a budgetary control system does depend on the stability of the environment and accurate measurement of results.

- When an organization"s environment is unstable ad unpredictable forecasts of achievements will be uncertain; and a comparison of actual results against plan might be meaningless. It might also be necessary to alter the system"s objectives in response toenvironmental change.
- If environmental changes are continual, or frequent, the problems of redefining systems objectives will be considerable and budgets would have to be revised at frequent intervals. In addition, the significance of differences between actual results and budget would be difficult to assess for control purposes.
- Outcome needs to be fairly clearly measurable for control system to operate successfully. In practice, there may be problems in applying quantative measures to qualitative outputs, and control information might be imperfect and incomplete. This always the prospect that unless results can be measured objectively managers will manipulate and „judge" the figures, so that the problems of human behaviour damage the operation ofthe control system.
- In conclusion, control theory can provide a useful framework for a MAIS but control of a business is not "automatic". Business organizations are largely „human systems," ad there will inevitably be difficulties with applying the theoretical
- structure of a control model in practice. Further more, although some environmental change can be achieved for in a control mode, frequent changes caused by unstable environment could remove the practical value of feedback systems for control.

QUESTION THREE

a)

		Sh. „000"
(i) Desired Residual Income		5,000
Current Income from external sales		
Contribution = 500 (37 – 25)	6,000	
Fixed costs	(1,400)	
Capital cost 13% x 20 m	(2,600)	2,000
Contribution to be generated by internal transfers		3,000

Contribution per unit $= \frac{3,000}{300} =$ Sh.10 per unit

Transfer price = Sh.25 + Sh.10 = Sh.35 per unit

(ii) The transfer price above may motivate the Z division manager to want to sell the components externally at Sh.37 rather than to transfer them to other divisions at Sh.35. This may result in the other divisions being forced to buy components externally and thus incur buying costs while Z will incur selling cots. The net effect is that the company as a whole losses.

b) The demand function can be determine as follows:

$P = A - bV$

Where P is the price per unit

V is the volume of sales at that price

A is the price at which V = O (Maximum price)

b is the rate at which the price falls for volume increases a proportion of sales volume.

Product A

Demand is currently 15,000 units at a price of Sh.30. The demand changes by 500 units for each Sh.1 change in price.

$$A = 30 + \frac{15{,}000}{500} \times 1 = Sh.60$$

The maximum price = Sh.60

$$b = \frac{1}{500}$$

The demand function will be

$$P = 60 - \frac{1}{500}Q$$

Total revenue = PQ = $60Q - \frac{1}{500}Q^2$

Profit is maximized where MR = MC

$$MR = \frac{dTR}{dQ} = 60 - \frac{2Q}{500} = 60 - \frac{Q}{250}$$

MC is the unit variable cost = Sh.12

At Maximum profit MR = MC

$$60 - \frac{Q}{250} = 12$$

Q = 12,000 units

Substituting to find P

$$P = 60 - \frac{12{,}000}{500} = \underline{\textbf{Sh.36}}$$

The profit maximizing price is Sh.36 and profit maximizing Quantity is 12,000 units.

Product B

This is solved in the same way as A

$$A = 58 + \frac{21{,}000}{500} \times 1 = Sh.100$$

$$P = 100 - \frac{1}{500}Q$$

$$TR = 100Q - \frac{Q^2}{500}$$

$$MR = \frac{dTR}{dQ} = 100 - \frac{Q}{250}$$

MC = Sh.8

At maximum profit MR = MC

$$100 - \frac{Q}{250} = 8$$

Q = 23,000 units

Substituting

$$P = 100 - \frac{23{,}000}{500} = \underline{\textbf{Sh.54}}$$

The profit maximizing price is Ksh.54 while the profit maximizing quantity is Sh.23,000 units

QUESTION FOUR

(a) Expected Value of Usage

Lead-Times (Days)	Probability	Demand (units)	Joint Probability	Expected Value (Usage)
15 working days 0.2	0.4	5,000	0.08	(15 x 5000) 0.08 = 6,000
	0.6	7,000	0.12	(15 x 7,000) 0.12 = 12,600
20 working days 0.5	0.4	5,000	0.20	(20 x 5,000) 0.20 = 20,000
	0.6	7,000	0.30	(20 x 7,000) 0.30 = 42,000
25 working days 0.3	0.4	5,000	0.12	(25 x 5,000) 0.12 = 15,000
	0.6	7,000	0.18	(25 x 7,000) 0.18 = 31,500
			1.00	127,100

Bufter stock at 150,000 units re- order level = (150,000 – 127,100) = <u>22,900 units</u>

(b) The P (stock out cost i.e. Demand in excess of 150,000 units)
= (25 x 7,000) = 175,000 units
∴ P (stock out cost) = 0.18

(c) **EOQ** = $\sqrt{\dfrac{2 \times (6{,}200 \times 360) \times 1{,}000}{0.0025 + (0.1 \times 2)}}$ = 140,855 units

Daily Demand = 5,000 (0.4) + 7,000 (0.6) = 6,200

No of average orders per annum = $\dfrac{6{,}200 \times 360}{140{,}855}$ = 15.85

∴ The expected annual stock outs in units per annum =
{(0.225) (175,000 – 150,000)} x 15.85 = 89,156 units

(d) The additional annual holding cost if the re-order level is increased to 175,000 units:
15 (175,000 – 150,000) (0.025 x 1.1 x 2) = 1,375
Therefore, are-order level of 150,000 units the expected value of stock outs per annum is 10,766 units.

Then the increase in stock is justified where stock out cost per unit is greater then Shs.0.3 (1,375/10,766)

(e) JIT (Just in time) it involves a continuous commitment to re-pursuit of excellence in all phases off manufacturing systems design and operation.

Advantages of JIT

i. Leads to substantial savings in stockholding costs.
ii. Elimination of waste
iii. Savings in factory and warehouse space, which can be used for other profitable activities.
iv. Reduction in obsolete stocks
v. Considerable reduction in paper work arising from a reduction in purchasing, stock and accounting transactions

Disadvantages of JIT

i. Additional investment costs in new machinery, changes in plant layout and goods inwards facilities.
ii. Difficulty in predicting duty or weekly demand, which is a key feature of the JIT philosophy.
iii. Increased risk due to the greater probability of stock out costs arising from strikes, or other unforeseen circumstances, then restrict production or supplies.

QUESTION FIVE

(a) Modification of the probability by use of Bayes Theorem

$$B\ (B/A) = \frac{P\ (B)\ x\ P}{(A/B)}\ P\ (A)$$

Steps to follow in modification of probabilities

Step 1 Interpretation of the formula into the question:
B is either oil (O) or not oil (N)
A is the result of the report either favourable (F) or unfavourable (U) under each of the above situations.

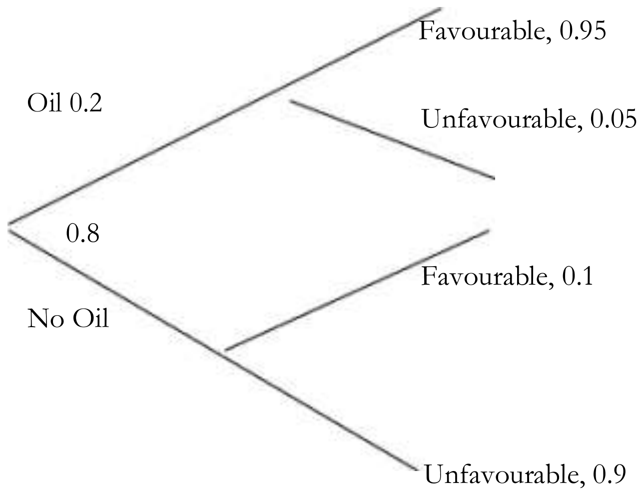
$$P\ (O/F) = P\ \frac{(O)\ x\ P\ (F/O)}{P\ (F)}$$

$$P\ (O/U) = \frac{P\ (O)\ x\ P\ (U/O)}{P\ (U)}$$

$$P\ (N/F) == \frac{P\ (N)\ x\ P\ (F/N)}{PF}$$

$$P\ (N/U) = \frac{P\ (N)\ x\ P\ (U/N)}{P\ (U)}$$

Step two Construction of probability tree.



Step three Derivation of probabilities from step two

P (O) = 0.2
P (N) = 0.3
P (F/O) = 0.95
P (U/O) = 0.05

P (F/O) = 0.1
P (U/N) = 0.9
P (F) = 0.95 (0.2) + 0.1 (0.8) = 0.27
P (U) = 1 – 0.27 = 0.73

Step four Incorporation of the probabilities into the formulas in step 1

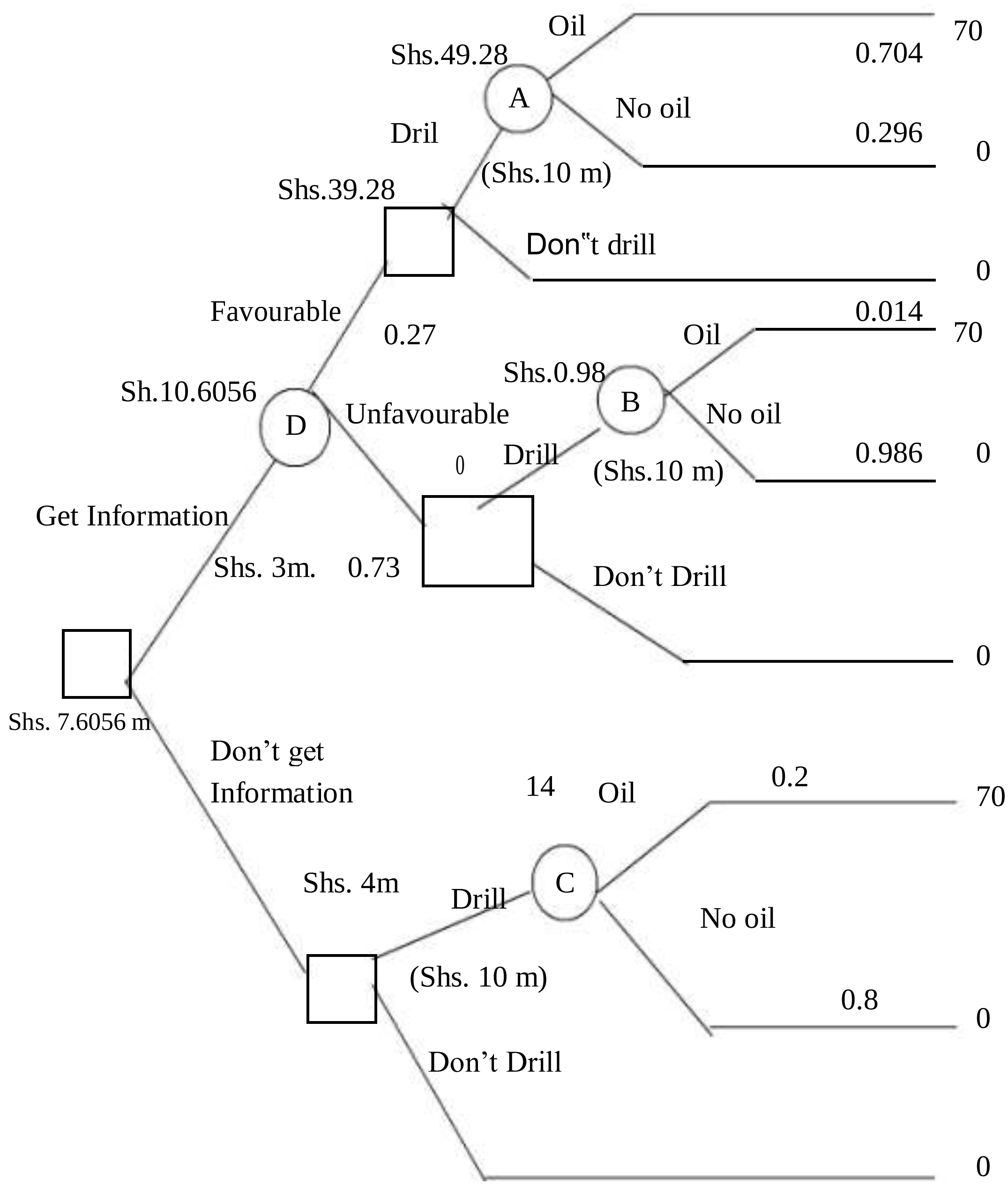
$$P\,(O/F) = \frac{P\,(O) \times P(F/O)}{P\,(F)} = \frac{0.2 \times 0.95}{0.27} = 0.704$$

$$P\,(O/U) = \frac{P\,(O) \times 9U/O)}{P\,(U)} = \frac{0.2 \times 0.05}{0.73} = 0.014$$

$$P\,(N/F) = \frac{P\,(N) \times (F/N)}{P\,(F)} = \frac{0.8 \times 0.1}{0.27} = 0.296$$

$$P\,(N/U) = \frac{P\,(N) \times (U/N)}{P\,(U)} = \frac{0.8 \times 0.9}{0.73} = 0.986$$

Step five Construct a Decision tree and evaluate



Evaluation using EMV

Emv @ A = 70 (0.704) + 0 (0.296) = 49.28

Emv @ B = 70 (0.014) + 0 (0.986) = 0.98

Emv @ C = 70 (0.2) + 0 (0.8) = 14

Emv @ D = 39.28 (0.27) + 0 (0.73) = 10.6056

At D_2 $\Rightarrow$ Drill = 49.28 – 10 m = <u>39.28</u>
$\Rightarrow$ Don"t Drill = 0

At D_3 $\Rightarrow$ Drill = 0.98 – 10 m = -9.02
$\Rightarrow$ Don"t Drill = 0

At D_4 $\Rightarrow$ Drill = 14 – 10 m= 4
$\Rightarrow$ Don"t Drill = 0

At D_1 $\Rightarrow$ Hire 10.6056 – 3 = 7.6056
Don"t Hire = 0

Note

1. At Decision Box choose the highest value
2. At outcome point use probabilities on values to get the expected monetary value.

Step six Make Decision or Advice –

Walt Lovell Limited (WLL) should use a consultants given the report is favourable drill as this will release a net benefit of Kshs. 7.6056 million.

(b) The value of imperfect information is:

Value of imperfect (sample) information =
Expected monetary value with IPI – Expected monetary value without IPI
Sh.7,605,600 – Sh.4,000,000
<u>Sh.3,605,600</u>

DECEMBER 2008

QUESTION ONE

(a) **Feed forward control** describes a control system in which deviations in the system areanticipated in a forecast of future results, so that „corrective action" can be taken in advance of any deviations actually happening while on the other hand, **Feedback control system** is information about actual achievements. In business organization, it is information about actual results, produced from within the organization (for example management accounting control reports) with the purpose of helping the control decisions.

(b) In his statement Chris Argyris, he identified situations why mangers could be reluctant in setting budgets: as follows:

(i) The budget is seen as a **pressure device,**based by management to force „ lazy" employees to work harder. The intention of such pressure is to improve performance, the unfavourable reactions of subordinates against is seems to be at the core of the budget problem.

(ii) The accounting department is usually responsible for recording actual achievement and comparing this against budget. Accountants therefore are „budget man" is the failure of another manager and this failure causes loss of interest and declining performance. The accountant, on the other hand, fearful of having his budget derailed by factory management, obscures his budget and variance reporting, and deliberately makes it difficult to understand.

(iii) The budget usually sets targets for each department, achieving the departmental target becomes of paramount importance regardless of the effect this may have on the other departments and the overall company performance.

(iv) Budgets are used by managers to express their character and patterns of leadership on subordinate; subordinates, resentful of their leadership style, blame the budget rather than the leader thus it looses meaning.

(c) The decision calls for the analysis of benefits and problems of budgeting.

Benefits

(i) It"s the major formal way in which the organizational objectives are translated into specificplans, basics, and objectives related to individual managers and supervisors. It should provide clear guidelines for current operations.

(ii) It"s an important medium of communication for organizational plans and objectives and the progress towards meeting those objectives.

(iii) The development of budgets (done properly) helps to achieve co-ordination between the various departments and functions of the organization.

(iv) The involvement of all levels of management with setting budgets, the acceptance of derived targets, the two way flow of information and other facets of a properly organized budgeting system all help to promote a coalition of interest and to increase motivation.

(v) Management"s time can be saved and alterations directed to areas of most concern by the „exception principle" which is at the heart of budgetary control.

(vi) Performance of all levels is systematically reported and monitored thus aiding the control of current activities.

(vii) The investigation of operations and procedures, which is part of budgetary planning and the subsequent monitoring of expenditure, may lead to reduced costs and greater efficiency.

Problems

(i) There may be too much reliance on the technique as a substitute for good management.

(ii) The budgetary system perhaps of undue pressure or poor human relations, may cause antagonism and decrease motivation.

(iii) Variances are just as frequently due to changing circumstances, poor forecasting or general uncertainties due to managerial performance.
(iv) Budgets are developed round existing organizational structures and departments, which may be inappropriate for current conditions and may not reflect the underlying economic realities.
(v) The very existence of well documented plans and budgets may cause rigidity and lack of flexibility in adapting to change.

In conclusion, budget should not be abolished as a company or an organization might not adjust to its set objectives without a budget system.

QUESTION TWO

The variables in the problem are the demand and the lead time. Since the demand is approximated by the continuous normal distribution we will consider demand insteps of 5 x LA 20

Allocation of random numbers to lead time.

Lead Time Week	**Probability**	**Cumulative probability**	**Random number**
	0.20	0.20	00 –19
2	0.50	0.70	20 – 69
3	0.25	0.95	70 – 94
4	0.05	1.00	95 – 99

Allocation of random numbers ranges to weekly demand

Demand/ Week	Probability	Cummulative Probability	Random Number
470	0.003	0.003	000 – 002
475	0.009	0.012	003 – 011
480	0.028	0.040	012 – 039
485	0.066	0.106	040 – 105
490	0.121	0.227	106 – 226
495	0.175	0.402	227 – 401
500	0.197	0.599	402 – 598
505	0.175	0.774	599 – 773
510	0.121	0.895	774 – 894
515	0.066	0.961	895 – 960
520	0.028	0.989	961 – 986
525	0.009	0.998	989 – 997
530	0.003	1.000	998 – 999

Simulation of Stock Control

Number Week	Opening Stock	Demand RN	Amount	Closing Stock	Reorder? YES/NO	Lead-Time RN	Weeks	Shortage
1	2,000	034	480	1,520				
2	1,520	743	505	1,015				
3	1,015	738	505	510	YES	95	4	
4	510	636	505	5				
5	5	964	520	0				515
6	0	736	505	0				505
7	2,500	614	505	1,995				
8	1,995	698	505	1,490				
9	1,490	637	505	985	YES	73	3	
10	985	162	490	495				
11	495	332	495	0				
12	2,500	616	505	1,995				
13	1995	804	510	1,485				
14	1,485	560	500	985	YES	10	1	
15	3,485	111	490	2,995				
Total			7,525	15,475				1,020

Mean demand = $\frac{7525}{15}$ = 501.7 x LA20 / Week

Mean closing stock = $\frac{15,475}{15}$ = 1,031.6 x LA/Week

Mean shortage = $\frac{1,020}{15}$ = 68 x LA20/Week

Number of orders placed during the 15 weeks period = 3
Therefore, mean number of orders/week = 3/15 = 0.2

The expected Average cost per week
= (1,031.67 x Shs.5) +(68 x Shs.200) + (0.2 x 500)

= Shs.18,858.35

QUESTION THREE

(a) How can the transportation algorithm be modified to maximize rather than minimize?
Instead of minimizing the positive unit costs of all the cells, calculate the unit profits, make them negative and put these in each cell. Use the transportation algorithm as usual to minimize these negative profits.
Alternatively, load the cells with the largest profits (instead of smaller costs) to give an initial allocation. Test the empty cells as usual, but use any cell which has positive shadow price. If all the shadow prices are negative or zero, that allocation gives the maximum profit.

(b) Factories P_1 P_2 P_3 supply outlets S_1 S_2 S_3& S_4

The contribution per desk = selling price at shop – variable cost at the factory – factory outlet transport costs

Example the contribution per desk
Supplied from factory P = 2300 – 1500 – 220 = Sh.580 to outlet S

The matrix for contribution is given below:

	S_1	S_2	S_3	S_4
P_1	580	610	530	600
P_2	510	600	520	570
P_3	540	650	490	660

The total demand from the four outlets is 850 + 640 + 380 + 230 = 2,100 desks.

The total supply from the three plants is: 625 + 825 + 450 = 1,900 desks.

There is therefore a need for a dummy factory to take up the 200 shortfall.

The transportation table is as follows:

	TO FROM	K_1 = 58 S_1	K_2 = 67 S_2	K_3 = 59 S_3	K_4 =68 S_4	Total Capacity	
R_1 = 0	P_1	58 625	61 -6	53 -6	49 -8	625	~~1~~ 3 3
R_2 = -7	P_2	51 25	60 420	52 380	57 -4	825	38881
R_3 = -2	P_3	54 -2	65 220	49 -8	66 230	450	111
R_4= -58	Dummy	0 200	0 -9	0 -1	0 -10	200	00000
Total Demand		850	640	380	230	2,100	
		~~4~~, 4, 7, 51,51	4, 4, 4, 60	1,1,1, 52, 52	6		

Note

- The initial solution is determined by use of VAM.
- The contributions are divided by 10 simplify the computations.
- The mode is used to solve for optimality.

Note

m + n – 1 = 7
No of filled cells = 7

The problem is not degenerate.

All the shadow prices are negative, therefore any change would reduce the contribution. This is thus the optimal solution. The optimal allocation is:

FROM	TO	Units	Contribution per unit	Total contribution
		Sh.	Sh.	Sh.
P_1	S_1	625	580	362,500
P_2	S_1	25	510	12,750
P_2	S_2	420	600	252,000
P_2	S_3	380	520	197,600
P_5	S_2	220	650	143,000
P_3	S_4	230	660	151,800
Dummy	S_1	200	0	0
Total contribution				**1,119,650**

QUESTION FOUR

a) (i) If the selling price is sh.200, demand will be zero. To increase demand by one unit, selling price must be reduced by Sh. $1/1000$ or Shs. 0.001. Hence the demand function is

$P = 200 – 0.001Q$

At the output level of 100,000 units.

$P = 200 – 0.001 (100,000)$

$= $ Sh.100 per unit.

The total contribution at an output level of 100,000 units

	Shs.
Contribution = 100,000 (100 – 50)	5,000,000
Less fixed cost	2,500,000
Profit	2,500,000

(ii) Profit is maximized when MC = MR

MC = Sh.50 per unit variable cost.

$$MR = \frac{dTR}{dQ}$$

$TR = 200Q – 0.001Q^2$

$$\frac{dTR}{dQ} = 200 - 0.002Q$$

The profit is maximized at

$50 = 200 – 0.002Q$

$Q = 75,00$ units

The profit maximizing selling price

$= 200 – 0.001 (75,000) = $ Sh.125

The maximum profits	**Sh.**
Total contribution 75,000 x Sh.75 =	5,625,000
Less fixed costs	2,500,000
Maximum profit	3,125,000

(iii) Change in fuel costs
Revised fixed costs = Sh.3,000,000
The optimal output level will not be affected by a change in fixed costs. Therefore the selling price should not be changed. Profits will decline by Sh.500,000.

Change in Material Costs
Revised marginal costs = Sh.60
The new optimum is where 60 = 200 – 0.002
Q = 70,000

At this output level, P = 200 – 0.001
(70,000) = Sh.130

The price should be increased to Sh.130 to maximize profits.

b)

(i) The price in the home market is based on full absorption cost plus pricing, whereas the price in the overseas market is based on partial absorption or variable cost-plus pricing. Therefore both price methods are on cost-plus basis. The rationale for such an approach is as follows:

Home Market

Absorption cost-plus pricing is the norm in the home market, with all companies adopting this approach. Consequently the pricing method encourages price stability.
The home market provides high volume sales and can therefore bear the full costs.

Export Market

The export market is more competitive, and a price penetration policy might be adopted in order to obtain a significance share of the market. Consequently, the pricing objective might be to set a selling pricing in excess of incremental costs.
Firms might view export business as a means of utilizing any unused capacity. Consequently, overheads have already been recovered in the home market and contribution pricing methods are adopted in the overseas market.
The firm might consider sales in the export market to be uncertain, and short-term prices are set so as to cover short-run costs only.

(ii) The main objection to the above pricing methods is that they are cost-based and ignore price demand relationships. Prices should be set by equating the marginal cost schedule with the sum of the marginal revenue schedules of the two countries.

QUESTION FIVE

(a) Advantages of Value added Statement

(i) Managers might be in a better position to control their organization"s own inputs than the cost or usage efficiency of purchased material and services. If this is so, value added statements focus attention on what managers can do something about.
They would also reflect the quality of such management"s effort.

(ii) Value added statements also focus attention on how the benefits are shared out, and in particular: -

- Whether the employees are getting paid too much for what they are doing. If the value added per unit of labour is declining, management will be made aware of the need to keep labour costs under control. On the other hand, an improving value added per shilling of labour cost would suggest that there is some scope for rewarding employees more highly.
- Whether enough funds are being returned in the business (depreciation plus retained profits) to provide for asset replacement and internally –funded growth.

(iii) In organizations where the material cost content is a high proportion on total costs, the total profit will be influenced by changes in material prices (largely outside management control) and possibly also by occasional stock losses or profits when material prices alter value added statements, by taking out material costs as a separate item, allow alterations to be directed at activities within management"s control.

(iv) Value added in relations to labour effort and labour costs provides excellent measures of productivity, and so far comprising the relative productivity of two or more divisions.

Overhead costs (Activities)	P(Shs)	Q(Shs)	R(Shs)	TOTAL(SHS)
Machinery cost	18,000	48,000	36,000	102,000
Production scheduling	16,800	44,800	22,400	84,000
Set up cost	10,800	28,800	14,400	54,000
Quality control	9,848	26,240	13,120	49,200
Receiving materials	7,200	32,000	25,600	64,800
Packing materials	6,000	16,000	8,000	36,000
Total overhead cost	**68,64**	**199,840**	**121,520**	**390,000**
Units produced	12,000	16,000	8,000	
Overhead cost/unit	**Shs.5.72**	**Shs.12.49**	**Shs.15.19**	

Workings for Recovery Rates

(i) Machining cost = $\frac{\text{Budgeted machining cost}}{\text{Budgeted machine hours}} = \frac{102,000}{34,000}$ = shs.3/machine hour

{Budgeted machine hours = ½ (12,0000 + (16,000) + 1½(8,000) = 34,000}

Production scheduling = $\frac{\text{budged production scheduling cost}}{\text{No. of production runs}} = \frac{84,000}{30}$ = Shs.2,800/production run

iii. Set up costs = $\frac{\text{Budgeted Set Up Cost}}{\text{No. of production runs}} = \frac{54,000}{30,000}$ = shs.1,800/production run

iv. Quality control = $\frac{\text{Budgeted Quality Control Cost}}{\text{No. of production runs}} = \frac{49,200}{30}$ = 1,640/production run

v. Receiving materials = $\frac{\text{Budgeted Receiving Materials cost}}{\text{No. of components Receipts}} = \frac{64,800}{162}$ = 400 Receipt

vi. Packing Materials = $\frac{\text{Packing Material"s cost}}{\text{No. of customers orders}} = \frac{36,000}{36}$ = 1,000/Customer order

Total cost statement and profit (shillings per unit)

	P	**Q**	**R**
Direct materials	16.00	24.00	20.00
Direct labour	8.00	12.00	8.00
Overhead cost (as above)	5.72	12.49	15.19
Total production cost	29.72	12.49	15.19
Sales price	50.00	70.00	60.00
Gross profit per unit	**20.28**	**21.51**	**16.81**

JUNE 2009

QUESTION ONE

(a) Contributions for each division and the company as a whole for the various selling prices are as follows:

Mugaa Division

Output Units	Total Revenue Shs.	Variables Costs Shs.	Total Contribution Shs.
1,000	35,000	7,000	24,000
2,000	70,000	22,000	48,000
3,000	105,000	33,000	72,000
4,000	140,000	44,000	96,000
5,000	175,000	55,000	120,000
6,000	210,000	66,000	144,000

Gwashati Division

Output Units	Total Revenue Shs.	Variables Costs Shs.	Total Cost Transfers Shs.	Total Contribution Shs.
1,000	100,000	7,000	35,000	58,000
2,000	180,000	14,000	70,000	96,000
3,000	240,000	21,000	105,000	114,000
4,000	280,000	28,000	140,000	112,000
5,000	300,000	35,000	175,000	90,000
6,000	300,000	42,000	210,000	48,000

Whole Company

Output Units	Total Revenue Shs.	Company Variables Costs Shs.	Total Contribution Shs.
1,000	100,000	18,000	82,000
2,000	180,000	36,000	144,000
3,000	240,000	54,000	186,000
4,000	280,000	72,000	208,000
5,000	300,000	90,000	210,000
6,000	300,000	108,000	192,000

(b) Based on the statements in (a) Gwashati division should select a selling price of Shs.80 per unit. This selling price produces a maximum divisional contribution of shs.114,000. it is in the best interest of the company as a whole if the selling price of Shs.60 per unit is selected. If Gwashati division selects a selling price of shs.60 per unit instead of shs.80 per unit, it"soverall marginal revenue would increase by shs.60,000 but it"s marginal cost would increase by shs.84,000. Consequently, Gwashati Division will not wish to lower the price.

(c) Where there is no market for the intermediate product and the supplying division has no capacity constraints, the correct transfer price is the marginal cost of the supply division for that output at which marginal revenue received from the intermediate product. When unit variable cost is constant and fixed cost remains unchanged, this rule will result in a transfer price that is equal to the supplying division"s unit variable cost. Therefore the transfer price will be set at shs.11 per unit when the variable cost transfer pricing rule is applied. Gwashati division will be faced with the following revenue schedules:

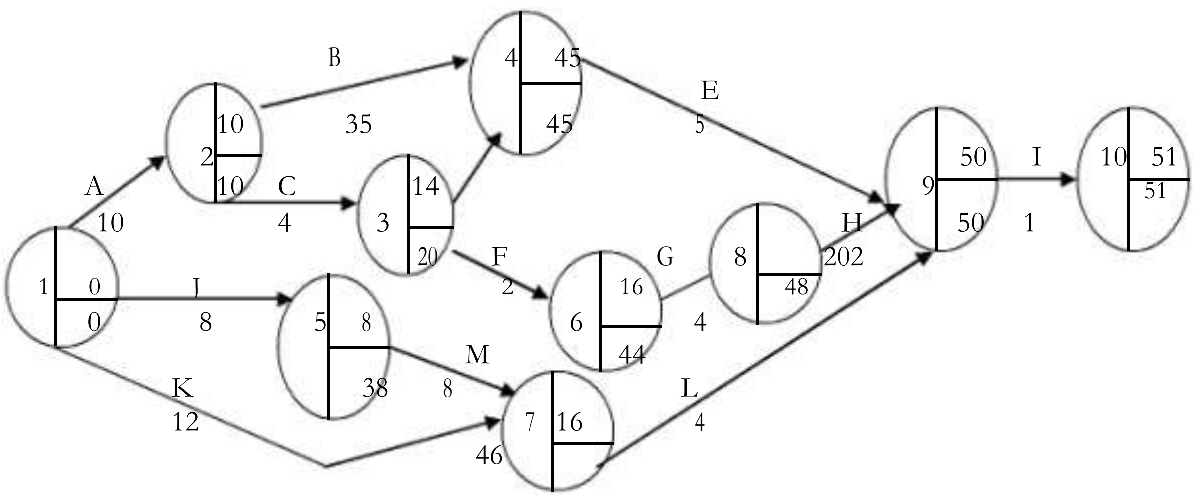
Output units	Marginal cost (NOTE) Shs.	Marginal Revenue Shs.
1,000	18,000	100,000
2,000	18,000	80,000
3,000	18,000	60,000
4,000	18,000	40,000
5,000	18,000	20,000
6,000	18,000	NIL

Note:

- Marginal cost = transfer price of shs.11 per unit plus conversion variable cost of shs.7 per unit.
- Gwashati will select the optimum output level for the group as a whole (i.e. 5,000 units)
- And the optimal selling price of shs.60 will be selected. A transfer price equal to the variable cost per unit of the supplying division will result in the profits of the group being allocated to Gwashati, and Mugaa will incur a loss equal to the forced costs. Consequently, a divisional profit incentive cannot be applied to the supplying division.

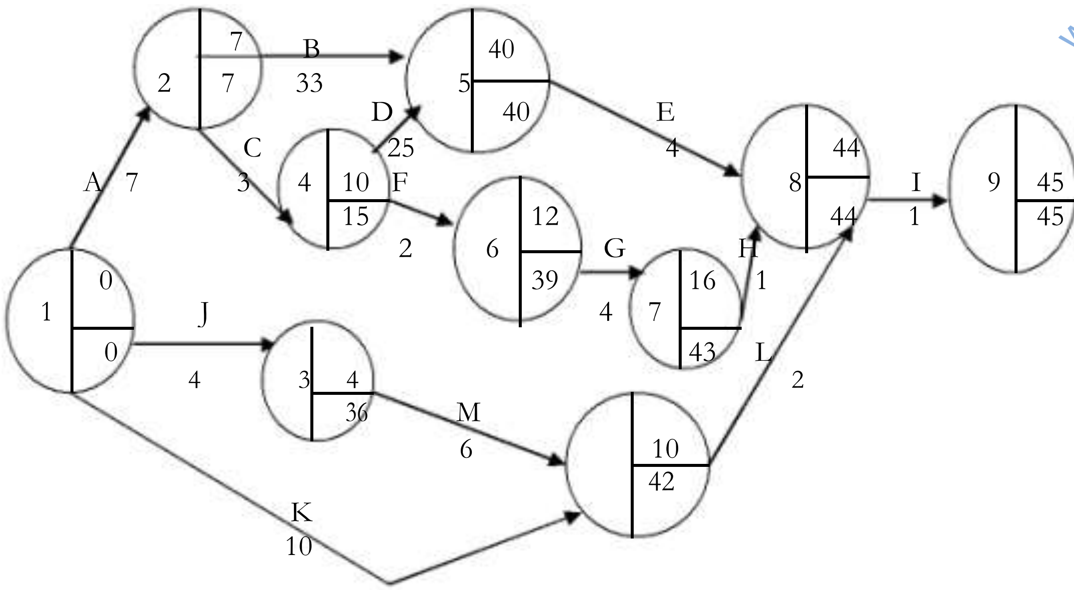
QUESTION TWO

(a)



The critical path = A – B – E – I
The project duration = 51 weeks
The project normal costs = **Sh<u>197</u>millions**

(b)



The minimum time is 45 weeks
The critical path is still A – B – E – I
The minimum time cost = Sh. **217.5million**

(c) Cost if project is completed in 50 weeks = Sh.197 + Sh1 x 5m + 0.5m = **207.5m**

(d) Cost of completing in 45 weeks
Crash A, B & E
Incremental costs = 2m + 2m + 0.5 = 4.5m
Cost of completing in 45 weeks = 197m + 4.5 + 5m
= **Sh.206.5m**

It is advisable to crash the project to 45 weeks since it will reduce the projects costs by Sh. 1m.

QUESTION THREE

(a) A high correlation between the independent and dependent variable simply means that the two variables move in the same direction and at almost the same rate. It does not mean that the independent variable will cause a change in the dependent variable. Such information can be determined by use of coefficient of determination.

(b)

(i) equation II

$\hat{Y} = 5{,}000{,}000 + 0.00005Z_t$

equation IV

$\hat{Y} = 3{,}000{,}000 + 50\ N_{t-1} + 0.00001Z_t + 0.000015Z_{t-1}$

(ii) Using equation I

$\hat{Y} = 2{,}500{,}000 + 5.5\ Y_{t-1}$

= 2,500,000 + 5.5 (7,500,000)
= <u>43,750,000</u>

(iii) The coefficient of determination (r^2) explains the variations in the dependent variable explained by the independent variable i.e. the explained variations. e.g. in equation ! 94% of the variations in Y can be explained by the introduction of the dependent variable in the model while 6% of the variation is unexplained variation.

(iv) The Financial Controller may refer equation III to equation II because equation II requires him to forecast even the independent variable while equation III uses actual gross domestic product as the independent variable.

(v) Equation IV is a multiple regression equation it has the following advantages:-

- It considers more independent variables. This may make it more reliable.
- Compared to the other equations it has a higher coefficient of determination of 0.96 meaning that the explained variation is 96%.
- It has a lower standard error of estimate than the other functions

Disadvantages

- The t- statistics are not as high as other functions.
- The problem of multi-collineerity may occur since the independent variables used are likely to be
highly correlated to each other.
- It may also be harder to formulate the function.

QUESTION FOUR

(a) The $\pm\sigma$ rule will trigger a decision to investigate when the round –trip fuel usage is outside the control limit:

Mean $\pm$ 2σ = 100 $\pm$ 2σ or 80 to 120 kl

Any fuel usage less than 80 kl or greater than 120kl will trigger a decision to investigate.

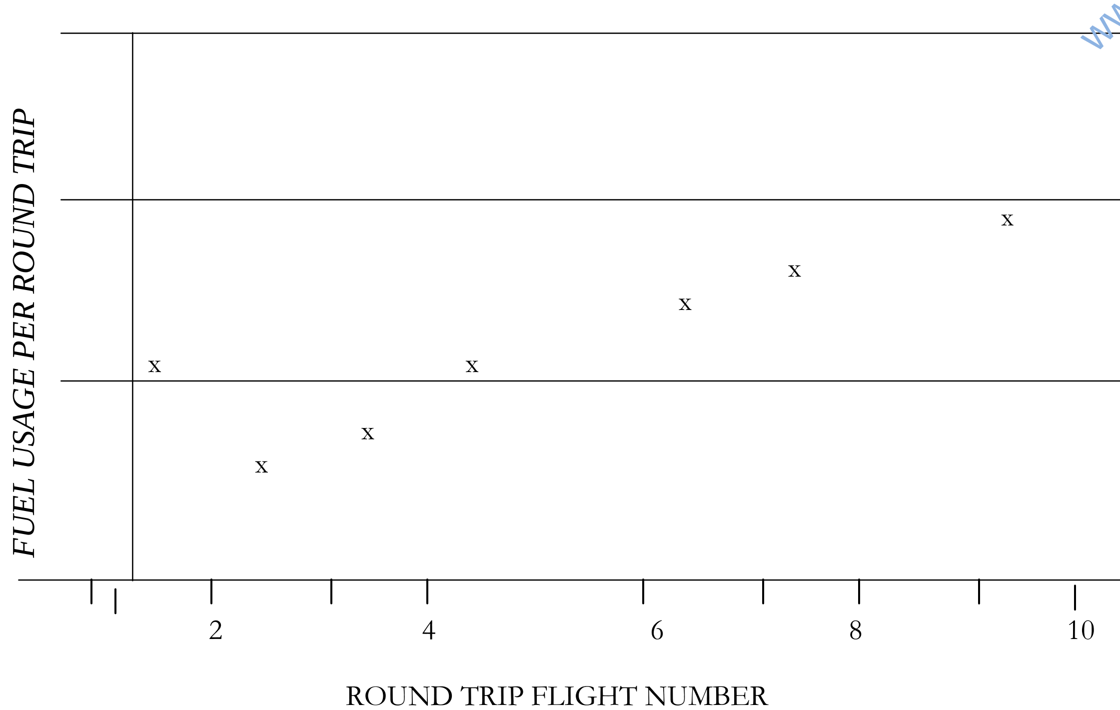
The only plane to be outside the specified $\mu \pm 2\sigma$ control limit is Skyline 3 on flights # 5 (126 kl) and #10 (123 gallon units).

(b) Solution Exhibit 26-25 presents the SQC charts for each of the three aircrafts

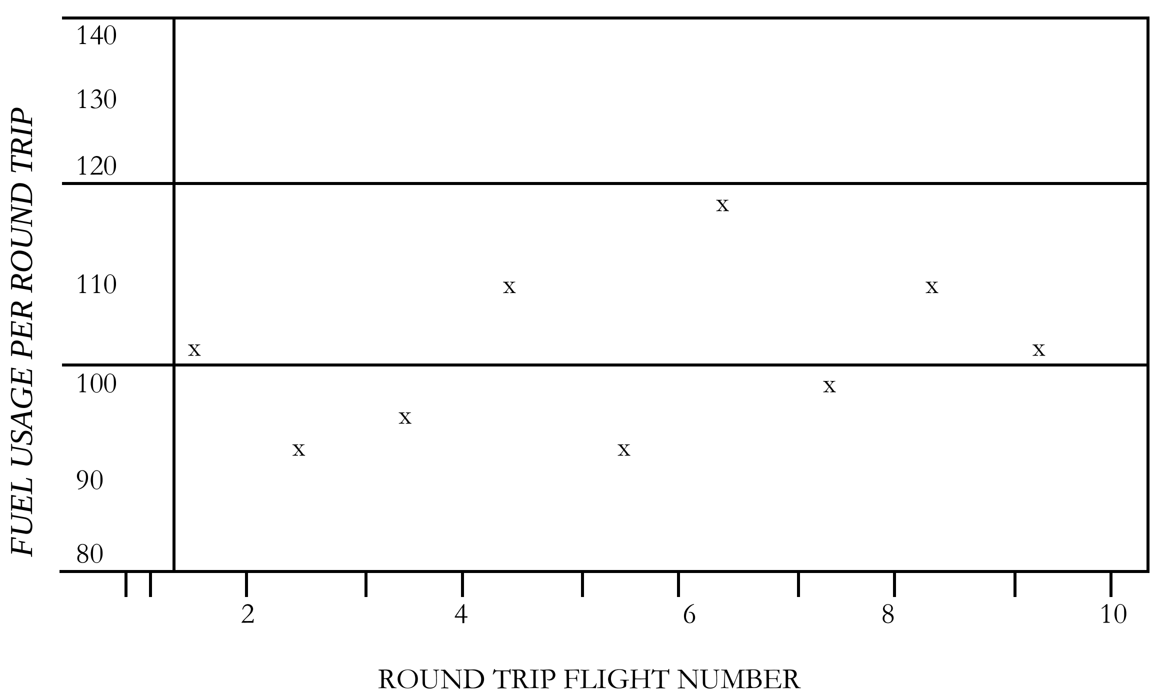
(c) Skyline 1 has no observation outside the $\mu \pm 2\sigma$ control limits. However, there was an increase in fuel use in each of the last eight-roundtrip flights. The probability of eight consecutive increases from an in-control process is very low.

Skyline 2 appears in control regarding fuel usage.
Skyline 3 has three observations outside the $\mu + 2\sigma$ control limits. Moreover, the mean on the last six flights is 120 compared to mean of 104for the first four flights.

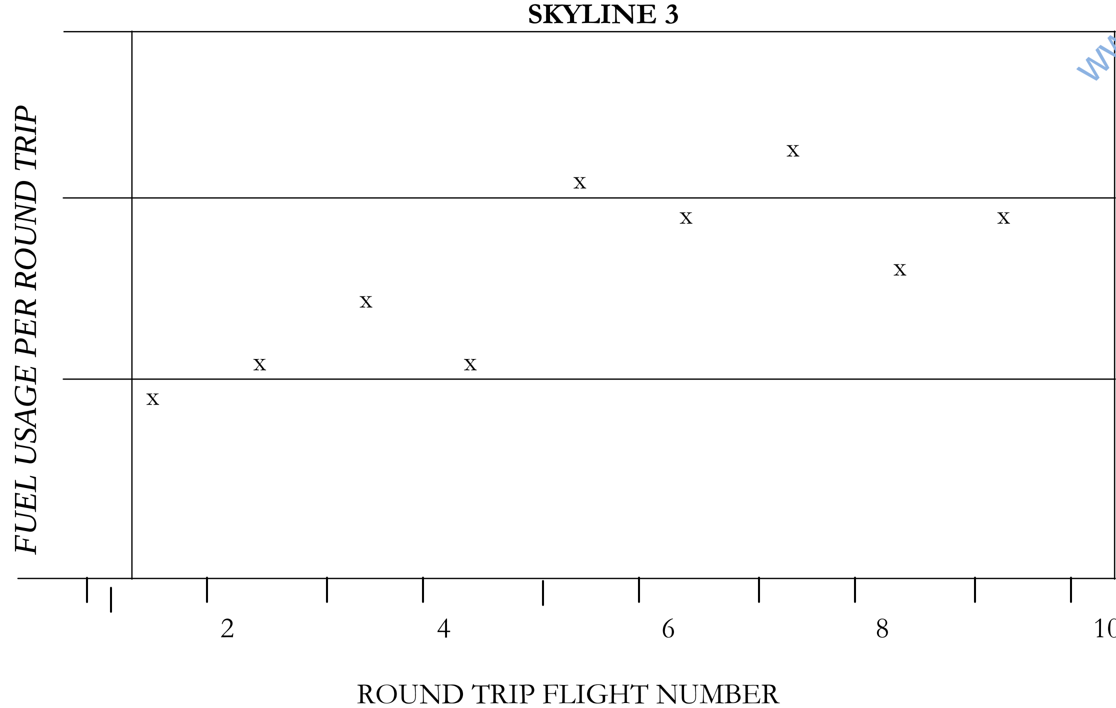
SKYLINE 1



SKYLINE 2



SKYLINE 3



QUESTION FIVE

(a)
i)

Client fee per day strategy contribution (shs. 000")

State of variable costs	Shs.3,600	Shs.4,000	Shs.4,000
High	26,775	27,562.5	26,250
Most likely	29,925	30,187.5	28,350
Low	34,650	34,125	31,500

(ii) **Maximum Rule**

Client fee	shs.3, 600	Shs.4, 000	Shs.4, 400
Maximum payoff (000")	34,650	34,125	31,500

Decision

Choose a client fee is Shs.3, 600 since at maximizes the maximum outcome or return.

(iii) **Maximum**

Client fee	shs.3, 600	Shs.4, 000	Shs.4, 400
Maximum payoff (000")	26,775	27,562.5	26,250

Decision

Choose a client fee of shs.4, 000 since it maximizes the minimum outcome or returns.

(iv) **Minimax Regret**

Opportunity Loss Table

Client fee per day strategy contribution (shs. 000")

State of variable costs	Shs.3,600	Shs.4,000	Shs.4,000
High	7877.5	0	1,312.5
Most likely	262.5	0	1,837.5
Low	0	525	3,150
Maxmini Regret	787.5	525	3,150

Decision: Choose fee of shs.4,000 since it minimizes the maximum regret.

(b)

Client fee per day strategy contribution (shs. 000")

State of variable costs	Probability	Shs.3,600	Shs.4,000	Shs.4,000
High	0.1	26,775	27,562.5	26,250
Most likely	0.6	29,925	30,187.5	28,350
Low	0.3	34,650	34,125	31,500
EMV		31,027.5	31,106.25	29,085

Value of Perfect information = ENV with IP – EMV without PI

EMV without PI = 31,106.25 (Highest EMV as above)

EMV with PI = 27,562.5 (0.1) + 30,187.5 (0.6) + 34,650 (0.3)

= 31,263.75

Value of PI = 31,263.75 – 31,106.25 = 157.5

∴ The maximum amount to pay is Shs.157, 500

DECEMBER 2009

QUESTION ONE

a) $D = 475$

C_o = Sh.50

C_h = Sh.12.50 + 10% (250) = Sh.37.50

Lead time demand	0	1	2	3	4	5	6	7	8
Probability	0.02	0.04	0.12	0.16	0.20	0.16	0.16	0.10	0.04

$$EOQ = \sqrt{\frac{2 \times 475 \times 50}{37.50}} = 35.59 \text{ units} \approx 36 \text{ units}$$

Safety stock	Stockholding Cost	Stock out cost	Total cost
0	0	1 x 0.04 x 20 x 13 = 10.4	
		2 x 0.12 x 20 x 13 = 48	
		3 x 0.16 x 20 x 13 = 124.8	
		4 x 0.20 x 20 x 13 = 208	
		5 x 0.16 x 20 x 13 = 208	
		6 x 0.16 x 20 x 13 = 249.6	
		7 x 0.10 x 20 x 13 = 182	
		8 x 0.04 x 20 x 13 = 83.2	
		1114	1114
1	37.50	1 x 0.12 x 20 x 13 = 31.2	
		2 x 0.16 x 20 x 13 = 83.2	
		3 x 0.20 x 20 x 13 = 156	
		4 x 0.16 x 20 x 13 = 166.4	
		5 x 0.16 x 20 x 13 = 208	
		6 x 0.10 x 20 x 13 = 156	
		7 x 0.04 x 20 x 13 = 72.8	
		873.6	911.1
2	75	1 x 0.16 x 20 x 13 = 41.6	
		2 x 0.20 x 20 x 13 = 104	
		3 x 0.16 x 20 x 13 = 124.8	
		4 x 0.16 x 20 x 13 = 166.4	
		5 x 0.10 x 20 x 13 = 130	
		6 x 0.04 x 20 x 13 = 629.2	704.2
3	3 x 37.50 = 112.5	1 x 0.20 x 20 x 13 = 52	
		2 x 0.16 x 20 x 13 = 83.2	
		3 x 0.16 x 20 x 13 = 124.8	
		4 x 0.10 x 20 x 13 = 104	
		5 x 0.04 x 20 x 13 = 52	
		416	528.5
4	4 x 37.5 = 150	1 x 0.16 x 20 x 13 = 41.6	
		2 x 0.16 x 20 x 13 = 83.2	

		3 x 0.10 x 20 x 13 = 78	
		4 x 0.04 x 20 x 13 = 41.6	
		244.4	394.4
5	5 x 37.5 = 187.5	1 x 0.16 x 20 x 13 = 41.6	
		2 x 0.10 x 20 x 13 = 52	
		3 x 0.04 x 20 x 13 = 31.2	
		124.8	312.3
6	6 x 37.5 = 225	1 x 0.1 x 20 x 13 = 26	
		2 x 0.04 x 20 x 13 = 20.8	
		46.8	271.8
7	7 x 37.5 = 262.5	1 x 0.04 x 20 x 13 = 10.4	272.9
8	8 x 37.5 = 300	0	300

The optimal safety stock is 6 units. The reorder level will be:

ROL = Cycle Stock + safety stock

$= \frac{DL}{SQ} +$

$= \frac{475 \times 3}{36} + 6 = 45.58 \approx \underline{46 \text{ units}}$

b) Total annual relevant Cost (TRC)

$TRC = \frac{D}{Q} Co + \left[\frac{1}{2} Q + S \quad C_h\right]$

$= 475 (50) + (\frac{1}{2}(36) + 6)\ 37.50 =$ **Kshs. 1,559.72**

QUESTION TWO

(a) Produce (a) of A (b) units of B, (c) units of C (d) units of product D and (e) units of products E each week

Calculate the unit contribution of each product.

A: unit contribution is 40 – {(2.10 x 6) + (3.0 x 1.0) + (1.3 x 3) + 8.0 x 0.5)}
= Shs.16.50 per unit.

B: unit contribution is 42 – {(2.10 x 6.5) + (3.0 x 0.75) + (1.3 x 4.5) + (8 x 0.5)}
= Shs.16.25 per unit

C: unit contribution is 44 – {(2.10 x 6.10) + (3.0 x 1.25) + (1.3 x 6) + (8 x 0.5)}
= Shs.15.64 per unit

D: unit contribution is 48 – {(2.10 x 6.1) + (3.0 x 1) + (1.3 x 6) + (8 x 0.75)}
= Shs.18.39 units

E: unit contribution is 52 – {(2.10 x 6.4) + (3.0 x 1) + (1.3 x 4.5) + (8.0 x 1)}
= Shs.21.71 per unit

Maximize total weekly contribution, Shs. P where;

P = 16.5a + 16.25b + 15.64c + 18.39d + 21.71e Shs/Week

Subject to:
Materials: 6.0a + 6.5b + 6.1c+ 6.1d + 6.4e ≤ 35,000 kg/week
Forming: 1.0a + 0.75b + 1.25c + 1.0d + 1.0e ≤ 6,000 hours/week
Firing: 3.0a + 4.5b + 6.0c + 6.0d + 4.5e ≤ 30,000 hours/week
Packing: 0.5a + 0.5b + 0.5c+ 0.75d + 1.0e ≤ 4,000 kg/week
Non-negativity: a, b, c, d, e, ≥ 0

(b) (i)The optimum weekly production plan is to produce 3,357 units of product A,2,321 units of product E and none of B, C or D. The resulting maximum weekly contribution is Kshs.105,791.

(ii) There is spare capacity of 321 hours per week on the forming process and 9,482 hours per week on the firing process. All raw materials and all packing time are used up. Raw materials and packing time are the limiting constraints in the problem.

(iii) The shadow price is the amount, which would be added to the value of the total weekly contribution if one extra unit of a limiting resource were made available that:

- No additional costs were incurred.
- The resource remains limiting

Alternatively the shadow price is the amount by which the total weekly contribution would fall if the provision of a limiting resource was reduced by one unit.

From the table, we can see the shadow price for raw materials is Ksh.2.02 per kilogram and for packing time is Kshs.8.81 per hour. One additional kilogram of raw material will generate an extra Kshs.2.20 of contributions, subject to the conditions above. One extra hour of packing time will, similarly generate additional shs.8.81 of contribution.

The additional product would also have to be made at the expense of one or both of the other products, since all raw materials and packing time are currently used.

Unit contribution of the new product

= 50 – {(2.1 x 1.6) + (3.0 x 1) + (1.3 x 5) + (8 x 1)}
= <u>Kshs. 19.90</u>

If one unit of this new product was made, the provision of raw materials for the other two products would effectively be reduced by 6 kilogrammes, this would reduce the current total contribution by 6 x Kshs.2.02 = Kshs.12.12. Similarly, the available packing time would be reduced by 1 hour, this reduces the total contributions by Kshs.8.81. The total reduction is the weekly contribution which would be:

Kshs.12.12 + Kshs.8.81 = <u>Kshs. 20.93</u>

The gain from one unit of the new product is shs.19.90 therefore, if one unit of the new product is made, there will be a net loss of
Shs.19.90 – Shs.20.93 = Shs.1.30. the proposition is not worthwhile.

QUESTION THREE

a) Four ways in which competitive situation can be classified are:

- Number of competitors e.g. two persons and N – persons game.
- Nature of payoff e.g. zero sum and non zero sum games
- Number of strategies available to each player e.g. 2 x 2 game, 2 x 3 game etc.
- Amount of information the competitors have e.g. games with perfect information or Games with imperfect information.

b) (i)

Game matrix

Kamau		Njoroge		
		N_1	N_2	Min
	K_1	500	-500	
	K_2	0	1,000	0
	Max	500	1,000	

Where:

K_1 is Kamau does not expand
K_2 is Kamau expands
N_1 is Njoroge does not expand
N_2 is Njoroge expand

Note:
Since there is no entry that simultaneously a maximum of the now minima and a minumum of the column maxima, then a saddle point does not exist. There is therefore no pure strategy.

(ii) Let K be proportion of time Kamau does not expand 1 – K is the proportion of time Kamau expands.

$500\ K_1 + 0\ (1 – K_1) = -500\ K_1 + 1{,}000\ (1 – K_1)$

$500K_1 + = -\ 1{,}500\ K_1 + 1{,}000$

$2{,}000\ K_1 = 1{,}000$

$K_1 = \underline{\underline{0.5}}$

$K_2 = \underline{0.5}$

Let N_1 be proportion of time Njoroge does not expand
$1 – N_1$ be proportion of time Njoroge expands.

$500N - 500\ (1 - N_1) = O_1N + 1{,}000\ (1 – N_1)$

$1{,}000\ N_1 - 500 = 1{,}000 – 1{,}000\ N$

$2{,}000\ N_1 = 1{,}500$

$$N_1 = \frac{1{,}500}{2{,}000} = \underline{0.75}$$

$$N_2 = \underline{0.25}$$

Strategies	Joint probability	Payoff	Weighted Pay offs
K_1 N_1	0.5 (0.75) = 0.375	500	187.5
K_1 N_2	0.5 (0.25) = 0.125	-500	-62.5
K_2 N_1	0.5 (0.75) = 0.375	0	0
K_2 N_2	0.5 (0.25) = 0.12	1,000	125
			250

Kamau would expect to increase his profits by Sh.250 per day on average while Njoroge expects to lose Sh.250 per day on average.

QUESTION FOUR

(a) The minimum price of Mega Techniques Ltd is the price which reflects the relevant costs(opportunity costs) of the work. These are established as follows:

1) Cost of original machine. Past costs are not relevant, and the shs.8, 280,000 of costs incurred should be excluded form the minimum price calculation. It is necessary, however, to consider the alternative use of the direct materials (opportunity cost), which would be forgone if the conversion work is carried out.

	Shs.
Type P	
Revenue from sales as scrap (note 1)	540,000
Type Q	
Revenue from sales as scrap, Minus the additional cash costs necessary to Prepare it for sale (360,000 – {120 x 270}) note 1	327,600
Type R	
Cost of Disposal if the machine is not converted (a negative opportunity cost) note 2	108,000
Total opportunity costs of materials Types P, Q, R	885,600

By agreeing to the conversion of the machine Mega Techniques Ltd would therefore lose net revenue of Shs.885, 600 from alternative use of these materials.

Notes

1. Scrap sales would be lost if the work for Zimwi systems Limited goes ahead.
2. These costs would be incurred unless the work goes ahead.

2) The cost of additional materials for conversion is Shs. 576, 000 but this is an historical cost. The relevant cost of close materials is the Shs. 684, 600 that would be spent on new purchases if the conversion is carried out. If the work in stock would be unavailable goes ahead, the materials in stock would be unavailable for production of the other machine mentioned item (2) of the question and so the extra purchases of Shs. 684, 000 would be needed.

3) Direct labour in Department X and Y is a fixed cost and the labour force will be paid regardless of the work they do or not do. The cost of labour for conversion in Department Y is not a relevant cost because the work could be done without any extra cost the company.

   In Department X, however, acceptance of the conversion work would be oblige the company to divert production from other profitable jobs. The minimum contribution from using Department X labour must be sufficient to cover the cost of the labour and variable overheads and then make an additional Shs.2.50 in contribution per direct labour hour.

Department X – costs for direct labour hours spent in conversion;	
3 men x 4 weeks x 27,000	Shs.324, 000
Variable overhead cost:	
Shs.324, 000 x 20%	Shs. 64,800
Contribution forgone by diverting	
Labour from other work	
Shs.2.5 per shs.1 of labour cost	
= 324,000 x 150%	Shs.486, 000

4) Variable overheads in Department Y are relevant costs because they will only be increased if production work is carried out (It"s assumed that if the work done is idle, no variable overheadswould be manned).

   Department Y = 20% of (1 man x 4 weeks x shs.21,600) = 86,400

5) If the machine is converted, the company cannot sell the designs and specifications to the overseas companyhs.270,000 is relevant (opportunity) cost of accepting the conversion order.
6) Fixed overhead, being manly undercharged regardless of what the company decided to do should be ignored because they are not relevant (incremental) costs. The additional cost of supervision should, however, be included as a relevant cost of order because the shs.162,000 will not be spent unless the conversion work is done.
7) The money received from Pawa Limited should be ignored and should not be deducted in the calculation of the minimum price. Just as costs incurred in the past are irrelevant to a current decision about what to do in the future, revenue collected in the past are also irrelevant.

	Shs.	**Shs.**
Opportunity cost of using the direct		
Material types P, Q, R		885,600
Opportunity cost of additional materials for		684,000
Conversion		
Opportunity cost of work in Department X:		
Labour	324,000	
Variable overhead	64,800	
Contributions forgone	486,000	874,800
Opportunity cost: sale of design & specifications		270,000
Incremental costs:		
Variable production overheads in Department Y		86,400
Fixed production overheads		162,000
Minimum price		2,962,800

(b) (i)cost behavior patterns are known.

(ii) The amount of fixed costs, unit variable costs, sales price and sales demand are known with certainty.

The objective of decision-making in the short-run is to minimize "satisfaction" which is often regarded

QUESTION FIVE

(a) MWANZO DIVISION
PROFIT & LOSS ACCOUNT TO 31/10//03

	2002	2003	TOTAL
Unit sales ($\frac{100}{75}$ x30,000)	40,000	40,000	80,000
	Sh. „M"	Sh. „M"	Sh. „M"
Sales revenue (40,000 x 22,000)	880	880	1,760
Direct material ($\frac{100}{75}$ x150,000)	600	600	1,200
Direct labour (110% x 90,000)	99	99	198
Total direct cost	120	120	240
Contribution	(819)	(819)	(1,638)
Fixed overheads (No depreciation)	61	61	122
Fixed overheads (depreciation)	(285)	(285)	(570)
Loss	(75)	(75)	(150)
	(299)	(299)	(598)

(b) OPTION 1: MAKINI PROPOSAL

	MWANZO Shs. „000"	MWISHO Sh. „000"	TOTAL Sh. „000"
Sales (25% x $\frac{9}{12}$ x 450,000)	84,375	4,500,000	4,584,375
Direct materials	-	2,100,000	2,100,000
Chassis	-	660,000	660,000
Direct labour	-	240,000	240,000
Variable overhead	-	150,000	150,000
Fixed overhead (excluding dep)	(285,000)	300,000	585,000
Depreciation	-	200,000	200,000
Total cost	(285,000)	(3,650,000)	(3,935,000)
Plant disposal	50,000	-	50,000
PROFIT	(150,625)	850,000	699,375

OPTION 2: MWANZO"S PROPOSAL

	MWANZO Sh. „000"	MWISHO Sh. „000"	TOTAL Sh. „000"
Sales	880,000	4,500,000	5,380,000
Direct materials	600,000	2,100,000	2,700,000
Chassis	-	660,000	660,000
Direct labour	99,000	240,000	339,000
Variable overhead	120,000	150,000	270,000
Fixed overhead (No Dep)	285,000	300,000	585,000
Depreciation	75,000	200,000	275,000
Total cost	(1,179,000)	(3,650,000)	(4,829,000)
Profit	(299,000)	850,000	551,000

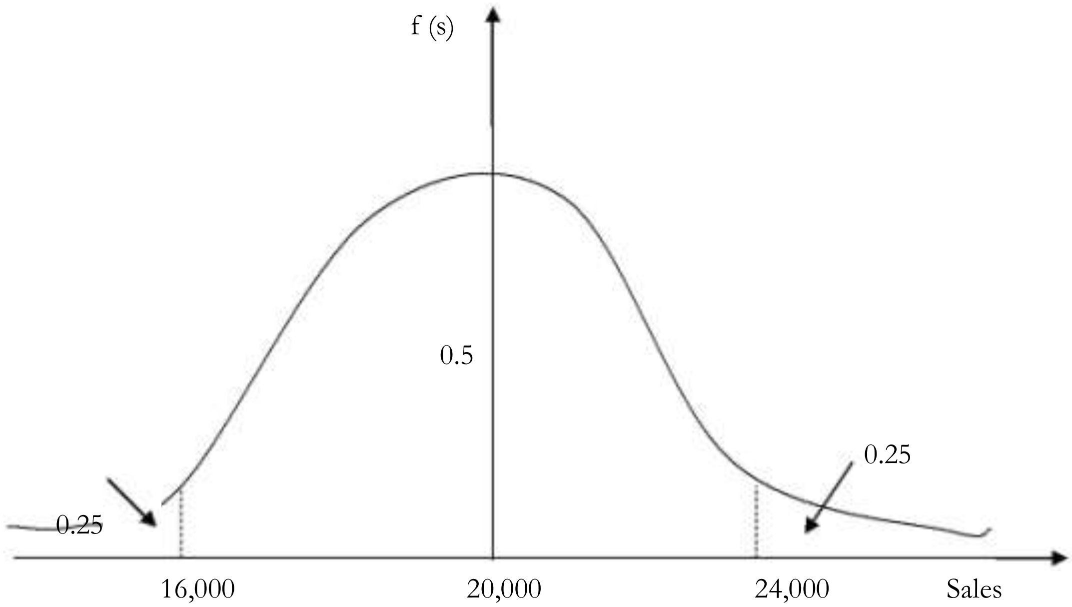
NOTES:

1. If Makini"s proposal is taken, the disposal of direct material by Mwanzo division will result in revenue of Sh. 84,375M though there will be a loss in cost.
2. Makini"s proposal will result in a reduction, in raw materials cost and also a reduction in depreciation cost.
3. The cost of Makini"s plan will result in group profit loss.

MAY 2010

QUESTION ONE

(a) Distribution of sales



Sales of 24,000 is Z, standard deviation above the mean where:

$$Z = \frac{24{,}000–20{,}000}{8} = \underline{4{,}000}$$

P (sales > 24,000) = 0.25, therefore P (Z > Z) = 0.25
Using the standard normal tables, Z = 0.675 approximately

$$\therefore\ 0.675 = \frac{4{,}000}{8} \qquad 8 = \frac{4{,}000}{0.675} = 5926$$

To two significant figures 8 = 6,000 sales

(b) (i)The company will at least break even if (revenue – cost) > 0

If the company sells ***b*** books, they will at least break even if
1,000 b – (400 + 2,500,000 + 0.1 x 1,000b) > 0
500 b > 2,500,000
b = 5,000

Assuming a normal distribution 5,000 is Z standard deviations below the mean where:

$$\geq = \frac{5{,}000–20{,}000}{6{,}000} = -\ 2.5$$

From the tables P (Z > 2.5) = 0.0475

Therefore P (Z> - 2.5) = 1 – 0.0475 = 0.9525

There is 95.25% probability that the company will at least break – even if the existing facilities are used.

(ii) If the company sells ***b*** books, they will at least break even if:

1,000 ***b***– (2,500,00 + 250 b + 1,400,000 + 0.1 x 1,000 b) $\geq$ 0
Assuming a normal distribution, 6,000 is b $\geq$ 6,000

Z standard deviations below the mean where:

$$Z = \frac{6{,}000 - 20{,}000}{6{,}000} = -2.33$$

From the tables P (Z > 2.00) = 0.0918
Therefore is there 90.82% probability that the company will at least break-even if the special machine is hired.

(c) Expected profit = (Unit contribution x Expected sales) – Fixed costs = Expected sales = 20,000 books.

If the existing facilities are used, the unit contribution is shs.500, therefore the expected profit
= (20,000 x 500) – 2,500,000
= 7,500,000

If the special machine is hired the unit contribution is shs.650, therefore the expected profit
= (20,000 x 650) – 2,600,000
= 10,400,00
On this basis, the special machine should be hired.

(d) Set up a payoff table for the following three possible decisions.
(i) Use existing facilities; payoff = Shs. (500 x sales – 2,500,000)
(ii) Hire special machine; payoff = Shs. (650 x sales – 3,900,000)
(iii) Do not publish payoff = 0

Payoff Shs. „000"
Possible decision

	Possible outcomes	Existing facilities	Special machine	Do not publish	Probability
Sales	5,000	0	-1,400	0	0.05
	13,000	4,000	2,600	0	0.20
	18,000	6,500	5,000	0	0.25
	22,000	8,500	7,100	0	0.25
	27,000	11,000	9,600	0	0.20
	35,000	15,000	6,100	0	0.05
	Expected payoff	7,500	6,100	0	

Calculate the expected pay off by multiplying each payoff by the probability of it"s occurring and summing them up.

On the basis of choosing the decision which leads to the maximum expected payoff the company should have the existing facility. The expected pay off is Shs.6,100,000.

QUESTION TWO

(a) Advantages

(i) Simulation can be used to investigate the behavior of problems, which are too complex to be modeled mathematically.

(ii) The technique can also be used when the variables in the problem e.g. arrival time, service time, do not follow the standard distribution, negative exponential distribution.

(iii) The basic principles of the simulation technique one fairly simple and it"s, therefore, more attractive to people who are not expert in quantitative techniques.

Disadvantages

(i) Simulation is not an optimizing technique. It simply allows us to select the best of the alternative systems examined.

(ii) Reliable results are possible only if the simulation is continued for a long period.

(iii) A computer is essential to cope with the amount of calculation required in (ii) above.

(b) i. The variables in this problem are:

a) The time between successive people arriving at the bus stop.
b) The time between successive buses arriving at the bus stop.
c) The number of empty seats on the bus.

The first step is to allocate random numbers to the variable values.

Passengers	i at mins	Probability	Cumulative Probability	Random Numbers
	0	0.04	0.04	00 – 03
	1	0.16	0.20	04 – 19
	2	0.24	0.44	20 – 43
	3	0.28	0.72	44 – 71
	4	0.16	0.88	72 – 87
	5	0.10	0.98	88 – 97
	6	0.02	1.00	98 – 99

Buses	i at mins	Probability	Cumulative Probability	Random Numbers
	8	0.10	0.10	00 – 09
	10	0.38	0.48	10 – 47
	12	0.28	0.76	48 – 75
	14	0.15	0.91	76 – 90
	16	0.09	1.00	91 – 99

Number of Empty seats	Probability	Cumulative Probability	Random Numbers
0	0.06	0.06	00 – 05
1	0.18	0.24	06 – 23
2	0.27	0.51	24 – 50
3	0.34	0.85	51 – 84
4	0.11	0.96	85 – 95
5	0.03	0.99	96 – 98
6	0.01	1.00	99

a) We can now set up the simulations for arrival of 10 passengers at the bus stop.

Passengers				Bus				Seats		Passengers		
No.	iat RN	Minute Time	Arrival Time (mins)		iat RN	Minute Time	Arrival Time (Mins)	RN	No.	Boards Bus	Queue Size	Wait time (Mins)
1	18	1	1	A	26	10	10	23	1	A	1	9
2	18	1	2	B	62	12	22	42	2	B	2	20
3	07	1	3	C	38	10	22	42	2	B	3	19
4	92	5	8	D	97	16	48	64	3	C	4	24
5	46	3	11	E	75	12	60	74	3	C	4	21
6	44	3	14	F	84	14	74	82	3	D	5	34
7	17	1	15	G	16	10	84	97	5	D	6	33
8	16	1	16	H	07	8	92	77	3	D	7	32
9	58	3	19	1	44	10	102	77	3	E	8	4
10	09	1	20	5	99	16	118	81	3	E	9	40
											49	273

(i) The expected waiting time for passengers

$$= \frac{273}{10} = 27.3 \text{ units}$$

(ii) The waiting time is progressively increasing at mean queue length

$= \frac{49}{10} = 4.9$ (This means the queue is increasing in length)

QUESTION THREE

(b) The three main elements of strategic cost management include:

i. Value chain analysis
ii. Strategic positioning
iii. Cost driver analysis

Value chain analysis

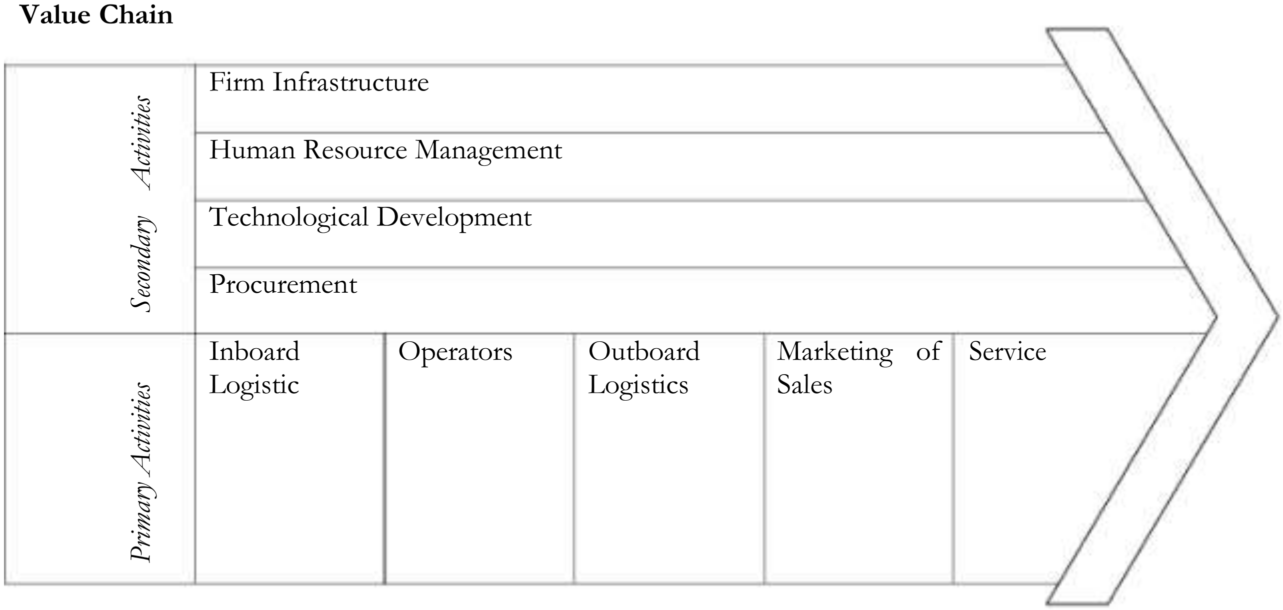
Every firm is a collection of activities that are performed to design, produce, market, deliver and support its products/services. Value chain analysis is a systematic way of examining all activities that a firm performs and how they interact.

The value chain disaggregates the firm into strategically separable activities in order to understand the behaviour of costs so as to create competitive advantage. A firm creates competitive advantages by:

i. Finding new ways to conduct activities e.g. improving efficiency through automation.
ii. Managing the linkages between activities better e.g. spending on better product design may reduce after sales service costs.
iii. Managing the linkages between customers and suppliers better.

Value activities are physically and technologically distinct activities a firm performs. These are the building blocks by which a firm creates products and services valuable to its customers. The value chain has been shown by Michael Porter as follows.

Value Chain



Strategic Positioning

The company must identify its strategic choices. This can be done from the firm"s objectives, whichemanates from the firms mission. Strategies have to be developed to achieve a competitive advantage over competitors, which may occur due to cost, price, quality, brand name, image of the product etc. Michael Porter highlighted two basic rules to competitive advantage:

i. Cost Leadership strategy
ii. Differentiation

Within each of these strategies a firm may decide to focus.

Cost driver analysis

Cost drivers are factors, which determine the costs of an activity i.e. a change in the cost driver will cause a change in the level total cost related cost object. The cost drivers can either be volume based or transaction based. The company must therefore understand its cost drivers so as to control costs.

b) Characteristics of modern business that necessitate the information of a strategic cost management system are:

i. Changing strategies
ii. International customers
iii. International competitors
iv. Greater product variety
v. Higher selling costs
vi. Shorter product life cycle
vii. Higher design costs

Note:
Each of these points should be explained.

c) It is not possible to come up with the „true costs" of each good or service produced by the firm due to the following reasons:

- Some costs such as overheads cannot easily be traceable to the final product. The method used to apportion overheads will result in an approximate cost but not the true costs.
- Most costs are computed from predicting models which are not 100% accurate and thus may not result in „true cost".
- The process of measuring and communicating information is bound to create errors in the costs computed.
- Even if it were possible to acquire perfect information so as to come with the „true cost" it may not be desirable because the value of perfect information may be less than the cost of getting that information.

QUESTION FOUR

(a)

Model Units	Actual Units	Budgeted Units	Sales Variance (units	Standard Contribution (shs)	Sales Quantity Variance (shs)
A	18,000	15,000	3,000(F)	(3,900 – 3,120) = 780	2,340,000 (F)
B	21,000	25,000	4,000(A)	(3,120 – 1,950) = 1,170	4,680,000 (A)
C	9,000	10,000	1,000(A)	(2,730 – 1,716) = 1,014	1,014,000 (A)
	48,000	50,000	2,000(A)		3,354,000 (A)

Sales quantity variance in total is 2,000 units (A) with a cost of Kshs.3, 354,000 (A).

(b) Weights Based on Budgeted units

Model	Proportion	Actual Sales in Budgeted proportion	Budgeted sales In units	Sales Quantity Variance	Standard Contribution (Shs)	Sales Quantity Variance (Shs)
A	3/10	14,400	15,000	600 (A)	780	468,000 (A)
B	½	24,000	25,000	1,000 (A)	1,170	1,170,000 (A)
C	1/5	9,600	10,000	400 (A)	1,014	405,600 (A)
		48,000	50,000	2,000 (A)		

(c) (i) **Similarities**

They both give the difference between the amount of contribution margin in the flexible budget based on actual sales volume at budgeted mix, and
Budgeted selling prices and Budgeted unit variable cost are held constant.

Differences

Sales – quantity income is the difference between the amount of contribution margin inthe flexible budget based on actual sales volume at budgeted mix and that amount in the static (master budget); Sales **–mix variance** is the difference between the amount of contribution margin in the flexible budget based on actual sales volume at budgeted mix.

(ii) Arguably, the most meaningful information is provided by not valuing the volume or sub-variances at all, but expressing them in unit terms. Alternatively, if managers are interested in market share, none of the information calculated is of much value. Managers would need to be told the percentage of the overall electronic game market and the markets for individual products that was taken during the period. However, management may wish to have some idea of the impact of the change in sales volumes in terms of financial results.

Information should be presented in a way that is understandable to it‟s users, so if they are used to an absorption costing system the users will prefer reporting in terms of profits and if they are used to marginal costing is should be presented in terms of contribution.

If managers are interested in turnover it will be useful to have an analysis of the oral impact turnover (unit sales of 2,000 of extra units give rise to a decrease in turnover of Shs.3,354,000), and of the breakdown by individual product.

If they are concerned with bottom line figure, the variances, in terms of profit will be most useful.

For decision-making purposes, valuation according to contribution is the options to choose, because this only includes cash flows that will change as a result of any decisions. Fixed costs are sunk and irrelevant.

(iii) By analyzing the variances in this way management are able to see how well the business has performed against what should in hindsight have been the standard. Otherwise part of each variance identified would simply reflect the fact that the original budget was wrong, perhaps through factors beyond the control of management. The analysis into planning and operational variances this provides more useful feedback about operational performance, and this can be used to point investigation, cost benefit analysis and control action where possible.

This approach is also useful for feed forward control. When budgets are next prepared the revised standards can be used. If it is not possible to set right all of the operational problems, the relevant proportion of operational variances can also be taken into account in future plans.

QUESTION FIVE

a) ROI , residual income.

$$ROI = \frac{\text{Revenues}}{\text{Total Asse ts}} \times \frac{\text{Operating Income}}{\text{Revenues}} = \frac{\text{Operative Income}}{\text{Total Asse ts}}$$

2001

Newspapers	0.939	0.239	0.224
Television	2.133	0.025	0.053
Film Studios	0.635	0.121	0.077

b) Although the proposed investment is small, relative to the total assets invested. It earns less than the 2001. Return on Investment of 0.224.

$$2001 \text{ ROI (before proposal)} = \frac{1100}{4900} = 0.224$$

$$\text{Investment Proposal ROI} = \frac{30}{200} = 0.150$$

$$2001 \text{ ROI (with proposal)} = \frac{1130}{5100} = 0.222$$

Given the existing bonus plan, any proposal that reduces the ROI is unattractive.

c) **2001 Residual Income**

Operating Income		Imputed Interest Charge		Divisional Residual Income
Newspaper	1100	– 0.12 x 4900	=	512
Television	160	– 0.12 x 3000	=	(200)
Film Studios	200	– 0.12 x 2600	=	(112)

d) RI for proposal = 30 – 0.12 x 200 = 6

Adopting this proposal will increase the division residual income. This will reduce Kanyama"s reluctance to adopt the proposal.

DECEMBER 2010

QUESTION ONE

1. Five mines supply three preparation plants.

The total mines output per day = 650 tonnes/day
The total preparation plant capacity = 700 tonnes/day

Therefore introduce a dummy mine to indicate which plant will not be fully used.
The unit costs for each combination of mine and preparation plant comprise:

Unit variable production cost at the mine
+ unit operating cost at the plant
+ unit transport cost

The values are shown in the following table. Vogel"s penalty cost method is used to find the first allocation and the MODI method to test for optimality.

		To Prep Plant A	B	C	Tons/day Available	Penalty Costs	MODI
	1	3.8	3.7	5.0		1,1.2	$U_1 = 0$
		70_5	50_4	+16 _	~~120~~ <u>70</u> 0		
	2	5.3	4.0	4.8		$.8_3$	$U_2 = 30$
		+12 _	150_3	+11 _	~~150~~ 0		
From mine	3	4.9	4.9	4.5		.4	$U_3 = 11$
		40	+1 _	40	<u>80</u> 0		

4	5.4 +13	5.0 +10	3.7 160_2	160 0	1.3_2	$U_4 = 3$
5	4.2 140	5.5 +14	4.2 +4	140 0	0	$U_5 = 4$
Dummy	0 50	0 +1	0 +4	50 0	0	$U_6 = -38$
Tons/day required	~~300~~ ~~250~~ ~~180~~ ~~40~~ 0	~~200~~ ~~50~~ ~~0~~	~~200~~ ~~40~~ ~~0~~			
Penalty costs 3.8_1	.4 .7	3.7 .3 1.2_4	3.7 .5 .3			
	$V_1 = 3.8$	$V_2 = 3.7$	$V_3 = 3.4$			

There must be (m + n – 1) = 8 entries for a basic solution. There are 8 entries. All the shadow costs are positive, therefore, this is the optimum allocation.

Mine 1 Supplies 70 tonnes per day to A and 50 to B; mine 2 supplies 150 tonnes per day to B; mine 3 supplies 40 tonnes per day to A and 40 to C; mine 4 supplies 160 tonnes per day to C; and mine 5 supplies 140 tonnes per day to A.

Preparation plant A has 50 tonnes per day spare capacity even thought it has the cheapest operating costs. The total cost of the above allocation are:
70 X 38 + 50 X 37 + 150 X 40 + 40 X 49 + 40 X 45 + 160 X 37 + 140 X 42 = Shs. 26,070/day

2. Production costs at Mine 3 fall from Shs. 34 to Shs. 30 per tonne. All mine output is already taken by the plants and production costs are like a fixed cost and do not affect the allocation, therefore total cost will be reduced by 80 x 4 =Shs. 320 per day.

3. Mine 5 plans to increase output by 40 tonnes per day from 140 to 180. all of Mine 5"s output is allocated to Plant A which has 50 tonnes per day spare capacity. The extra 40 tonnes per day output will go form Mine 5 to Plant A, increasing costs by 40 x 42 =Shs. 1,680 per day.

QUESTION TWO

a) Advantages of Just-In-Time (JIT)

i. Leads to substantial savings in stockholding costs
ii. Elimination of waste
iii. Savings in factory and warehouse space, which can be used for other profitable activities
iv. Reduction in obsolete stocks
v. Considerable reduction in paper work arising from a reduction in purchasing stock and accounting transaction or procedures.

Disadvantages

i. Additional investment costs in new machinery, changes in plant layout and goods services, thus affecting cash flow of the organization
ii. Difficulty in predicting daily or weekly demand, which is a key feature of the JIT philosophy.
iii. Increased risk due to the greater probability of stock out costs arising from strikes, or other unforeseen circumstances, that restrict production or supplies.

(b)
i.

Safety stock	Stock out	Stock out cost @ shs.100	Probability	Expected Cost (Shs)	Total (Shs)
500	0	0	0	0	0
400	100	10,000	0.04	400	400
300	200	20,000	0.04	800	
	100	10,000	0.07	700	1,500
200	300	30,000	0.04	1,200	
	200	20,000	0.07	1,400	
	100	10,000	0.10	1,000	3,600
100	400	40,000	0.04	1,600	
	300	30,000	0.07	2,100	
	200	20,000	0.10	2,000	
	100	10,000	0.13	1,300	7,000
0	500	50,000	0.04	2,000	
	400	40,000	0.07	2,800	
	300	30,000	0.10	3,000	
	200	20,000	0.13	2,600	
	100	10,000	0.16	1,600	12,000

SUMMARY

Safety Stock	Stock out cost	Holding Cost @ sh.10	Total Cost
0	12,000	0	12,000
100	7,000	1,000	8,000
200	3,600	2,000	5,600
300	1,500	3,000	4,500
400	400	4,000	4,400
500	0	5,000	5,000

The optional safety stock is 400 units

ii. P (being out of stock) i.e. at optimal safety stock of 400 units = 0.04

QUESTION THREE

(a) Productivity

September

Standard hours of output achieved	3,437hours
Productive hours worked (3800 – 430)	3,370 hours
Variable	67 hours (F)
X Standard charge rate (W1)	x Shs.300 (F)
Productivity Variance	Shs.20,100 (F)

October

Standard hours of work achieved	4,061 hours
Productive hours worked (4200 – 440)	3,760 hours
Variance	301 hours
X Standard rate (W1)	x Shs.300 (F)
Productivity variance	shs.90, 300 (F)

Excess Idle Time

September

Excess time should have been (3800 x 10%)	380 hours
But was	430 hours
Variance	(50) hours (A)
X variance rate (W1)	x Shs.300
Variance	Shs (15,000) (A)

October

Excess time should have been (4,200 x 10%),	420 hours
But was	440 hours
Variance	(20) hours (A)
X standard rate (W)	x shs.300
Variance	Shs.(6,000) (A)

Expenditure

September:	Shs.
Expenditure should have been (3,800 x Shs.270)	1,026,000
But was	1,070,000
Variance	(44,000) A

October	Shs.
Expenditure should have been (4200 x Shs.270)	1,134,000
But was	1,247,000
Variance	(113,000) (A)

b) (i) Productivity $= \frac{\text{Productivity variance (part (a))}}{\text{Standard cost of output (W2)}}$

August $= \frac{42,900 \times 100}{1,031,100} = (4.2\%)$

September $= \frac{20,100 \times 100}{1,031,100} = 1.9\%$

October $= \frac{90,300 \times 100}{1,194,000} = 8.3\%$

(ii) Excess Idle Time $= \frac{\text{Variance (Part (a))}}{\text{Expected cost (W2)}}$

August $= \frac{6,000}{120,000} = (5.0\%)$

September $= \frac{15,000}{114,000} = (13.2\%)$

October $= \frac{6,000}{126,000} = (4.8\%)$

November $= \frac{12,000}{123,000} = (9.8\%)$

(iii) Expenditure $= \frac{\text{Variance (par (a))}}{\text{Standard machine cost (W2)}}$

August $= \frac{20,000}{1,080,000} = (1.9\%)$

September $= \frac{44,000}{1,026,000} = (4.3\%)$

October $= \frac{113,000}{1,134,000} = (10.0\%)$

November $= \frac{111,000}{1,107,000} = (10.0\%)$

Workings

1. Standard Charge Rate

   Standard variable machine cost per gross hour is Shs.270 divided by (100- 10%) = Shs.300

2. Standard costs	August	September	October	November
Productivity				
Standard hours of output	3,437	3,437	4,061	3,980
Standard cost x shs.300 (W1)	1,031,100	1,031,100	1,218,300	1,194,000
Expected Idle Time				
(10% x 4,000 etc)	4,000	380	420	410
Expected cost x Shs.300)	120,000	114,000	126,000	123,000
Expenditure				
Gross machine hours	4,000	3,800	4,200	4,100
Standard cost (x Shs.270)	1,080,000	1,026,000	1,134,000	1,107,000

c) The following comments may be made:

1. Improvement in productivity:
Productivity has improved in each month, suggesting that the extra alteration to quality is having a positive effect.

2. Fluctuation in excess idle time:
Excess idle time has fluctuated in the period; it is higher (more adverse) In October and November.

3. Increasing Expenditure:
Expenditure has been increasing, notably between September and October, but seems to hold steady in November.

In the absence of other information we can suggest the following possible **interdependencies.**

1. **The productivity improvement** may have been brought about by means of **measured expenditure**, perhaps on better quality materials, machine maintenance or supervision. The factthat improvements continue may be due to a learning curve effect, however;
2. The fluctuation levels of **idle time do not have a clear cause**, though they do suggest that the quality improvement process is not yet fully under control.

QUESTION FOUR

(a) Large – scale service organizations have a number of features that have been identified as being necessary to drive significant benefits from the introduction of ABC:

i. They operate in a highly competitive environment
ii. They incur a large proportion of indirect costs that cannot be directly assigned to specific cost objects.
iii. Products and consumers differ significantly in terms of consuming overhead resources.
iv. They market many different products and services.

Furthermore, many of the constraints imposed on manufacturing organizations, such as also having to meet financial accounting stock valuation requirements, or a reluctance to change or scrap existing systems, do not apply. Many services organizations have only recently implemented cost systems for the first time. This has occurred at the same time as when the weaknesses of existing systems and the benefits of ABC systems were being widely publicized. These conditions have provided a strong measure for introducing ABC systems.

(b) The following may create problems for the application of ABC.

i. Facility sustaining costs (such as property rents etc) represent a significant proportion of total costs and may only be avoidable if the organization ceases business. It may be impossible to establish appropriate cost drivers

ii. It"s often difficult to define products where they are of an intangible nature. Cost objects can therefore be difficult to specify;

iii. Many service organizations have not previously had a costing system and much of the information required to set up an ABC system will be non-existent. Therefore introducing ABC is likely to be expensive.

(c) The uses for ABC information for service industries are similar to those for manufacturing organizations:

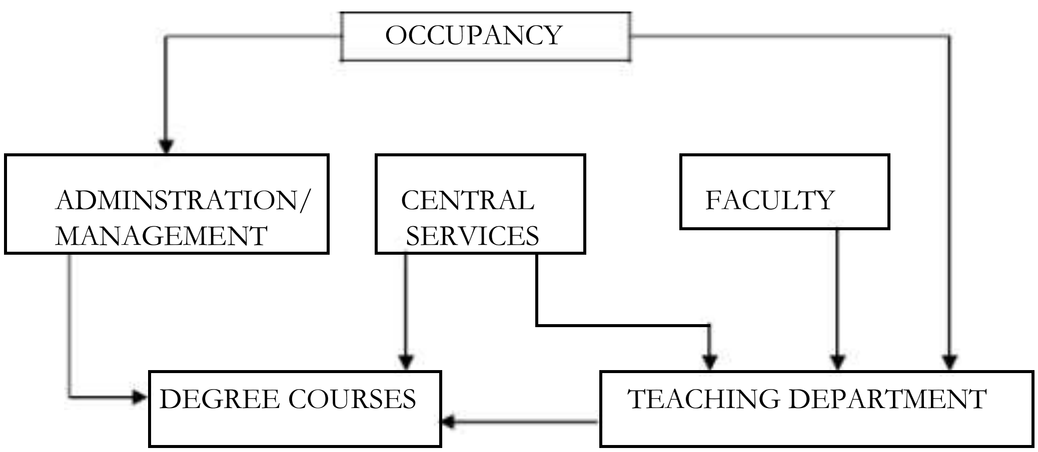
i. It leads to more accurate product costs as a basis for pricing decisions when cost-plus pricing methods are used;

ii. It results in more accurate product and customer profitability analysis statements that provide a more appropriate basis for decision-making.

iii. ABC attaches costs to activities and identifies the cost drivers that cause the costs. Thus ABC provides a better understanding of what causes costs and highlights ways of performing activities more effectively by reducing cost driver transactions. Costs can therefore be managed more effectively in the long term. Activities can be analyzed into value added and non-value added activities alteration is drawn to areas where there is a potential for cost reduction without reducing the products" service potentials to customers.

QUESTION FIVE

(a) **Flow diagram**



(b) **Step 1**

Apportion occupancy costs = Sh. $\frac{15,000,000}{37,500 \text{ ft}}$ = Sh.400 per sq. ft

	Sh„000"
Administration/management	2,800
Central Services	1,200
Faculty	3,000
Teaching Departments	8,000
	15,000

Step 2
Apportion Central Services costs:

$\frac{10,000,000 + 1,200,000}{16,000,000}$ = Sh. 0.7 per external costs

	Sh„000"
Faculty	1,680
Teaching departments	5,600
Degree courses	3,920
	11,200

Step 3
Apportion teaching department costs (includes 100% of faculty costs) and administration/management costs to degree courses.

Teaching department =
8,000,000 + 5,600,000 + (3,000,000 + (1,680,000 + 7,000,000) + 55,250,000 = Sh. 80,530,000

Administration/management = Sh. 2,800,000 + 17,750,000 = Sh.20,550,000

Total degree courses costs =
Sh 80,530,000 + 20,550,000 + 3,920,000 = Sh. 105,000,000

Average university cost per student = 105,000,000 =
Sh.42,000 2,500

Step 4
Analyse Sh. 105,000,000 by degree courses (in round Sh „000")

	Business studies Sh „000"	**Mechanical Engineering Sh „000"**	**Catering Studies Sh „000"**
Teaching department	2,416	2,013	5,637
Administration/management	514	1,028	822
Central services (base on external cost)	224	336	224
Average cost per graduate	3,154	3,377	6,683

(c) The average cost per graduate will differ from one-degree course to another for several reasons, the most obvious of which is the very different nature of the courses.

The engineering and catering courses will require much greater use of expensive machinery and equipment, which in turn will need more room. In addition these courses will probably require much greater lecturer input than on the business studies courses. The much lower staff/student ratio will push up the teaching costs per student.

Another factor to be considered is the variability in the student numbers. This variable is unlikely to have an impact on many of the university costs, which are mainly fixed in nature. For example, if in the following year intake is up to sixty on the mechanical engineering degree, with a similar level of costs, the average cost per student would fall to nearly that being reported for a catering studies student.

These average costs figures must be interpreted with great care by the management. They give a „rough" guide to the relative cost of degree courses but the arbitrary apportionments render them very nearly useless for decision-making. For decision making incremental costs are required.

JUNE 2011

QUESTION ONE

a) **Methods used to analyses uncertainty in CV-P analysis**

(i) **Sensitivity analysis**

This is what if analysis that considers the effect of a marginal change on each of the relevant variables to the decision.

(ii) **Point estimate of probability**

This approach requires a number of different values for each of the uncertain variables to be selected. Usually three values are selected: these are the worst possible, most likely and best possible outcomes. For each of these values a probability of occurrence is estimated. The expected values and standard deviation can then be computed.

(iii) **Continuous probability distribution**

(e.g. normal distribution)

The uncertain variables can be estimated as a continuous probability distribution. Estimates are made of the mean and standard deviation, which can then be used to compute expected profit, standard deviation of profits and probability that the company will break even.

(iv) **Simulation analysis**

This is a method of analyzing a system by experimentally duplicating its behaviour. Simulation is used where analytical techniques are not available or would be very complex.

b) (i) **Current production: Ti only**

contribution = 10 – 6 = Sh.4

E (Profit)= 4 x 110,000 – 400,000 = Sh.40,000

δ profit = 4 x 10,000 = Sh.40,000

$$\text{BEP units} = \frac{\text{Total fixed costs}}{\text{Contribution margin}} = \frac{400{,}000}{4}$$

= 100,000 units

BEP sh. = 100,000 (10) = Sh.1,000,000

(ii) **Coefficient of variation C.V**

$$\text{C.V} = \frac{\delta}{\text{E(profit)}} = \frac{40{,}000}{40{,}000} = 1$$

(i) Proposed production: Ti and T2.

Expected profit = 4(85,000) + 3(50,000) – (400,000 + 50,000)

= Sh.40,000

$$\delta_\Pi = \sqrt{CM_1^2\delta_1^2 + CM_2^2\delta_2^2 + 2r_{12} + CM_1\,CM_2\delta_1\delta_2}$$

$= \sqrt{4\,(800)^2 + 3^2\,(5000)^2 + 2(-0.9)(4)(3)(8000)(5000)}$

$= 19621.4$

$$B.E.P\text{units} = \frac{\text{Total fixed costs average}}{\text{contribution margin}}$$

$$AV.CM = 4\left(\frac{85}{135}\right) + 3\left(\frac{50}{135}\right) = 3.62962963$$

$$\text{BEP units} = \frac{400{,}000 + 50{,}000}{3{,}62962963} = \underline{\underline{123980}}\text{ units}$$

$$\text{Thing one} = \frac{85}{135}(123980) = 78061\text{ units}$$

$$\text{Thing two} = \frac{50}{135}(123980) = 45919\text{ units}$$

in sh	T1		sh
BEP Sh =	78061 x Sh10	=	780,610
	T2		
BEP Sh =	45919 *x* 8	=	367,352
Total BEP Sh			1,147,962

(ii) Coefficient of variation (C.V)

$$C.V = \frac{\delta}{E(\,profit)} = \frac{19621.4}{40{,}000} = \underline{\underline{0.49}}$$

(iii) Since the mean demand is greater than breakeven point then BEP is not a good criteria in making the decision. We should use the coefficient o f variation.

The decision therefore is to add T2 to the production schedule since it r educes the coefficient of variation from 1 to 0.49.

QUESTION TWO

a) Overhead absorption is the technique of attributing departmental overhead costs to a cost unit.

Traditionally, the basis of overhead absorption was the number of labour hours expected within the budget period and this was then used to calculate an absorption rate per labour hour. This was then used to attribute costs to the cost units on the basis of the number of labour hours used to produce the cost unit.

Alternative bases of apportioning exist such as the number of machine hours or the percentage of particular elements of prime costs incurred in respect of cost units. If the method of manufacture is machine intensive for example, it is more realistic to absorb the overhead cost on the basis of the number of machine hours instead of the number of labour hours.

A further development is to divide the overheads into those costs, which are labour related, and those, which are machine hour, related and apply a separate absorption rate to each part of the overhead cost. This is the use of multiple rates similar to the principle of activity bases costing (ABC).

ABC is based on the principle that activities cause costs and therefore the use of activities should be the basis of attributing costs to cost units. Costs are identified with particular activities and the performance of those activities is linked with products.

b) (i) Incremental budgeting uses the previous year"s budget as the starting point for thepreparation of next year"s budget. It assume that the basic structure of the budget willremain unchanged and that adjustments will be made to allow for changes in volume, efficiency and price levels. The budget is therefore concerned with increments to operations that will occur during the period and the focus is on existing uses of resources rather than considering alternative strategies for the future budget period. Incremental budgeting suffers from the following weaknesses:

i It perpetuates past inefficiencies
ii There is insufficient focus on improving efficiency and effectiveness.
iii The resource allocation tends to be based on existing strategies rather than considering future strategies.
iv It tends to focus excessively on the short term and often leads to arbitrary cuts being made in order to achieve short-term financial targets

(ii) The answer should stress that:;
i. The focus is on managing activities
ii. The focus is on the resources that are required for undertaking activities and identifying those activities resources that are un-utilized or which are insufficient to meet the requirements specified in the budget.
iii. Attention is given to eliminating non-value-added activities.
iv. The focus is on the control of the causes of costs (i.e. the cost drivers).

QUESTION THREE

For (a) and (b)

	Fixed Fee	Share of Revenue to Joan	Share of Costs Borne By Joan	Net profit to Joan	Joint Prob	Expected Monetary value
Contract A	**Sh. „m"**	**Sh. „m"**	**Sh. „m"**	**Sh „m"**		**Sh. „m"**
HD – BC	10	100	-	110	0.06	6.6
HD – HC	10	100	-	110	0.04	4.4
MD – BC	10	0	-	10	0.18	1.8
MD – HC	10	0	-	10	0.12	1.2
LD – BC	10	0	-	10	0.36	3.6
LD – HC	10	0	-	10	0.24	2.4
					1.0	20.0
Contract B						
HD – BC	0	200	20	180	0.06	10.8
HD – HC	0	200	70	130	0.04	4.4
MD – BC	0	50	20	30	0.18	5.4
MD – HC	0	50	70	-20	0.12	-4.8
LD – BC	0	10	20	-10	0.36	-3.6
LD - HC	0	10	70	-60	0.24	-19.2
						-7.0
Contract C						
HD – BC	0	600	50	550	0.06	33.0
HD – HC	0	600	150	450	0.04	18.0
MD – BC	0	150	50	100	0.18	18.0
MD – HC	0	150	150	0	0.12	0
LD – BC	0	30	50	-20	0.36	-7.2
LD – HC	0	30	150	-12	0.24	-28.8
						33.0

Note

HD = High demand
MD = Moderate demand
LD = Low demand
BC = Budgeted Cost
HC = High Cost

b) From the solution above the

EMV for Contract A = Sh.2 million
EMV for Contract B = Sh.1 million
EMV for Contract C = Sh.3 million

Joan should choose contract C, given the objective of maximizing expected monetary value.

c) Three sources of information Joan might use are:

1. Her own track record of actual production and marketing relative to amounts
2. The tract record of the film station parts in "the rise and fall of cock" film running over budget
3. The geographical location of the technical nature of the stunts set the film. Examine the tract record costs against budgeted costs for films in the same location and of similar difficulty.

QUESTION FOUR

(a) (i)

Month	Machine Hours X	Maintenance Cost Y	XY	X^2	Y^2
1	800	350	280,000	640,000	122,500
2	1,200	350	420,000	1,440,000	122,500
3	400	150	60,000	160,000	22,500
4	1,600	550	880,000	2,560,000	302,500
Sum	4,000	1,400	1,640,000	4,800,000	570,000

High Low method

	X	**Y**
Highest point	1,600	550
Lowest point	400	150
Difference	1,200	400

$$b = \frac{400}{1200} = 0.33$$

$$\hat{Y} = a + bx$$

Substitute Highest point

$550 = a + 0.33(1,600)$

$a = 17$

The cost function is $\hat{Y} = 17 + 0.3X$.

(ii) Regression analysis

$$b = \frac{n\Sigma xy - \Sigma x \Sigma y}{n\Sigma x^2 - (\Sigma x)^2} = \frac{4(1,640,000) - 4,000(1,400)}{4(480,000) - (4,000)^2}$$

$$= 0.3$$

$$a = \frac{\Sigma Y}{n} - b\frac{\Sigma x}{n} = \frac{1,400}{4} - 0.3\left(\frac{4,000}{4}\right) = 50$$

The function is $\hat{Y} = 50 + 0.3x$

b) (i)

$\hat{Y} = 50 + 0.3X$

If x = 900

$\hat{Y} = 50 + 0.3\,(900) = \underline{\underline{320}}$ (in Sh. '000')

$\hat{X} = a^1 + b^1 Y$

$$b^1 = \frac{n\Sigma XY - \Sigma X \Sigma Y}{N\Sigma Y^2 - (\Sigma Y)^2} = \frac{4(1,640,000) - 4000(1400)}{4(570,000) - (1400)^2}$$

$$= \frac{960,000}{320,000} = 3$$

(c)

$$a^1 = \frac{\Sigma x}{n} - b^1\frac{\Sigma Y}{n}$$

$$= \frac{4,000}{4} - 3\left(\frac{1,400}{4}\right) = \underline{\underline{-50}}$$

$\hat{X} = -50 + 3Y$

If Y = 400

$\hat{X} = -50 + 3(400) = 1{,}150$ machine hours.

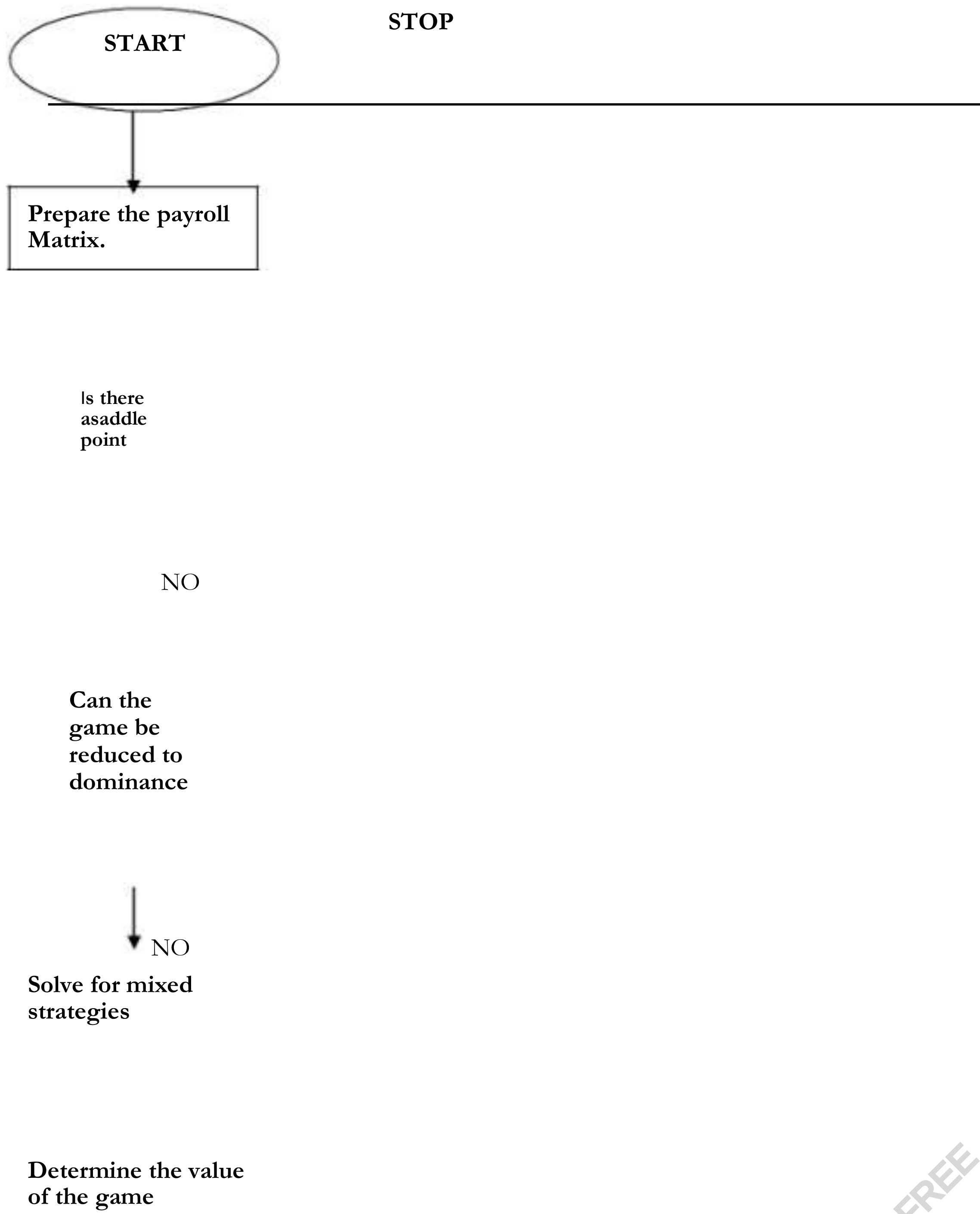
$\hat{Y} - t_c s_e \leq Y \leq \hat{Y} + t_c s_e$

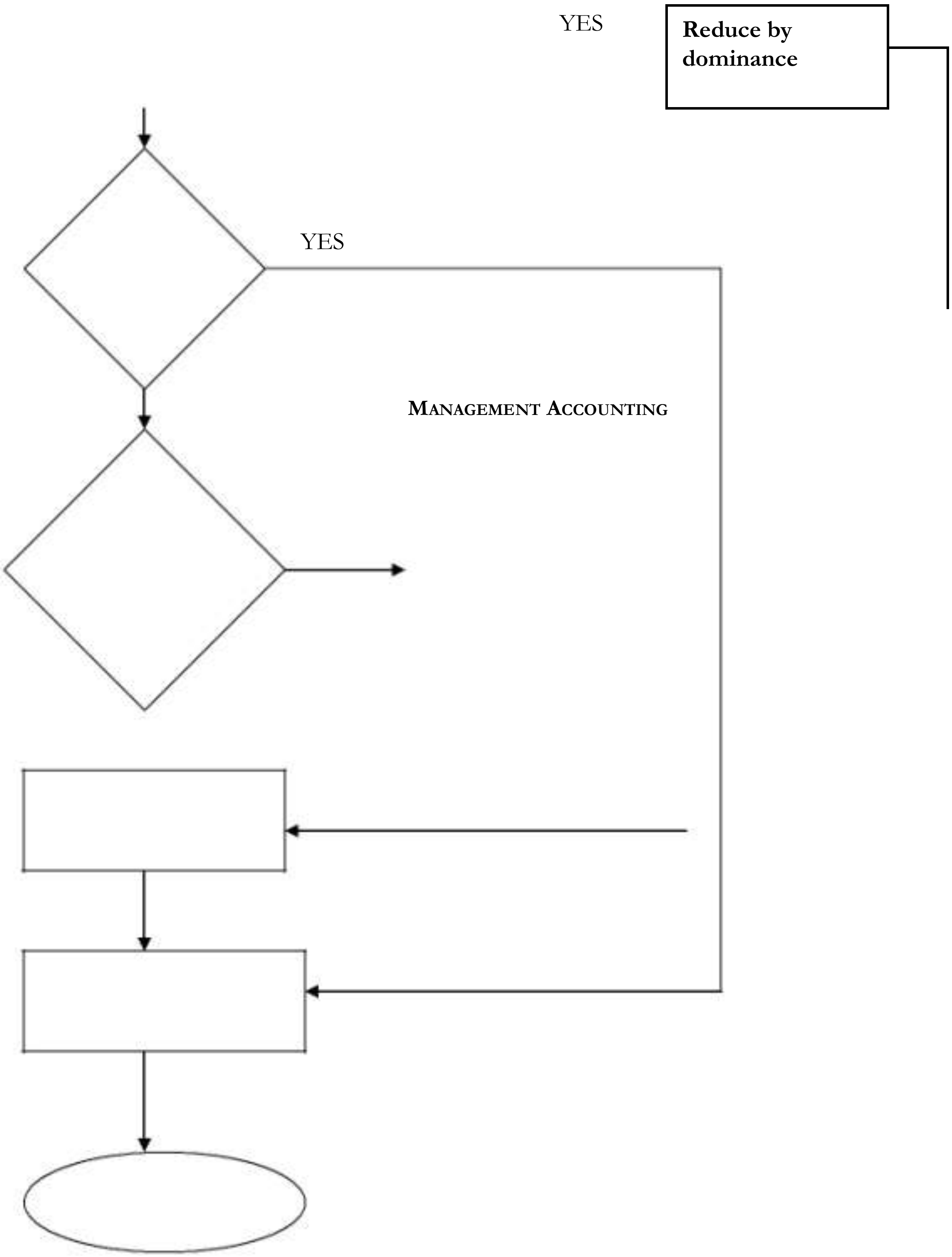
$320 - 2.7764(63.25) \leq Y \leq 320 + 2.27764(63.25)$

$144.39 \leq Y \leq 495.6$

We are 95% confident that maintenance cost next period will lie between Sh.144,390 and Sh.495,600

QUESTION FIVE




YES
Reduce by dominance
YES

b) (i)Let A_1 be company A undertakes a vigorous market campaign.

A_2 be Company A does not run the market campaign

B_1 = Company B invests Sh.25 m in Research and Development (R & D)

B_2 = Company B invests Sh.50 m in R & D

B_3 = Company B invests Sh.80 m in R & D

Game Matrix

Company B

		B_1	B_2	B_3b	
Company A_1	A_1	0.79	0.76	0.73	0.73
	A_2	0.76	0.74	0.72	0.72
	Max	0.78	0.76	0.73	

The game has a saddle point occurring at strategy A_3 . These are the optimal strategies with a game value of 73% of the market share of A implying that B will get a market share of 27%.

(ii) **Payoff matrix**

	B_1	B_2	B_3
A_1	(202, 38)	(193, 22)	(184, 1)
A_2	(228, 47)	(222, 28)	(216, 4)

A"s Reasonings

- If B plays strategy B_1 , then A should play strategy A_2 to maximize his winnings.
- If B plays strategy B_2 , then A should play strategy A_2..

In all cases A plays strategy A_2B"s reasonings.

- If A plays strategy A_1 then B should play strategy B_1 to maximize his profits.
- If A plays strategy A_2 then B should play strategy B_1 .

The saddle point occurs when A plays strategy A_2 and B plays strategy B_1 .

The profit contribution will be:
Company A: Sh.<u>228</u> million
Company B: Sh.<u> 47</u> million

DECEMBER 2011

QUESTION ONE

(a) Proposed production

P_1 = ⅗ x 400,000 = 240,000 litres
P_2 = ⅖ x 400,000 = 160,000 litres

The production of P_1 will go down by 60,000 litres while that of product P_2 will increase by 60,000 litres.

Incremental revenue from P_2 = 60,000 x 7,000	420,000,000	
Loss of revenue from P_1 = 60,000 x 3,500	210,000,000	
		210,000,000
Extra joint processing costs = 60,000 x 500		(30,000,000)
Blending and refining		
Extra cost of P_2 = $\frac{250,000,000}{,000100,000}$ x70%x60	(105,000,000)	
Saving on cost of P_1 = $\frac{250,000,000}{300,000}$ x70%x60,000	35,000,000	(70,000,000)
Other separable costs		
Extra cost of P_2 = $\frac{20,000,000}{000100,000}$ x60,	(12,000,000)	
	10,000,000	2,000,000
Savings on cost of P_1 = $\frac{50,000,000}{300,000}$ x60,000		
Opportunity cost		
Mixing hours of P_2 = $\frac{2,000}{100,000}$ x60,000 = 1,200		
Mixing hours of P_1 = $\frac{2,000}{300,000}$ x60,000 = (400)		
Extra hours 800		
Opportunity costs 800 x 100,000		80,000,000
Net benefit of changing the mix		28,000,000

Decision
The company should change the mix because the net benefit of the change is positive.

(b) **Other factors include:**

- Demand for the extra units of P_2
- Effect of change on employees
- Contracts already signed for supply of materials etc.
- Future production structure

QUESTION TWO

(a) **General analysis**

Plant capacity: Bungoma $\frac{270,000}{0.75}$ = 360,000 tonnes max.

Busia $\frac{360,000}{0.6}$ = 600,000 tonnes max

Raw materials:	**Sh.**
Bungoma	1,875
Busia	2,000
From brokers	2,750

Maximum production for cheap material

Bungoma $\frac{144,000x800}{1000}$ = 115,200 tonnes of output

Busia $\frac{400,000x800}{1000}$ = 320,000 tonnes of output

Unit cost of Production

Bungoma $\frac{1,000}{800}x1,875$ = Sh.2,344

Busia $\frac{1,000}{800}x2,500$ = Sh.2,500

Brokers material $\frac{1,000}{800}x2,750$ = Sh.3,438

Other variable costs apart from aw materials

Bungoma $\frac{102,600,000}{270,000}$ = Sh.380 per unit

Busia $\frac{140,400,000}{360,000}$ = Sh.390 per unit

Total variable costs per kg of output:

Bungoma 380 + 2,344 = Sh.2,724 per tonne range 1 – 115,200 tonnes
And 380 + 3,438 = Sh.3,818 per tone range 115,200 – 360,000 tonnes

Busia 390 + 2,500 = Sh.2,890 per tonne range 1 – 320,000 tonnes
And 390 + 3,438 = Sh.3,828 per tonne range 320,000 – 600,000 tonnes

(i) **Desired output is 630,000 tonnes**
Bungoma produce 115,200 tonnes @ Sh.2,724 per tonne

Bungoma produce 194,800 tonnes @ Sh.3,818 per tonne and
Busines produce 320,000 tonnes @ Sh.2,890 per tonne

Total relevant cost:

115,200 x 2,724	=	313,804,800
194,800 x 3,718	=	724,266,400
320,000 x 2,890	=	924,800,000
		1,962,871,200

Current relevant costs:

Raw materials for both plants 468,000 + 576,000 =	1,044,000,000
Variable costs for both plants 1,026,000 +1,404,000 =	2,430,000,000
Total	3,474,000,000

(ii) Cost savings 3,474,000,000 – 1,962,871,200 = Sh.1,511,128,800

(b) **Production of 910,000 Kgs**
Bungoma 115,200 @ 2,724 per tonne
Busia 320,000 @ 2,890 per tonne
Bungoma 244,800 @ 3,718 per tonne
Busia 230,000 @ 3,824 per tonne.

∴ **Recommended production**

Bungoma plant	360,000 tonnes
Busia plant	550,000 tonnes
	910,000 tonnes

QUESTION THREE

(a) **T o**

FROM		LD	SUM	SON	PAL
	LD	1,750	200	100	150
	SUM	400	2,300	50	250
	SON	0	250	2,050	0
	PAL	100	150	100	2,150

	LD	SUM	SON	PAL
LD	1,750/2,200	200/2,200	100/2,200	150/2,200
SUM	400/3,000	2,300/3,000	50/3,000	250/3,000
SON	0	250/2,300	2,050/2,300	O
PAL	100/2,500	150/2,500	100/2,500	2,150/2,500

$$\begin{array}{l} \\ \text{LD} \\ \text{SUM} \\ \text{SON} \\ \text{PAL} \end{array} \begin{array}{cccc} \textbf{LD} & \textbf{SUM} & \textbf{SON} & \textbf{PAL} \\ \end{array}$$

$$\begin{array}{l|cccc} & \textbf{LD} & \textbf{SUM} & \textbf{SON} & \textbf{PAL} \\ \hline \text{LD} & 0.80 & 0.09 & 0.05 & 0.06 \\ \text{SUM} & 0.13 & 0.77 & 0.02 & 0.08 \\ \text{SON} & 0.00 & 0.11 & 0.89 & 0.00 \\ \text{PAL} & 0.04 & 0.06 & 0.04 & 0.86 \end{array}$$

Market shares at the end of December 2003

$$\begin{pmatrix} 0.22 & 0.30 & 0.23 & 0.25 \end{pmatrix} \begin{pmatrix} 0.80 & 0.09 & 0.05 & 0.06 \\ 0.13 & 0.77 & 0.02 & 0.08 \\ 0 & 0.11 & 0.89 & 0 \\ 0.04 & 0.06 & 0.04 & 0.86 \end{pmatrix}$$

$$\begin{pmatrix} 0.225 & 0.291 & 0.232 & 0.252 \end{pmatrix}$$

LD TV	22.5%
SUM TV	29.1%
SON TV	23.2%
PAL TV	25.2%

(b) **Market shares at steady state**

Let X, Y, Z and 1-X-Y-Z be long run market shares of LD - TV, SUM TV, SON TV and PAL TV respectively.

$$\begin{pmatrix} X, Y, Z, 1\text{-}X\text{-}Y\text{-}Z \end{pmatrix} \begin{pmatrix} 0.80 & 0.09 & 0.05 & 0.06 \\ 0.13 & 0.77 & 0.02 & 0.08 \\ 0 & 0.11 & 0.89 & 0 \\ 0.04 & 0.06 & 0.04 & 0.86 \end{pmatrix}$$

$$= \begin{pmatrix} X, Y, Z, 1\text{-}X\text{-}Y\text{-}Z \end{pmatrix}$$

$$\begin{array}{lllllll} 0.24x & + & 0.09Y & -- & 0.04Z & = & -0.04 \ldots\ldots\ldots\ldots(i) \\ 0.03x & -- & 0.29Y & + & 0.05Z & = & -0.06 \ldots\ldots\ldots\ldots(ii) \\ 0.01x & -- & 0.02Y & -- & 0.15Z & = & -0.04 \ldots\ldots\ldots\ldots(iii) \end{array}$$

Equation (ii) x3 + (iii)

$$0.09X -- 0.87Y + 0.15Y = - 0.18$$
$$\underline{0.01X - 0.02Y - 0.15Z = - 0.04}$$

$0.1X - 0.89Y = -0.22$..............(iv)

EQUATION [(I) X5) – [(III) X 4]

$- 3.6X + 1.35Y - 0.6Z = - 0.6$
$\underline{0.04X - 0.08Y - 0.6Z = - .016}$

$- 3.64X + 1.43Y = - 0.44$....................(v)

Equation (iv x 36.4) + (v)

$3.64X - 32.396Y = 8.008$
$\underline{-3.64x + 1.43Y = - 0.44}$

$- 30.966Y = - 8.448$

$Y = \frac{8.448}{30.966}$

$= 0.273$

Substitution for X

$0.1X - 0.24297 = -0.22$

$0.1X = 0.02297$

$X = \frac{0.02297}{0.1}$

$X = 0.23$

Substitution for Z using equation (i)

$-0.24(0.23) + 0.09\ (0.273) - 0.047Z = -0.04$

$-0.03063 - 0.04Z = 0.04$

$-0.04Z = \underline{-0.00937}\ 0.04$

$Z = 0.234$

$\therefore$ **Long run market shares are:**

LD TV	23%
SUM TV	27.3%
SON TV	23.4%

PAL TV (100 – 23 – 27.3 – 23.4) 26.3%

ASSUMPTIONS OF MAKOV PROCESS

(i) There is a finite number of possible states of nature

(ii) The probability of changing states remains constant through out the period of analysis i.e. the transaction matrix is static.

(iii) The size and make up of the Markov system do not change for the period to which the analysis applies. More precisely in market forecasting for instant we assume that there are no new competitors or consumers and none of the old one leaves.

(iv) We can predict any future state from the current state using the matrix of transition probabilities.
(v) The various states are assumed to be mutually exclusive and collectively exhaustive

QUESTION FOUR

(a) Total proportion 6+ 5+ 5+ 4 = 20

Kariuki

1. Mt. Kenya zone — $^6/_{20}$ x 60,000 (100 – 70) = 540,000
2. Western zone — $^6/_{20}$ x 50,000 (110 -- 70) = 600,000
3. Nyanza zone — $^6/_{20}$ x 40,000 (139 – 70) = 720,000
4. Eastern zone — $^6/_{20}$ x 30,000 (120 – 70) = 450,000

Wafula

1. Mt. Kenya zone — $^5/_{20}$ x 60,000 (10 – 70) = 450,000
2. Western zone — $^5/_{20}$ x 50,000 (110 -- 70) = 500,000
3. Nyanza zone — $^5/_{20}$ x 40,000 (130 – 70) = 600,000
4. Eastern zone — $^5/_{20}$ x 30,000 (120 – 70) = 375,000

Oketch
Will be same as Wafula because they have same ability.

Wambua

1. Mt. Kenya zone — $^4/_{20}$ x 60,000 (100 – 70) = 540,000
2. Western zone — $^4/_{20}$ x 50,000 (110 - 70) = 600,000
3. Nyanza zone — $^4/_{20}$ x 40,000 (139 – 70) = 720,000
4. Eastern zone — $^4/_{20}$ x 30,000 (120 – 70) = 450,000

OBJECTIVE OF THE COMPANY IS TO MAXIMIZE CONTRIBUTION

S.Man/Zone	Mt. Kenya	Data in „000" Western	Nyanza	Eastern	Max.
Kariuki	540	600	720	450	720
Wafula	450	500	600	375	600
Oketch	450	500	600	375	600
Wambua	360	400	480	300	480

S.Man/Zone	Mt. Kenya	Western	Nyanza	Eastern
Kariuki	180	120	0	270
Wafula	150	100	0	225
Oketch	150	100	0	225
Wambua	120	80	0	180
Min	120	80	0	180

S.Man/Zone	Mt. Kenya	Western	Nyanza	Eastern
Kariuki	60	40	0	90
Wafula	30	20	0	45
Oketch	30	20	0	45
Wambua	0	0	0	0

Min No. of lines 2 < 4, solution not optimal
Entering variable is 20.

S.Man/Zone	Mt. Kenya	Western	Nyanza	Eastern
Kariuki	40	20	0	70
Wafula	10	0	0	25
Oketch	10	0	0	25
Wambua	0	0	20	0

Min No. of lines 3<4 hence solution not optimal entering variable is 10.

S. Man/Zone	Mt. Kenya	Western	Nyanza	Eastern
Kariuki	30	20	0	60
Wafula	0	0	0	15
Oketch	0	0	0	15
Wambua	0	10	30	0

Min. of lines 4=4 hence the solution is optimal.

(b) Allocation

Salesman	**Zone**	**Contribution Sh**
Kariuki	Nyanza	720,000
Wafula	Western	500,000
Oketch	Mt. Kenya	450,000
Wambua	Eastern	300,000
Total contribution		1,970,000

Or

Salesman	**Zone**	**Contribution Sh**
Kariuki	Nyanza	720,000
Wafula	Mt. Kenya	450,000
Oketch	Western	500,000
Wambua	Eastern	300,000
Total contribution		1,970,000

QUESTION FIVE

(a) (i)

ARR	**A** Sh."000"	**B** Sh „000"
Investment	70,000	70,000
Average capital employed (dividend by 2)	35,000	35,000
Increase in net cashflows	150,000	150,000
Average ikncrease per year (dividend by 10)	15,000	15,000
Less depreciation per year	7,000	7,000
Average net income	8,000	8,0000

The average ARR for both projects = $\frac{8,000,0000 \times 100}{35,000,000}$

= 22.86%

(ii) **NPV**

TABLE 1

Year	Cashflow A Sh."000"	Discount factor at 18%	Present value Sh."000"
0	(70,000)	1.000	(70,000)
1-10	100,000	4.494	44,940
1-5	100,000	3,127	31,270
		NET PRESENT VALUE	6,210

TABLE 2

Year	Cashflow A Sh. „000"	Discount factor at 22%	Present value Sh. „000"
0	(70,000)	1,000	(70,000)
1-10	150,000	4,494	674,100
			604,100

(iii) **IRR**

TABLE 3

Year	Cashflow A **Sh. „000"**	Discount factor at 22%	Present value **Sh. „000"**
0	(70,000)	1.000	(70,000)
1-10	10,000	3.923	39,230
1-5	10,000	2.864	28,640
		NPV	(2,130)

TABLE 4

Year	Cashflow B **Sh. „000"**	Discount factor at 18	Present value **Sh."000"**
	(70,000)		
0	150,000		(70,000)
1-10	-	1.000	72,490
1-5		0.4833	
		-	2,490
		NPV	

A $18 + \frac{6,210,000 \times 4}{6,210,000 + 2,590,000} = 20.98$

B $16 + \frac{2,490,000 \times 2}{2,490,000 + 2,590,000} = 16.98\%$

(b) Several reasons can be advanced in favour of computing target sell prices by means of cost plus formulae, even if the prices are later modified firstly, the decision maker is faced with uncertainties. The use of cost-pus formulae enables the decision-maker to absorb some of these uncertainties and come up with a price that will be acceptable given the constraints at hard.

Secondly, cost may be reviews as abase from which the price setter moves, guarding againstthe possibility of setting the price too low and incurring losses. Cost-plus pricing will not guarantee against loss making; for instance, there are problems of volume estimating. However, these will point the price setter in the right direction.

A third explanation of the popularity of cost-based price is the estimates of the company"s own cost may help the decision – maker to predict either competitor"s cost or a competitor"sprice. For example, if a company is operating in an industry where a 30% mark-up is the norm, then the company may be able to assume that this parttern will hold for new products and thereby either to predict competitor price or to price in such a way as to gain quick acceptance of a new product line.

-- Motivation & Autonomy

The main reason is that information is rarely (if ever) available to allow an approach based on marginal cost and marginal revenue.

(c) The factors to be taken into consideration in establishing the lengths of the proposed budget are:

(i) The type of budget e.g. sales, capital expenditure cash or production.

(ii) The economic situation in general.

(iii) The stability of the market for the product
(iv) The probability of changes in products and/or product mix.
(v) Political climate.

JUNE 2012

QUESTION ONE

(a) (i) Profits for the group as a whole will be maximized where the marginal cost of South division is equal to the marginal revenue of North division.

Price = 4,500 – $0.0008Q_N$

Therefore total revenue = $4{,}500Q_N - 0.0008Q^2_N$

Therefore: $MR_N = \frac{dTR}{dQN} = 4{,}500 - 0.0016Q_N$

$MC_N = \frac{dTCN}{dQN} = 1{,}100 + 0.002Q_N$

$NMR_N = MR_N - MC_N = 3{,}400 - 0.0036Q_N$

$MC_S = \frac{dTC\ S}{dQ_S} = 550 + 0.004Q_S$

So profits are maximized where $550 + 0.004Q_S = 3{,}400 - 0.0036Q_N$

Since there is no intermediate market both divisions must agree on the output level so that $Q_S = Q_D = Q$

Therefore $0.0076Q = 2{,}850$
$Q = 375{,}000$

(ii) The optimum transfer price is the marginal cost of South division for that output at which the marginal cost equals North division"s net marginal revenue from processing the intermediate product (at output level of 375,000 units).

The marginal cost of South division at an output level of 375,000 units

is: 550 + (0.004 x 375,000) = 550 + 1500 = Sh.2,050

At 375,000 units the price that North division would charge for selling the final product

is: 4,500 – 0.0008 x 375,000 = Sh.4,200.

The resulting profit from each division would be:

South division	**Sh."000"**	**North division**	**Sh."000"**
Revenue 375,000 x 2,050	768,750	Revenue 375,000 x 4,200	1,575,000
Costs (W_1)	488,500	Conversion costs (W_2)	554,625
		Transferred costs	768,750
Profit	280,250	Profit	476,625

W_1 $TC_S = 1,000,000 + 550 \times 375,000 + 0.002(375,000)^2 =$ Sh.487,500,000

W_2 $TC_N = 1,500,000 + 1,100 \times 375,000 + 0.001(375,000)^2 =$ Sh.554,625,000

Group profit = Sh.281,250,000 + Sh.476,625,000 = Sh.757,975,000

(b) (i) In (a) the marginal cost for South division at different output levels were equated to the NMR of North division. It is assumed that the question implies that South division would quote transfer prices based on its marginal costs would at a given output levels, so that North would regard these transfer prices ($550 + 0.004Q_S$) to be constant per unit for all output levels. Drink"s net profit (NP) will be as follows:

$$NP = (4,500Q - 0.0008Q^2) - (1,500,000 + 1,100Q + 0.001Q^2) - Q(550 + 0.004Q)$$

OR

$$\text{Profit} = \text{Revenue} - \text{Total Costs}$$
$$= 2,850Q - 0.0038Q^2 - 2,500,000$$

$$\frac{d\pi}{dQ} = 2850 - 0.0076Q = 0$$

$$Q = 375,000 \text{ units}$$

$$= 2,850Q - 0.0058Q^2 - 1,500,000$$

Profit is maximized where $\frac{dNP}{dQ}=0$

That is, where: $2,850 - 0.0116Q = 0$
$Q = 245,690$ units

An alternative approach is to equate the net marginal revenue with the marginal cost of the transfers. South division will transfer out at a marginal cost of $550 + 0.004Q_S$ and North division will treat this price at a constant sum per unit. Therefore the total cost of transfers to North division will be:

$Q_S(550 + 0.004Q_S) = 550Q_S + 0.004Q_S$

Therefore the marginal cost of transfer will be $550 + 0.008Q_S$

The transfer price for North division that maximized its profits is where NMR = MC i.e. where $3,400 - 0.0036Q = 550 + 0.008Q$
$Q = 245,690$ units

(ii) The level that maximizes profit for North division determines the transfer price. At an output level of 245,690 units the transfer price will be:

550 + (0.004 x 245,690) = Sh.1,533

At 245,690 units the price that North division would charge for selling the fund product is 4,500 – 0.0008 x 245,690 = Sh.4,303

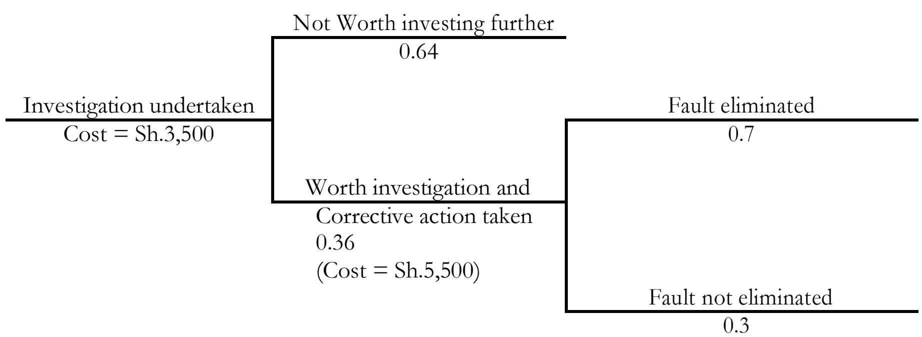
South division	**Sh."000"**	**North division**	**Sh."000"**
Revenue 245,690 x 1533	376,642.77	Revenue 245,690 x 4,303	1,057,204.07
Costs (W1)	256,856.652	Conversion costs (W2)	332,122.5761
		Transferred costs	376,642.77
Profit	119,785.118	Profit	348,438.664

$W_1 = TC_S = 1{,}000{,}000 + 550 \times 245{,}690 + 0.002(245{,}690)^2 = Sh.256{,}856{,}652.2$

$W_2 = TC_N = 1{,}500{,}000 + 1{,}100 \times 245{,}690 + 0.001(245{,}690) = Sh.332{,}122{,}576.1$

QUESTION TWO

(a) (i) Decision tree if investigation is carried out.



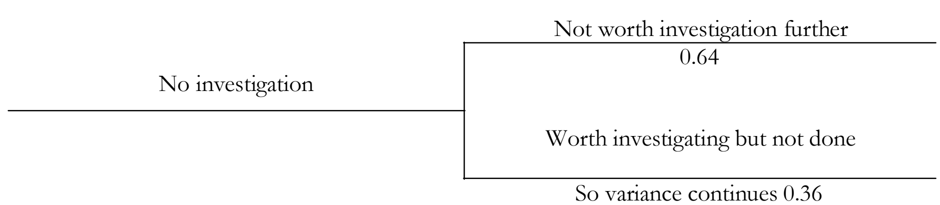
It is assumed that the Sh.5,500 correction costs applies to all variances that the initial investigation indicates are worth of further investigation.

The expected cost if the investigation is carried out is:

3,500 + 0.36 x 5,500 + 0.36 x 0.3 x 24,746* = Sh.8,153

* 24,746 represent the PV of Sh.5,250 for 5 months at 2% (5,250 x 4.7135) for variances that are not eliminated.

Decision tree if an investigation is not carried out:



The expected cost if no investigation is undertaken is:
0.36 x 5,250 x 4.7135 = Sh.8,908.5

(ii) Applying the expected value decision rule, the company should follow a policy of investigating variances as a matter of routine. The expected cost of investigation is Sh.8,153. On average the benefit of investigating is 8,908.5 – 8,153 = Sh.755.5 per variance.

(iii) Examples of category 1 variances include:

- Variance due to random uncontrollable factors and is under control
- Where the cause is obvious (e.g. a machine fault) and future action has been taken to remedy the situation.

Examples of category 2 variances include:

- Excessive usage of materials and labour due possibly to wrong working practices on a repetitive operation which is likely to continue if not corrected.
- Where the variance is significant and exceeds a specified percentage of standard usage.

(b) (i)Unit contribution = 1,300 – (800 + 50) = Sh.450
Unit loss when surplus is sold = 850 – 500 = Sh.350
Unit penalty for stock out = Sh.200

	Order quantity				
DEMAND	PROBABILITY	1100	1200	1300	1400
1100	0.3	495[a]	460	425	390
1200	0.4	475[b]	540	505	470
1300	0.2	455	520	585	550
1400	0.1	435	500	565	630
Expected contribution		473	508	503	478

On the basis of expected contribution over 1200 outfits:
Note: The order costs are constant and therefore ignored.
Workings:

(a) 450 x 1100 = 495,000
(b) 1100 x 450 – 100 x 200 = 475,000

The others are computed in a similar manner.

(ii) The EOQ model does not include stock outs and their penalties and was developed for manufacturing rather than for the special needs of retailers.

$$P = \frac{ML}{MP + ML}$$

ML= 350 + 200

MP = 450

$$P = \frac{550}{450 + 550} = \underline{0.55}$$

DEMAND	PROBS	P(Demand > x)
1100	0.3	1.0 > 0.55
1200	0.4	2.0 0.7 > 0.55
1300	0.2	3.0 0.3 < 0.55
1400	<u>0.1</u>	
	1.00	

The best level is to order 1200 outfits.

More precise 1

Interpolation: $1200 + 100 \times \frac{0.7 - 0.55}{0.7 - 0.3}$

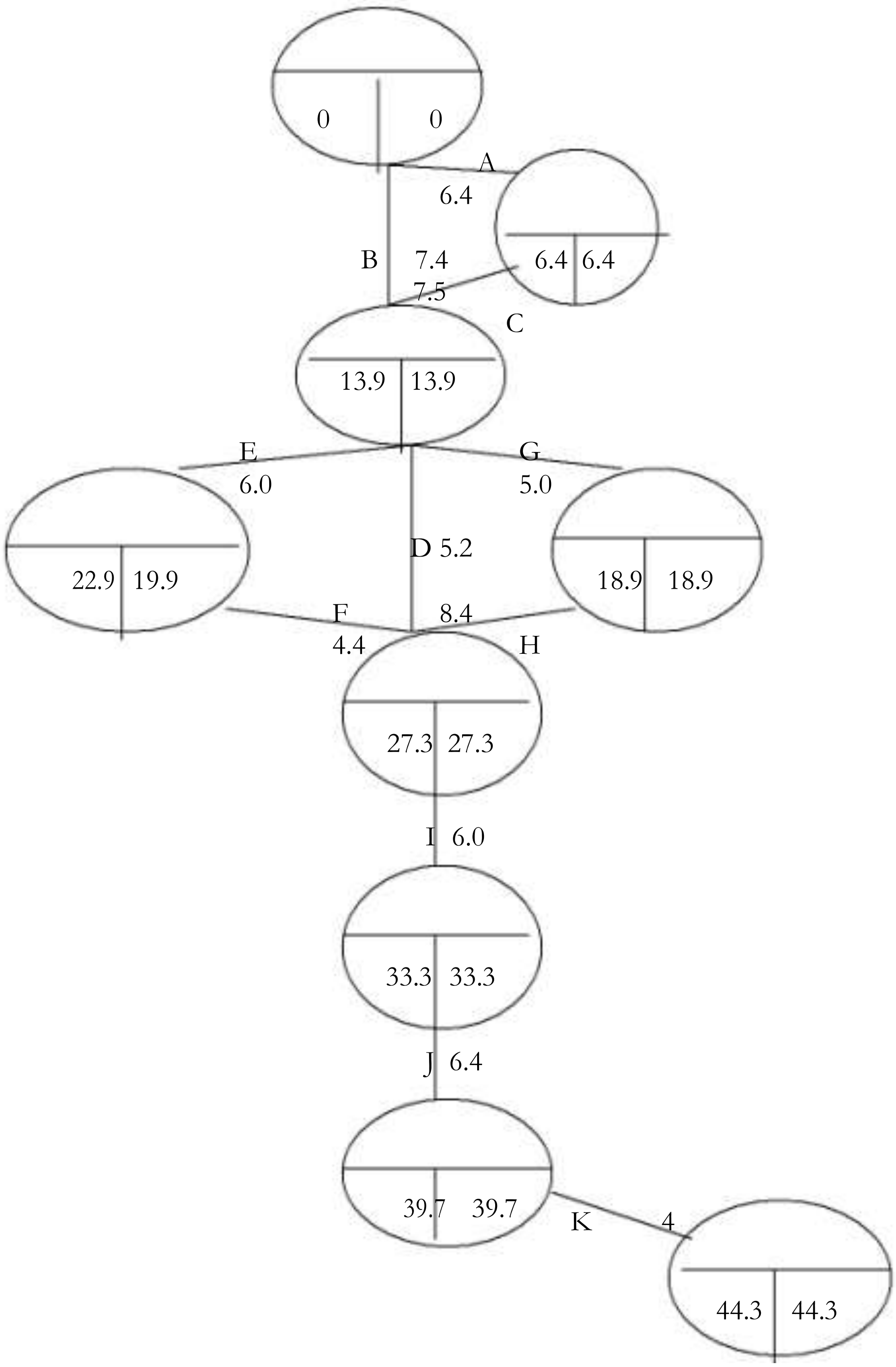
Make an order of 1238 outfits.

QUESTION THREE

(a)
- Formulate the problem and discuss with those concerned in order to determine the constraints.
- Formulate the model and decide which variables to include.
- Collect the information required and determine the functional relationship and the types of statistical distribution to apply.
- Construct the simulation flow chart.
- Prepare the computer program.
- Validate the model.
- Design the experimental runs.
- Analyze results.
- Formulate proposals.
- Modify the model.

(b)

Activity	Expect activity Completion time	
A	4 X 0.10 + 6 X 0.7 + 9X 0.2	= 6.4
B	5 X 0.4 + 7 X 0.2 + 10 X 0.4	= 7.4
C	3 X 0.1 + 8 X 0.9	= 7.5
D	4 X 0.5 + 6 X 0.4 + 8 X 0.1	= 5.2
E	5 X 0.8 + 10 X 0.2	= 6.0
F	3 X 0.5 + 5 X 0.3 + 7 + 0.2	= 4.4
G	3 X 0.4 + 6 X 0.2 + 9 X 0.2 + 4 X 0.2	= 5.0
H	5 X 0.2 + 8 X 0.3 + 10 X 0.5	= 8.4
I	4 X 0.5 + 8 X 0.5	= 6.0
J	5 X 0.6 + 7 X 0.2 + 10 X 0.2	= 6.4
K	4 X 0.7 + 6 X 0.3	= 4.6



0
0
A
6.4
B
7.4
7.5
6.4
6.4
C
13.9
13.9
E
6.0
G
5.0
D 5.2
22.9
19.9
18.9
18.9
F
4.4
8.4
H
27.3
27.3
I 6.0
33.3
33.3
J 6.4
39.7
39.7
K
4
44.3
44.3

(c)

ACTIVITY	DAYS	PROBABILITY	Cum-probabilities	RN - Range
A	4	0.10	0.10	01 – 10
	6	0.70	0.80	11 – 80
	9	0.20	1.00	81 – 00
B	5	0.40	0.40	01 – 40
	7	0.20	0.60	41 – 60
	10	0.40	1.00	61 – 00
C	3	0.10	0.10	01 – 10
	8	0.90	1.00	11 – 00
D	4	0.50	0.50	01 – 50
	6	0.40	0.90	51 – 90
	8	0.10	1.00	91 – 00
E	5	0.80	0.80	01 – 80
	10	0.20	1.00	91 – 00
F	3	0.50	0.50	01 – 50
	5	0.30	0.80	51 – 80
	7	0.20	1.00	81 – 00
G	3	0.40	0.40	01 – 40
	4	0.20	0.60	41 – 60
	6	0.20	0.80	61 – 80
	9	0.20	1.00	81 – 00
H	5	0.20	0.20	01 – 20
	7	0.30	0.50	21 – 50
	10	0.50	1.00	51 – 00
I	4	0.50	0.50	01 – 50
	8	0.50	1.00	51 – 00
J	5	0.60	0.60	01 – 60
	7	0.20	0.80	61 – 80
	10	0.20	1.00	81 – 00
K	4	0.70	0.70	01 – 70
	6	0.30	1.00	71 – 00

Activity	RN. NO.	DAYS	RN. NO.	DAYS	RN. NO.	DAYS	RN. NO.	DAYS	TOTAL DAYS	AVERAGE DAYS
A	95	9	30	6	59	6	93	9	30	7.5
B	28	5	72	10	09	5	54	7	27	6.75
C	66	8	95	8	36	8	98	8	32	8
D	56	6	23	4	60	6	79	6	22	5.5
E	14	5	50	5	61	5	81	10	25	6.25
F	84	7	14	3	24	3	75	5	18	4.5
G	85	9	49	4	05	3	09	3	19	4.75
H	53	10	45	7	60	10	98	10	37	9.25
I	90	8	86	8	74	8	55	8	32	8
J	69	7	09	5	10	5	96	10	27	6.75
K	40	4	27	4	15	4	83	6	18	4.5

CRITICAL ACTIVITIES

A – C – G – H – I – J – K

Total completion time = sum of completion period for critical Activities.

= 7.5 + 8 + 4.75 + 9.25 + 8 + 6.75 + 4.5
= 48.75 days.

(d) **Advantages of simulation technique**

1. Simulation is particularly well suited for problems that are difficult or impossible to solve analytically.
2. Allows an analyst or decision maker to experiment with system behaviour in a controlled environment instead of real life setting that can be very costly and has inherent risk.
3. Enables a decision maker to compress time in order to evaluate long term effects of alternative policies.
4. Serves a model for training decision makers.
5. Provides a means of solution to problems which are of a kind for which the application of analytical methods is unsuitable.
6. Degree of assumption is not so great in simulation exercises as it is with analytical methods.

Disadvantages of Simulation Technique

1. Simulation is not precise, it is not an optimization tool.
2. A good simulation model may be quite expensive in terms of design personnel and software.
3. Each simulation model is quite unique in its solutions and inferences are not usually transferable to other problems. This makes it even more expensive.
4. Data problems: Obtaining reliable/accurate data e.g. probability distribution of relevant factors is not easy.
5. Substantial amount of calculation is required.
6. Results estimates which are subject to statistical error.

QUESTION FOUR

(a) (i) **Cost behaviour**

- Suggests an inappropriate degree of variability. To calculate unit product costs, batch level activity costs are divided by the number of units in the batch and product sustaining costs are divided by the number of products produced.
- Managing unused capacity may be applicable in the case of human resources since human resources are more flexible and can be adjusted in small increments as opposed to physical resources which are required in huge amounts.
- Human and physical resources should be separated.
- Changes in physical usage may be viewed as fixed costs especially where such costs are unavoidable and the treatment will thus be similar to that of traditional costing systems.
- Cost of operating an ABC system is very high.

(ii) **Why ABC might be more suitable**

- ABC system likely to generate the most accurate costs.
- Most manufacturing companies suffer intense competition
- Most manufacturing companies have a wide range of products.

(iii) **ABC likes more information for decision making because**

- Detailed tracking of information is therefore not required
- Information provided is more accurate
- Cost of any unused capacity is highlighted for management attention.
- Focuses on the future profitability of products and customers.

(b) (i)**Cost drivers rates**

Factory overhead: $\frac{74,848,000}{49,900}$ = Sh.1,500/m. hr

Set up costs $\frac{8,710,000}{34}$ = Sh.256,176/set up

Cost of ordering $\frac{3,840,000}{36}$ = Sh.106,667/Mat. Ord

Mat. Handling $\frac{15,160,000}{54}$ = Sh.280,741/Mat hr.

Admin. Costs $\frac{17,200,000}{24}$ = Sh.716,667/Spare part

(ii) **OVERHEADS**

	W	X	Y	Z
	Sh.	**Sh.**	**Sh.**	**Sh.**
Factory overheads	750,000	7,500,000	3,600,000	63,000,000
Set up costs	512,352	3,074,112	1,024,704	4,098,816
Ordering costs	213,334	1,706,672	213,334	1,706,672
Material handling	1,122,964	5,614,820	1,684,446	6,737,784
Admin. Costs	2,866,668	7,166,670	1,433,334	5,733,336
	5,465,318	25,062,274	7,955,818	81,276,608
	÷1,000	÷ 10,000	÷ 1,100	÷ 14,000
	5,465	2,506	6,630	5,805

Unit Production Cost

	W	X	Y	Z
	Sh.	**Sh.**	**Sh.**	**Sh.**
Materials	10	10	32	34
Direct labour	6	6	24	18
Prime cost	16	16	56	52
Overheads	5,465	2,506	6,630	5,805
Production cost/unit	5,481	2,522	6,686	5,857

The difference comes in because ABC allocates more overheads to low volumes of production and less to high volumes of production.

QUESTION FIVE

(a) The answer should cover the following:

(i) Insufficient strategic thinking and long-term planning. The annual budgeting process based on short-term plans was frequently used for policy planning. Allocation of resources should be based on long-term planning process and not the annual budgeting process.
(ii) Traditional approaches failed to identify the cost of activities and the programmes to be implemented.
(iii) Traditional approaches tend to be based on increamental budgeting rather than considering alternative ways of achieving objectives.
(iv) Emphasis tended to be on separate planning for each department rather than focusing on activities or functions necessary to achieve organisational objectives.

(b) The aim of PPBS is to enable the management of a public authority to make more informed decisions about the allocation of resources to meet the overall objectives of the organisation.

First, overall objectives are established, secondary, secondary, the programmes that might achieve these objectives are identified and finally, the costs and benefits of each programme are determined so that budget allocation can be made on the basis of the cost-benefits of the different programmes.

For example, one objective of a local authority may be the care of the elderly. The following services may contribute to this objective:
(i) Provision of sheltered accommodation.
(ii) Erection of aged-persons dwellings.
(iii) Provision of domestic health services.
(iv) Provision of home nursing services.
(v) Provision of social and recreational facilities.

The provision of these activities may be undertaken by different departments such as housing, health and social services. However, PPBS relates the estimates of total costs to the care of the elderly programme, rather than relating costs to various departments.

A programme budgeted cuts across departmental barriers by providing estimates of the programme for the provision of the elderly rather than these estimates being included within the three budgets for each of the housing, health and social welfare departments.

PPBS forces management to identify the activities, functions or programmes o be provided thereby establishing a basis for evaluating their worthiness.

(c) Problems that have made PPBS difficult to introduce include:
(i) PPBS cuts across departmental activities and focuses on programmes rather than departments. Consequently, the system does not focus on traditional lines of authority and there is a tendency for heads of departments to be resistant to such changes.
(ii) Difficult in matching programme structure to the organisation"s structure to cost control.
(iii) Difficulty in defining objectives and stating objectives in quantitative terms. It is extremely difficult to measure the output of services and compare actual accomplishments with planned accomplishments.

December 2012

QUESTION ONE

(a) Account analysis method

	Variable Costs Sh. „000"	Fixed costs Sh. „000"
Indirect materials	37,500	-
Indirect labour	23,200	171,000
Building occupancy	-	236,420
Power	27,210	-
Equipment depreciation	-	181,000
Equipment maintenance	15,830	8,500
Personal property taxes	7,750	6,350
Data processing	1,750	9,470
Technical support	-	16,940
	113,240	629,680

$$\text{Variable cost per unit} = \frac{113{,}240{,}000}{800{,}000}$$

∴ b = 141.55

∴ Equation $\hat{Y} = 629{,}680{,}000 + 141.55X$

$\hat{Y} =$ <u>629,680 + 0.14155X (000)</u>

(6 Marks)

(b) **High-Low method**

Let Y = Overheads
X = Production in units

	X	Y
High	98,000	777,640
Low	56,900	714,220
	41,100	63,420

$$\text{Slope } b = \frac{Y}{\Delta X} \quad \frac{63{,}420}{41{,}100} = 1.543$$

Using the high point

777,640 = a + 98,000 (1.543)
a = 626,426

∴ $\hat{Y}$ 626,426 + 1.543X

∴ Total cost for 800,000 units

$\hat{Y}$ = 626,426 + 1.543 (800)
= 627,660.4 (000)
= Sh. <u>627,660,400</u>

(4 Marks)

ALTERNATIVE

Y
777,640
717,670
59,970

b $= \frac{\Delta Y}{\Delta X} = 1.459$

$\hat{Y} = 634645.839 + 1167.2$
= Sh. 635813.939

(c) Using linear regression (simple)

$\hat{Y}$ = 626,547 + 1.504 X 800
= 626,547 + 1,203.2
= Sh. 627,750.2 (000)
= Sh. 627,750,200

(4 Marks)

(d) **Multiple regression analysis**

$\hat{Y}$= 632,640 + 1.501X – 59.067 (index)
X = 800 Index = 113
Y = 632,640 + 1.501 (800) – 59.067 (index)
= 632,640,000 + 1.501 x 800,000 – 59.067 x 113
= 627,166,229

(4 Marks)

(e) Multiple regression analysis is the most appropriate because it considers price changes, making price index to be an independent variable.

Or simple regression has highest adjusted R^2. (2 Marks)

QUESTION TWO

(a) Standard cost of materials per kilogramme of output = (0.65 kilogrammes x 40) + (0.3 kilogrammes x 60) + 0.2 kilogrammes x 25) = Sh.49

Standard overhead rate = 120,000/Budgeted standard quantity of ingredient F (4000 x 0.65)

$= \frac{120,000}{2,600}$ = Sh. 46 per kilogramme of F

Standard overhead rate per kilogramme of Y = 0.65 x 46 = Sh. 30

	Sh.
Standard cost of actual output	
Material (4,200 x 49)	205,800
Overhead (4,200 x 30)	126,000
	331,800
Actual Cost of output	
Material	203,800
Overheads (78,000 + 48,000)	126,000
	329,800

Variance calculations

Materials price variance = (standard price – actual price) Actual Quantity
= SP X AQ – AC
= (40 X 2840) + (60 X 1210) + (25 X 860) – 203800
= 3900 F

Material yield variance = Actual yield – Standard yield x Standard material cost per unit of output = $(4200 - \frac{4910}{1.15}) \times 49$ = Sh. 3409A

Material mix variance = Actual quantity in actual mix at standard price – actual quantity in standard mix at standard prices

F (4910 x 0.65/1.15 – 2840)40	= Sh. 2591A
D (4910 x 0.30/1.15 – 1210)60	= Sh. 4252F
N (4910 x 0.20/1.15 – 860)25	= Sh. 152A
	1509F

Overhead efficiency variance = (standard quantity of F – Actual quantity) Standard overhead rate per kg of F

Overhead efficiency variance = (4200 x 0.65 – 2840) 46 = 5060A

Overhead capacity variance = (Budgeted input of F – Actual input) x Standard overhead rate per kg of F
= (4000 x 0.65 – 2840)46 = 11040F

Overhead expenditure variance = budgeted cost – actual costs
= 120,000 – 126,000 = 6000A

Reconciliation of standard costs and actual cost of output

		Sh.
Standard cost of actual production		331,800
Material variances		
Material price variance	3900F	
Material yield variance	3409A	
Material mix variance	1509F	2000F
Overhead variances		
Overhead efficiency	5060A	
Overhead capacity	11040F	
Overhead expenditure	6000A	20A
Actual costs		333,780

(12 Marks)

(b) Standard number of deliveries (4000 x 1.15)/460 = 10
Standard cost per supplier delivery (40,000/10) = Sh.4,000
Standard number of dispatches to customers (4,000/100) = 40
Standard cost per customer dispatch (80,000/40) = Sh.
2,000 Actual output exceeds budgeted output by $\frac{200}{4,000}$ = 5%

Activity-based costing reconciliation statement

Standard cost for actual output	**Sh.**	**Sh.**
Deliveries (1.05 x 10 x 4,000)	42,000	126,000
Despatches (1.05 x 40 x 2,000)	84,000	
Activity usage variance		
Deliveries (10.5 – 12)4,000	6000A	
Despatches (42 – 38) 2,000	8000F	2,000F
Activity expenditure variance		
Deliveries (12 x 4000 – 48,000)	0	
Despatches (38 x 2000 – 78,000)	2000A	2,000A
Actual overheads		126,000

(8 Marks)
(Total: 20 Marks)

Alternative

(a) **material and overhead variances**

Material price variance
(AQ X AP) – (AQ X SP)

203,800 – (2840 x 40 x 1210 x 60 +860 x 25)

203,800 – 207,700
= 3900 F

Material Yield Variance
Std. cost per unit (Actual Yield – std yield)
Std cost of output = (0.65 x 40 + 0.30 x 60 +0.2 x 25 = Sh.49

Std yield: 2840 + 1210 + 860 4910

Input	Output
1.15kg	1 kg
4910	?

$\therefore$ Output $= \frac{4910}{1.15}$
$= 4269.5$
$= 4270.$

$\therefore$ Material yield 49(4200 -4270)
= 3430A

Material Mix Variance
SP (Actual Mix – Std. mix)

F 40$(2840 - \frac{0.65}{1.15} \times 4910)$ = 2,600A

D 60$(1210 - \frac{0.3}{1.15} \times 4910)$ = 4,260F

N 25(860 – 0.2 x 4910 = 150A
1.15

Total Material Mix variance = 1510F

Overhead variances

Overhead expenditure variance.

Actual expenditure – Budgeted expenditure (78000 + 48000) – 120000
126000 – 120000
= 6000A

Overhead capacity variance
FOAR (Actual input – budgeted input)

FOAR = 120,000 = 46.154
4000/0.65
= 46.154 (2840 – 4000 x 0.65)
46.154 (2840 – 2600)
11077 A

Overhead efficiency variance

FOAR (Actual quantity – Std. quantity)
46.154(2840 – 4200 x 0.65)
46.154(2840 – 2730)
46.154 (110)
= 5077A

b) **Variance analysis based on Activity Based costing (ABC)**

Std no. of deliveries (4000 x 1.15) ÷ 460 = 10

Std cost per supplies delivery 40000 = Sh.4000
10

Std no. of dispatches 4000 = 40
400

Std cost per customer dispatch 80,000 = Sh. 2000 40

Actual output exceeds budgeted output by
4,200 = 1.05 i.e. 5% 4000

Activity usage variances
Deliveries (1.05 x 10 – 12) x 4000 = 6000A
Dispatches (1.05 x 40 – 38) x 2000 =
8000F2000F

Activity expenditure variances

Deliveries (12 x 4000 – 48,000) = Nil

Dispatches (38 x 2000 – 78000) = 2000A
2000A

Reconciliation
Actual overheads 48,000 + 78,000 = 126,000

Deliveries 1.05 x 10 x 4000 = 42,000
Dispatches
1.05 x 40 x 2000 = 84,000
126,000

QUESTION THREE

(a)

	Narok as a special Order Sh. „000"	**Convert to standard model Sh. „000"**	**Sell the way it is Sh. „000"**
Sales price	68,400.00	62,500	52,000.00
Less cash discount 2%	-	1,250	-
	68,400.00	61,250	52,000.00
Additional manufacturing costs			
Direct materials	6,200.00	2,850.00	-
Direct labour	4,200.00	330.00	-
Variable overheads 50% of direct labour	2,100.00	1,650.00	-
	12,500.00	7,800.00	-
Commission 3% of selling price	2,052.00	1,225.50	1,560.00
Total costs	14,552.00	9,025.00	1,560.00
Net contribution	53,848.00	52,225.00	50,440.00

(12 Marks)

(b)

	Sh. „000"
Narok option"s contribution	53,848
Next best alternative	(52,225)
Difference	1,623

∴ The counter offer price that Farmers Limited is willing to accept from Narok Corporation will be:-

68,400 – 1,623 = Sh. 66,777,00

(3 Marks)

(c) (i) Farmers Limited should accept special orders whenever the firm is operating substantially below capacity, including below the break even point, whenever marginal revenue from the orders exceeds marginal cost. Normally, this would mean that the order should be acceptable as long as the sales price of the order exceeds the variable production costs. The special order will result in a positive contribution towards covering the company"s fixed costs. The fixed factory overhead is not considered in the pricing because it will be incurred whether the order is accepted or not. (3 Marks)

(ii) If Farmers Limited is operating above its break even volume and if special order will allow the company to utilize unused capacity efficiently, the special order should be accepted as long as marginal revenue exceeds marginal cost or, in most cases, the sales price exceeds variable production costs.

If the sales price exceeds the variable production costs the order will yields a positive contribution towards company"s fixed costs. In this case fixed costs are irrelevant. (2 Marks)

(Total: 20 Marks)

QUESTION FOUR

(a) (i) **Degeneracy**

This is a term in transportation and assignment which refers to a situation where the number of occupied cells is less than n + m – 1 where n is the number of rows and m is the number of columns. (2 Marks)

(ii) **Pure Strategy**

In a game matrix represent the row and column whose intersection is the saddle point. In a pure strategy player X will play one row all of the time and player Y will also play one of his column all the time. (2 Marks)

(iii) **Mixed Strategy**

Consist of a probability mixture of more than one strategy. The objective in a mixed strategy involves preparing the opponent from knowing which strategy is used on a given play. This is accomplished by selecting the strategy to be used for each play at random, according to probabilities that can be computed from the game matrix. (2 Marks)

(iv) **Dominance rule**

This rule states that there are strategies that a given player would never play, irrespective of what the other player does. The strategies which are always avoided are said to be dominated by the other strategies and can be left out from the analysis. (2 Marks)

(b) The problem is transportation model and the problem is a minimisation. Cost Computations:-

Destinations

Plant		E		F		G	
		W_1	W_2	W_1	W_2	W_1	W_2
	A	8m	170	160	150	190	210
	B	140	170	160	150	190	210
	C	190	130	210	110	240	170

(6 Marks)

Computation of the above table

E.g. A to W_1 under E = 30 + 20 + 60 + 30 = 140

A to W_2 under E = 30 + 30 + 60 + 50 = 170
A to W_1 under F = 30 + 20 + 60 + 50 = 160
A to W_2 under F = 30 +30 + 60 + 30 = 150
A to W_1 under G = 30 + 20 + 60 + 80 = 190
A to W_2 under G = 30 + 30 + 60 + 90 = 210

From the above pick the lowest cost through each combination.

The problem is not balance, it has a difference of 1400.

Initial table using LCCM.

		K_1 = 140 E	K_2 = 120 F	K_3 = 190 G	K_4 = 0 Dummy	Capacity
R_1 = 0	A	140 0	150 +30	190 900	0 100	1000
R_2 = 0	B	140 700	150 +30	190 0	0 1300	2000
R_3 – 10	C	130	110	170 -10	0	

	200	800			1000
Supply	900	800	900	1400	4000

Degeneracy check

No. of filled cell = 6
R + C – 1 = 6
Hence the problem is not degenerate

Optimality check

The solution is not optimal since there are negative improvement index.

Table 2

	$K_1 = 140$ E	$K_2 = 130$ F	$K_3 = 190$ G	$K_4 = 0$ Dummy	Capacity
$R_1 = 0$ A	140 0	150 	190 700	0 300	1000
$R_2 – 0$ B	140 900	150 +20	190 0	0 1100	2000
$R_3 – 20$ C	130 +10	110 800	170 200	0 +20	1000
Supply	900	800	900	1400	4000

Degeneracy check:

No. of filled cells = 6
R + C – 1 = 6
Hence the problem is not degenerate.

Optimality check:

The problem is optimal since there is no negative improvement index, however the problem is not unique since it has zero improvement index, that means it has more than one solution.

Allocation optimal solution 1

Source	Destination	Units x cost		Total
A	G	700 x 190		133000
A	Dummy	300 x 0	=	0
B	E	900 x 140	=	126000
B	Dummy	1100 x 0	=	0
C	F	800 x 110	=	88000
C	G	200 x 170	=	34000
	Minimum total cost			381000

(6 Marks)

Optimal solution 2

Source	Destination	Unit x cost	Total
A	E	300 X 140	42000
A	G	700 X 190	133000
B	E	600 X 140	84000
C	F	800 X 110	88000
C	G	200 X 170	34000
	Total minimum cost		**381000**

(6 Marks)

QUESTION FIVE

(a) The balanced scorecard is an integrated set of performance measures derived from the company"s strategies that gives the top management a fast but comprehensive view of theorganizational unit (i.e. a division on a Strategic Business Unit (SBU)). The balanced scorecard philosophy assumes that an organization"s vision and strategy is best achieved when the organization is viewed from the following four perspectives.

i) **Customer Perspective** (How do customers see us?) This gives rise to targets thatmatter to customers perspective.

ii) **Internal business process** (what must we excel in?) This aims to improve internalprocesses and decision making e.g. quality control.

iii) **Learning and growth perspective** (can we continue to improve and create value?) This considers an organization"s capacity to maintain its competitive position through acquisition of new skills.

iv) **Financial perspective**. (How do we look to shareholders?) This covers traditional measures such as profitability, return on investment e.t.c.

By implementing the balanced scorecard, the major objectives for each of the four perspectives should be articulated. These objectives should be translated into specific performance measures and targets for achievement. This method integrates traditional financial measures with operational, customer and staff issues vital in long-run competitiveness. (10 Marks)

(b) Benchmarking involves comparing key activities of a company with world class best practices. It attempts to identify an activity, such as customer order processing, that needs to be improved and finding a non-rival organization that is considered to represent world class best practice for the activity, and study how it performs the activity.

The objective is to find out how the activity can be improved and ensure that the improvements are implemented. Benchmarking is cost effective since an organization can save time and money avoiding mistakes that other companies have made.

They can also avoid duplicating the efforts of other companies. The overall aim should be to find and implement best practice.

- Benchmarking in production, stockholding
- Benchmarking prices, quality, wastage.
- Benchmarking productivity & efficiency.
- Benchmarking services.
- Benchmarking New Production Development. (10 Marks)

(Total: 20 marks)

CPA PART III

MANAGEMENT ACCOUNTING

SUGGESTED SOLUTIONS

JUNE 2013

QUESTION ONE

(a) Evaluation of the linear regression equations

	Criterion	**Regression 1**	**Regression 2**	**Regression 3**
(i)	Economic Plausibility	Positive coefficient thus economically plausible.	Negative coefficient **not economically plausible** in long run, but may be in short run for discretionary costs.	Positive coefficient economically plausible
(ii)	Goodness of fit	$r^2 = 0.61$ Fair goodness of fit	$r^2 = 0.68$ Fair goodness of fit	$r^2 = 0.29$ Poor goodness of fit
(iii)	Significance of independent variables Note $T_C = 2.228$	$t_b = 3.86$ Slope coefficient significant at $\alpha = 0.05$	$T_b = 4.43$ **Slope coefficient significant** at $\alpha = 0.05$	$T_b = 2.09$ Slope coefficient not significant at $\alpha = 0.05$
(iv)	Specification Analysis (a) Linearity (Note: A plot required)	Appears reasonable from the plot	Appears reasonable from the plot.	Appears somewhat questionable from plot.
	(b) Independence of residuals	D = S1 Assumption of independence not rejected.	D = 1.73 Assumption of independence not rejected.	D = 2.34 Assumption of independence not rejected

(12 marks)

(b) Variables that could be important cost drivers of the company"s operating costs include:
1) Fuel consumed in litres
2) Number of employees
3) Product mix characteristics
4) Route mix characteristics e.g. number of short Vs. long trips.
5) Age and maintenance record of vehicles. (3 marks)

(c) An alternative data base for use in quantitative analysis would be annual maintenance costs and annual kilometers traveled. This data base would be less prone to within the year deferral of maintenance costs to months with low kilometers traveled. However, management may also defer maintenance expenditure across years due to pressure from short run profit performance for example. (2 marks)

(d) Limitations of regression analysis method

(i) A sufficient number of observations is required to derive an acceptable cost function. This may not be the case in the analysis.
(ii) The assumption that the function is linear may be misleading.
(iii) The cost function is valid only within the relevant range.
(iv) The function may not hold where historical performance is different from expected future performance.
(v) The observed data may be affected by inflation or accounting policy and thus affecting the final function.
(vi) The cost and the activity level sometimes do not relate to the same period especially where wages paid to one period may be calculated by reference to the output of a previous period. (3 marks)

(Total: 20 marks)

QUESTION TWO

(a) EOQ $= \sqrt{\frac{2DC_O}{C_h}} = \sqrt{\frac{2\ X10{,}000X\ 2{,}500}{4{,}500\ +10\%(5000)}} =$ 100 units

(2 marks)

(b) To ascertain whether it is worth increasing the purchase quantity to 200 units, we must compare the total costs at each of these quantities.

Total costs with a reorder quality of 100 units			**Shs.**
Annual holding costs	=	½ QC_h = ½ (100) x 5000 =	250,000
Annual ordering costs	=	$\frac{D}{Q}C_o = \frac{10000}{100}x2500=$	250,000
			500,000
Purchase manager bonus	=	10% x (1,000,000 – 500,000)	50,000
Annual purchase costs	=	10,000 x 5,000	50,000,000
Total annual costs			50,550,000

Total costs with a reorder quality of 200 units			**Shs.**
Annual holding costs	=	$\frac{200}{2}x4{,}999$	499,900
Annual ordering costs	=	$\frac{10{,}000}{200}x2{,}500$	125,000
			624,900
Purchase manager bonus	=	10% x (1,000,000 – 624,900)	37,500
Annual purchase costs	=	10,000 x 4,990	49,900,000
Total annual costs			50,562,400

The optimal order quantity is still 100 units (4 marks)

(c) The probability distribution of demand during the lead time is

Demand	Frequency	Probability	Expected Value
106	4	0.04	4.24
104	10	0.10	10.40
102	16	0.18	16.32
100	40	0.40	40.00
98	14	0.14	13.72
96	14	0.14	13.44
94	2	0.02	1.88
	100		100.00

NB:
It is expected that re-order level will be set at 100 units (expected value).

The expected costs of various levels of safety stock are as follows:

Safety Stock (units)	Reorder Point (unit)	Stock out per order (units)	Stock out per year (units)	Probability of stock-out	Expected Stock-out Costs	Holding costs Shs.	Total Cost
6	106	0	0	0	0	27000	27000
4	104	2	200	0.04	8000	18000	26000
2	102	2	200	1.10	20000	9000	45000
		4	400	0.04	16000	0	96000
0	100	2	200	0.16	32000		
		4	400	1.10	40000		
		6	600	0.04	24000		

Note:
During the year 100 orders will be made (10000/100)
Stock-out per year in units is calculated by multiplying the stock-out per order by 100 orders.
Expected stock-out costs = annual stock-out in units x Prob. of stock-out x 1000 Lost contribution.

Holding costs = Safety stock x (Holding Cost of Shs. 5000 – Saving of 10% on purchasing managers bonus)

Conclusion
Costs are minimized if a safety stock of 4 units is maintained. (6 marks)

(d) The following items should be included in the report:
- (i) The disadvantage of ordering from only one supplier (e.g. Vulnerability of disruptions of supplies due to strike/production difficulties or bankruptcy).
- (ii) Failure to seek out cheap or alternative sources of supply.
- (iii) It is assumed that no major price increases are anticipated that will justify holding additional stocks or that the stocks are not subject to deterioration or obsolescence.
- (iv) It is assumed that the lead time will remain unchanged. However, investigations should be made as to whether this, or other suppliers, can guarantee a shorter lead time.
- (v) The need to ascertain the impact on customers goodwill if a stock-out occurs. The answer to (c) assumes that the company will merely lose the contribution on the sales and long term sales will not be affected if a stock-out occurs. (8 marks)

(Total: 20 marks)

QUESTION THREE

(a) Assumptions

(i) All costs can be resolved into fixed and variable elements.
(ii) Over the activity range being considered costs and revenues behave in a linear fashion.
(iii) The only factor affecting costs and revenues is volume.
(iv) The technology, production methods and efficiency remain unchanged.
(v) There is assumed to be no uncertainty.
(vi) There are no stock level changes or that stocks are valued at marginal cost only.

(5 marks)

(b) The expected value calculation are:

Variable Costs	**Shs.**	Fixed Costs	**Shs.**
(1000 + 10% x 1000) x 10/20	550	8200000 x 0.3	2460000
(1000 + 0) x 6/20 =	300	8500000 x 0.5	4250000
(1000 – 5% x 1000) x 4/20	190	900000 x 0.2	180000
	1,040		8510000

Shs. 1,700 selling price	**Units**	Fixed costs	**Shs.**
21000 x 0.2	4,200	19000 x 0.2 =	38,000
19000 x 0.5	9,500	17500 x 0.5 =	8,750
16500 x 0.3	4,950	15500 x 0.3 =	4,650
	18,650		17,200

Expected contribution
At price of Shs. 1700 = (1700 – 1040) 18650 = Shs. 12,309,000
At price of Shs. 1800 = (1800 – 1040) 17200 = Shs. 13,072,000

The existing selling price is Shs. 1600 and if demand continues at 20,000 units per annum, then total contribution will be (1600 – 1040) 20,000 = Shs. 11,200,000.

Using the expected value approach, a selling price of Shs. 1800 should be set. (6 marks)

(ii) Expected profit =13,072,000 – 8,510,000 = 4,562,000

Breakeven point = $\frac{8510000}{1800 - 1040} = 11{,}197$ units

Margin of safety = Expected – BEP = $\frac{17200 - 11197}{17200}$ = 6003 units

$= \frac{Sales - Sales}{Expected sales}$

= 34.9% (4 marks)

(iii) An expected value approach has been used. The answer should draw attention to the limitations of this approach such as

- Risk is ignored.
- Range of possible outcomes is not considered.

The answer should have been based on a comparison of probability distribution. (2 marks)

(iv) Computer assistance would enable a more complex analysis to be undertaken. In particular, different scenarios could be considered, based on different combinations of assumptions regarding variable costs, fixed costs, selling prices and demand using computers would also enable Morte Carlo simulation to be used for more complex decisions.

(3 marks)

(Total: 20 marks)

QUESTION FOUR

(a) **(i)Decision making under conditions of certainty.**

In this environment only one state of nature exists i.e. there is complete certainty about the future.

(ii) Decision making under conditions of uncertainty.

More than one state of nature exists but the decision maker lacks sufficient knowledge to allow him assign probabilities to various states of nature.

(iii) Decision making under conditions of risk

More than one state of nature exists but the decision maker has sufficient information to allow him assign probabilities to various states.

(6 marks)

(b) Best strategies:

(i)

	U_1	U_2	U_3	U_4	Row Minimum
C_1	2.5	2.7	3.5	-0.2	-0.2
C_2	2.0	1.1	0.8	0.8	0.8
C_3	1.4	1.2	1.5	1.3	1.2
C_4	3.0	1.0	1.9	0	0
Column maximum	3.0	2.7	3.5	1.3	

There is no saddle point (6 marks)

Using dominance rule column U_1 and U_3 are dominated. Hence the game can be reduced to

	U_2	U_4
C_1	2.7	- 0.2
C_2	1.1	0.8
C_3	1.2	1.3
C_4	1.0	0

(2 marks)

Row four and two are dominated. The final matrix will

$$\begin{array}{c c} & \begin{array}{cc} U_2 & U_4 \end{array} \\ \begin{array}{c} C_1 \\ C_3 \end{array} & \begin{pmatrix} 2.7 & -0.2 \\ 1.2 & 1.3 \end{pmatrix} \end{array}$$

Solving this we get

$2.7C_1 + 1.2C_3 = -0.2C_1 + 1.3C_3$
But $C_3 = 1 – C_1$
$2.7C_1 + 1.2\ (1-C_1)$
$= -0.2C_1 + 1.3\ (1-C_1)$
$\Rightarrow\ C_1 = 1/80$ so $C_3 = 29/30$
The union strategies are done likewise

$$\begin{array}{ccc} & U1 & U3 \\ 1/30 & 2.7 & 0.2 \\ 29/30 & 1.2 & 1.3 \\ & \tfrac{1}{2} & \tfrac{1}{2} \end{array}$$

Hence the company should play strategies

C_1: C_2: C_3: C_4 in the ratio 1/30:0:29/30:0

While the union should play strategies

U_1: U_2: U_3: U_4 in ratios 0: ½: 0: ½

(c) Limitations
- (i) Managerial decision making environment is rarely ever a zero-sum.
- (ii) Rarely do both parties in real-life game situation have equal information.
- (iii) It is extremely difficult to convert monetary pay-off for the matrix game.
- (iv) The environment in which managerial decisions are made is rarely a two person game.

(6 marks)
(Total: 20 marks)

QUESTION FIVE

(a) A transfer pricing system can be used to meet the following purposes:
- (i) To provide information that motivates divisional managers to make good economic decisions. This will happen when actions that divisional managers take to improve the reported profit of their divisions also improves the profits of the company as a whole.
- (ii) To provide information that is useful for evaluating the managerial and economic performance of the divisions.
- (iii) To intentionally move profits between divisions or locations.
- (iv) To ensure that divisional autonomy is not undermined. (4 marks)

(b) Transfer pricing of products at cost or sales value

- With cost – based transfer price systems, transfers are made either at actual cost or standard cost. When actual costs are used, there is no incentive for the supplying centre to control costs because any inefficiencies arising in the supplying centre will be passed on to the receiving centre. Consequently, the receiving centre will be held accountable for the inefficiencies of the supplying division. Transfers at actual costs are therefore inappropriate for responsibility accounting.
- When cost based transfer pricing systems are used, transfer should be at standard cost and not actual cost. This will result in the supplying centre being held accountable for variances arising from the difference between standard and actual cost of transfers. The managers of the supplying centre are therefore motivated to minimize costs.
- When transfers are made at standard cost any inefficiencies of the supplying centre are not passed on to the receiving centre. The receiving centre should be held accountable

for usage of resources at the standard price, thus ensuring that the manager of the receiving centre is held accountable only for excessive usage of resources.

- Where cost-based transfer prices are used, there is still a danger that inappropriate transfer prices are set that will not provide an appropriate basis for allocating profits between divisions. Where there is a competitive market for intermediate products the current market price is the most suitable basis for setting the transfer price. When transfers are recorded at market prices, profit centre performance is likely to represent the real economic contribution of the profit centre to total company profits.
- If the supplying centre did not exist, then intermediate products would have to be purchased from the outside market at the current market prices. Alternatively, if the receiving centre did not exist, the intermediate product would have to be sold on the outside market at the current market price. Responsibility centre profits are therefore likely to be similar to the profits that would be calculated if the centres were separate independent businesses. Therefore, transfer based on selling prices will represent a more appropriate basis for meeting the requirements of a responsibility accounting system. (8 marks)

(c) Transfer prices

- When the supplying division does not have sufficient capacity to meet all the demands placed upon it, linear programming can be used to determine the optimum production level. The transfer price that will induce the supplying division to produce the optimum output level can be derived from the linear programming model. The transfer price is determined by adding the shadow prices of the scarce resources (as indicated by output from the linear programming model) to the variable costs of the resources consumed by the intermediate product. This transfer price will result in the supplying division being credited with all of the contribution arising from the transfers and the receiving division earning a zero contribution. The allocation of zero contribution to the receiving division will have a negative motivational influence, and result in a loss of divisional autonomy and a reported performance that does not reflect the economic performance of the division. (8 marks)

(Total: 20 marks)

KENYA ACCOUNTANTS AND SECRETARIES NATIONAL EXAMINATIONS BOARD

CPA PART III

MANAGEMENT ACCOUNTING

December 2013 **3 hours**

QUESTION ONE

(a) (i) Let P = Selling price per bottle
C_1 = Cost of ingredient 1
C_2 = Cost of ingredient 2

Amount Produced daily = $\sqrt{250 \text{x} 360}$
= 300 units

$\therefore$ Profit = 300P – (250X_1 + 360X_2)
Expected selling price
4000 x 0.15 + 4,500 x 0.35 + 5,000 x 0.20 + 5,500 x 0.3
= Shs. 4,825

Expected cost of ingredient 1
1000 x 0.1 + 1,500 x 0.05 + 2,000 x 0.35 +2,500 x 0.5
= Shs. 2,125

Expected cost of ingredient 2
1500 x 0.20 + 2,000 x 0.25 + 2,500 x 0.15 + 3,000 x 0.4
= Shs. 2,375

$\therefore$ Expected daily profit = (300 x 4825) – [(2,125 x 250) + (360 x 2,375)]
= 1,447,500 – 1,386,250
= Shs. 61,250

(ii) Selling

Price Shs.	Probs.	Cum Probs.	RN-Ranges
4,000	0.15	0.15	01 – 15
4,500	0.35	0.50	16 – 50
5,000	0.20	0.70	51 – 70
5,500	0.30	1.00	71 - 00

Cost, ingredient 1

Sh.	Probs.	Cum Probs.	RN-Ranges
1,000	0.10	0.10	01 – 10
1,500	0.05	0.15	11 – 15
2,000	0.35	0.50	16 – 50
2,500	0.50	1.00	51 - 00

Cost, ingredient 2

Shs.	Probs.	Cum Probs.	RN-Ranges
1,500	0.20	0.20	01 – 20
2,000	0.25	0.45	21 – 45
2,500	0.15	0.60	46 – 60
3,000	0.40	1.00	61 - 00

Day	RN	Selling Price	Units	Total Revenue	RN	Cost X_1	Units	Total Cost X_1	RN	Cost X_2	Units	Total Cost $X_1 + X_2$	Total Cost $X_1 + X_2$	Daily Profit
		Shs.		Shs. „000"				Shs. „000"		Shs.		Shs. „000"	Shs. „000"	Shs. „000"
1	58	5,000	300	1,500	71	2,500	250	625	96	3,000	360	1,080	1,705	(205)
2	30	4,500	300	1,350	24	2,000	250	500	18	1,500	360	540	1,040	310
3	46	4,500	300	1,350	23	2,000	250	500	34	2,000	360	720	1,220	130
4	27	4,500	300	1,350	85	2,500	250	625	13	1,500	360	540	1,165	185
5	99	5,500	300	1,650	24	2,000	250	500	44	2,000	360	720	1,220	430
6	49	4,500	300	1,350	18	2,000	250	500	09	1,500	360	540	1,040	310
7	79	5,500	300	1,650	49	2,000	250	500	74	3,000	360	1,080	1,580	70
8	16	4,500	300	1,350	32	2,000	250	500	23	2,000	360	720	1,220	130
9	02	4,000	300	1,200	56	2,500	250	625	88	3,000	360	1,080	1,705	(505)
10	87	5,500	300	1,650	59	2,500	250	625	41	2,000	360	720	1,345	305
														1,160

Average Daily Profit $= \dfrac{1{,}160{,}000}{10}$

$=$ Shs. 116,000

(b) EBQ $= \sqrt{\dfrac{2D_{Co.}}{C_h} x \dfrac{P}{P - D}}$

$$\sqrt{\frac{2x12{,}000x2{,}000}{7.5} \text{x} \frac{48000}{48000 - 12000}}$$

= 2921.19 or 2921 units
Where P is production rate
D is usage rate
C_h = 2.50 + (20% x 25) = Shs. 7.5

(ii) Optimal EBQ = $\sqrt{\dfrac{2x12000x1000}{7.5}\left(\dfrac{48000}{48000-12000}\right)}$

$= \quad 2065.59 = \quad 2066$ units

TRC incurred $= \dfrac{12000(1000)}{2921} + \dfrac{1}{2}\dfrac{(2921)(48000-12000)}{48000} x7.5$

$=$ Sh. 12323.49

TRC Optimal $= \dfrac{12000(1000)}{2066} + \dfrac{1}{2}\dfrac{(2066)(48000-12000)}{48000} x7.5$

$= \quad 11618.95$

Cost of production error = 12323.49 – 11618.95
= Shs. 704.54

QUESTION TWO

- The variable cost per unit of output for sales outside the company are Shs. 110 for the intermediate product and Shs. 490 (i.e. 100 A + 390 B) for the final product. It is assumed that the company has sufficient capacity to meet demand at the various selling prices.

Optimal output of intermediate product for sale on external market.

Selling price (Sh)	200	300	400
Unit contribution (Sh)	90	190	290
Demand in units	15,000	10,000	5,000
Total contribution (Sh)	1,350,000	1,900,000	1,450,000

Optimal output is 10,000 units at a selling price of Sh. 300.

Optimal output for final product

Selling price (Sh)	800	900	400
Unit contribution (Sh)	310	410	510
Demand in units	7,200	5,000	2,800
Total contribution (Sh)	2,232,000	2,050,000	1,428,000

Optimal output is 7,200 units at a selling price of Shs. 800.

Optimal output of Division B based on a transfer price of Sh. 290.

Division B will regard the transfer price as a variable cost. Therefore total variable cost per unit will be Sh. 680 (Sh. 290 + 390) and Division B will calculate the following contributions:

Selling price (Shs.)	800	900	1,000
Unit contribution (Shs.)	120	220	320
Demand in units	7,200	5,000	2,800
Total contribution (Shs.)	864,000	1,100,000	896,000

The manager of Division B will choose an output level of 5,000 units at a selling price of Sh. 900.

This is sub-optimal for the company as a whole. Profits for the company as a whole for the sale of the final product are reduced from Shs. 2,232,000 (7,200 units) to Shs. 2,050,000 (5,000 units). The Shs. 2,050,000 profit will be allocated as follows;

Division A = Shs. 950,000 (5,000(290-100)
Division B = Shs. 1,100,000.

(b) At a transfer price of Shs. 120, the variable cost per unit produced in Division B will be Sh. 510 (Shs. 120 + 390).

Division B will calculate the following contributions.

Selling price (Sh)	800	900	1,000
Unit contribution (Sh)	290	390	490
Demand (units)	7,200	5,000	2,800
Total contribution (Sh)	2,088,000	1,950,000	1,372,00

The manager of Division B will choose an optimal level of 7,200 units and a selling price of Sh. 800. This is the optimal output level for the company as a whole. Division A would obtain a contribution of Sh. 144,000 (7,200 x (120 – 100)) from internal transfers of the intermediate product, whereas division B will obtain a contribution of 2,088,000 from converting the intermediate product and selling a final product.

The total contribution for the company as a whole would be Sh. 2,232,000. Note that Division A would also earn a contribution of Shs. 1,900,000 from the sale of intermediate product to external market.

QUESTION THREE

(a) **Pricing decisions**
The learning curve theory is used in cost prediction to enable quotations to be prepared for potential orders.

Work scheduling
Learning curve enables firms predict the required inputs more effectively and this enables production of more accurate delivery schedules.

Standard setting
In order to set proper standards that will not be easily achieved in future the learning curve is taken into consideration.

(b) (i) Skilled labour: 952 hours: $Y = 052X^{0.678}$ (Total)
Semi skilled 650 hours: $Y = 650X^{0.848}$ (Total)
Labour hours for 6th and 7th boat:
Skilled: $952\ (7)^{0.678} - 952(5)^{0.678} = 726.4$ hours
Semi skilled $650(7)^{0.848} - 650\ (5)^{0.848} = 840.3$ hours
Standard labour cost of boats assembled in June i.e. (six and seventh)

Skilled:	726.4 x 1250	=	908,000
Semi skilled:	840.3 x 950	=	798,285
			1,706,285

(b) (ii) Reconciliation

Standard Labour Cost	1,706,285
Labour rate variance	

Skilled: 800,400 – 680 x 1,250	49,600F	
Semi skilled: 1,281,200 – 1,256 x 950	88,000A	384,000A
Labour efficiency		
Skilled: 1,250 (680 – 726.4)	58,000F	
Semi skilled: 950(1,256 – 840.3)	394,915A	336,915A
Actual labour cost (800,400 - 1,281,200)		2,082,600

(iii) Labour Mix variance = SR (Actual Mix – Std mix)

Skilled: $1250 \left[680 - \frac{726.4}{726.4 + 840.3} x(680 + 1256) \right] =$ 272,032 F

Semi Skilled: $950 \left[1256 - \frac{840.3}{726.4 + 840.3} x(680 + 1256) \right] =$ 206,745 A

Total labour mix variance = 65,287 F

Labour output variance = Std. labour cost (Actual output – std. output)

Std. cost per labour cost = $\frac{1,706,285}{2}$ = 853142.5

Std. output = $(1936 \div \frac{(6 = 726.4 + 840.3)}{2}$ = 2.4714

∴ Labour output variance = 853,142.5 (2-2.4714)
= 402,171 A

Labour efficiency variance = Labour Mix + Labour output
= 65,287 F + 402,171 A
= 336,884 A

QUESTION FOUR

(a) T =

$$\begin{array}{c} \\ ICU \\ HDU \\ GW \end{array} \begin{array}{c} \begin{array}{ccc} ICU & HDU & GW \end{array} \\ \begin{pmatrix} 0.5 & 0.5 & - \\ 0.1 & 0.5 & 0.4 \\ 0.05 & 0.1 & 0.85 \end{pmatrix} \end{array}$$

Let X = long run share of ICU Patients
Y = long run share of HDU Patients
I – X – Y = long run share of ICU GP patients

$\therefore$ [X Y I – X – = [X, $\begin{pmatrix} 0.5 & 0.5 & - \\ 0.1 & 0.5 & 0.4 \\ 0.05 & 0.1 & 0.85 \end{pmatrix}$ Y, 1-X-Y]

0.5x + 0.1y + 0.05 (1-x-y) = x
0.5x + 0.1y + 0.05 – 0.05x – 0.05y = x
- 0.55x + 0.05y = - 0.05………….. (1)

0.5x + 0.5y + 0.1 (1-x-y) = y
0.5x + 0.5y + 0.1 – 0.1x – 0.1y = y 0.4x
– 0.6y = -0.1…………………(2)

- 0.55x + 0.05y = - 0.05…………. x 12
0.4x – 0.6y = 0.1

- 6.6x + 0.6y = -0.6
0.4x – 0.6y = - 0.1
- 6.2x = - 0.7

x = $\frac{0.7}{6.2}$
= <u>0.1129</u>

- 0.55 (0.1129) + 0.05y = - 0.05
Y = <u>0.2419</u>

$\therefore$ 1xy = 1   0.1120   0.240
= 0.6452

$\therefore$ Long run percentages are:

ICU	11.29%
HDU	24.19%
GW	64.55%

$\therefore$ Long run weekly costs

		Shs. „000"
ICU:	11.29% x 4000 x 200,000	9,032
HDU:	24.19% x 4000 x 100,000	96,760
GW:	64.52% x 4000 x 50,000	<u>129,040</u>
		<u>234,832</u>

(b)T =

$$\begin{array}{c} \\ ICU \\ HDU \\ GW \end{array} \begin{pmatrix} ICU & HDU & GW \\ 0.4 & 0.6 & - \\ 0.2 & 0.5 & 0.3 \\ 0.05 & 0.1 & 0.85 \end{pmatrix}$$

$$[x, y, 1\text{-}x\text{-}y] \begin{matrix} 0.4 & 0.6 & - \\ 0.2 & 0.5 & 0.3 \\ 0.05 & 0.1 & 0.85 \end{matrix} = [x, y, 1\text{-}x\text{-}y]$$

0.4x + 0.2y + 0.05 (1-x-y) = x
0.4x + 0.2y + 0.05 – 0.05x – 0.05y = x
- 0.65x + 0.15y = - 0.05………. (1)

0.6x + 0.5y + 0.1 (1-x-y) = y
0.6x + 0.5y + 0.1 – 0.1x – 0.1y = y
0.5x + 0.6y = -0.1

0.65x + 0.15y = - 0.05………….. x 4
0.5 x – 0.6y = - 0.1

- 2.6x + 0.6y = - 0.2
0.5x + 0.6y = - 0.1 -
2.1x = - 0.3

$$x = \frac{0.3}{2.1}$$
$$= \underline{0.1429}$$

- 0.5 (0.1429) – 0.6y = - 0.1
0.07145 – 0.6y = - 0.1
y = <u>0.28575</u>

∴1 – 0.1429 – 0.2858 = 0.5713
= 0.6452

∴Steady State percentages:

ICU	14.29%
HDU	28.58%
GW	57.13%

∴Steady state weekly costs

ICU:	14.29% x 4000 x 200000	114,320
HDU:	28.58% x 4000 x 100000	114,320
GW:	57.13% x 4000 x 50000	114,260
		342,900

(c) Decision: The hospital should not adopt the proposal of the board of governors because the proposal will increase long run costs by:

Shs. 342,900 – 316,120
= Shs. 108,068 (000)
= Shs. 108,068,000

(d) Assumptions of Markov Analysis
- (i) There is a finite number of possible states.
- (ii) Transition matrix remains constant.
- (iii) The size and make up of the Markov system does not change.
- (iv) A future state of nature can be predicted given the current state and the transition matrix.
- (v) The various states of nature are assumed to be mutually exclusive and collectively exhaustive.

QUESTION FIVE

(a) Assumptions of C-V-P
- It assumes a single product or a constant sales mix.
- It assumes that the total cost and total revenue functions are linear.
- The C-V-P analysis applies to the relevant range only.
- It assumes that all other variables remain constant other than the one on consideration.
- It assumes that costs can be accurately divided into fixed and variable elements.
- The C-V-P analysis applies only in the short-run.
- The C-V-P analysis assumes all costs to be variable in calculation of profits for the period.
- It assumes a fixed complexity related costs.

(b) Revenue per person: 5000 + 800 + 100 = Shs. 5900

Fixed costs = 210,000 + 840,000 + 50,000 + 790,000 = Shs. 1,890,000

Average no. of people

Mid points	**Probability**
3000	0.2
4000	0.3
5000	0.4
6000	0.1

Profit from dinner and dance:

No. of people	Revenue Shs. „000"	Food Costs Shs. „000"	Fixed costs Shs. „000"	Total costs Shs. „000"	Profit Shs. „000"	Probability	Expected profit Shs. „000"
3,000	17,700	9,600	1,890	11,490	6,210	0.2	1,242
4,000	23,600	9,600	1,890	11,490	12,110	0.3	3,633
5,000	29,500	12,000	1,890	13,890	15,610	0.4	6,244
6,000	35,400	14,400	1,890	16,290	19,110	0.1	1,911
Total expected profit from dinner and dance							13,030

Profit from the programme

Pages	Probabilities
240	0.2
320	0.4
400	0.3
480	0.1
	1.00

Pages	Revenue Sh. „000"	Costs Sh. „000"	Profit Sh. „000"	Probability Sh. „000"	Expected profit Sh. „000"
240	16,800	5,200	11,600	0.2	2,320
320	22,400	5,600	16,800	0.4	6,720
400	28,000	6,000	22,000	0.3	6,600
480	33,600	6,400	27,200	0.1	2,720
Total Profit from the programme					18,360

Expected profit = 13,030,000 + 18,360,000
= Shs. 31,390,000.

Part III: Comprehensive Mock Examinations

QUESTIONS - MOCKS

COMPREHENSIVE TEST 1

Time Allowed: 3 hours

Answer any FIVE questions. **All questions carry equal marks**

QUESTION ONE

1. Samaki Ltd., a company based in Mombasa, exports vital fishing hooks to Madagascar. The demand for the hooks is constant and Samaki Ltd., is able to predict the annual demand with considerable accuracy. The predicted demand for the next couple of year is 200,000 hooks per year.

Samaki Ltd. purchases its hooks from a manufacturer in Mombasa at a price of Sh.400 per hook. In order to transport the purchases from Mombasa to Madagascar, Samaki Ltd. must charter a ship. The charter services usually charge Sh.20,000 per trip plus Sh.40 per hook (this includes the cost of loading the ship). The ships have a capacity of 10,000 hooks. The placing of each order including arranging for the ship requires 5 h ours of employee time. It takes about a week for an order to arrive at the Samaki Ltd. warehouse in Madagascar. The warehouse has a capacity of 15,000 hooks.

When a ship arrives at the Samaki warehouse, the hooks can be unloaded at a rate of 25 hooks per hour per employee. The unloading equipment used by each employee is rented from a local supplier at a rate equivalent to Sh.100 per hour. Supervisory time for each shipload is about 4 hours. The employees working in the warehouse have several tasks:

- i Placing the hooks into storage, after they are unloaded which can be done at the rate of about 40 per hour.
- ii Checking, cleaning etc. of the hooks in inventory requires about one-half hour per hook per year.
- iii Removing a hook from inventory and preparing it for shipments to a customer requires about one-eighth of an hour.
- iv Security guards general maintenance, etc. require about 10,000 hours per year.

The average cost per hour of labour is equivalent to Sh.200 (including fringe benefits). Samaki Ltd. has developed the following prediction equation for its general overhead (excluding shipping materials, fringe benefits, and equipment rental):
Predicted overhead for the year = Sh.20,000,000 + (Sh.160 x Total labour hours)
The materials used to ship one hook to a customer costs Sh.20 and the delivery costs average out to about Sh.40 per hook.
The company requires a before-tax rate of return of 20 per cent on its investment.
The ordering policy from the manufacturers by Samaki Ltd., is based on an EOQ. Model, which is determined by the demand for hooks in Madagascar.

Required

a) Determine the quantity that should be ordered each time and the re-order level (15 marks)

b) If the true overhead prediction equation is:
Sh.16,000,000 + (Sh.240 x Total labour hours), what is the cost of the prediction error? (10 marks)

(Total: 25 marks)

QUESTION TWO

The Finance Director of Africa Problems Ltd. is considering developing a flexible-budget formula for the manufacturing overhead costs.

The accounting staffs have suggested that simple linear regression be used to determine the cost behaviour pattern of the overhead cost. They consider that this method would provide a good and quick estimate of the costs that can be expected to be incurred each month. The actual direct-labour hours and corresponding manufacturing overhead costs for each month between 1996 and 1999 were used in the linear-regression analysis.

The following occurrences during the period are considered unusual:

1. Production was reduced in one month during 1997 due to wildcat strikes related to political changes in one of the countries.
2. In 1998, production was reduced in one month because of material shortages and materially increased (overtime scheduled) during two-months to meet the units required for one-time sales order.
3. Employee benefits were raised significantly in December 1998 as a result of a labour agreement.
4. Production during 1999 was not affected by any special circumstances.

The accounting staff raised the following issues:

- Some members question whether historical data should be used at all to form the basis for a flexible-budget formula.
- Some members believe that he use of data from all 48 months would provide a more accurate portrayal of the cost behaviour. While they recognized that any of the monthly data could include efficiencies, they believed these would tend to balance out over a long period of time.
- Still other members felt that only the most recent 12 months should be used because they were the most current.
- Other members of the accounting staff suggested that only those months that were considered normal should be used so that the regression would not be distorted.

The accounting department ran two regression analyses of the data, one using the data from all 48 months and the other using only the data from the last 12 months.

The results were as follows:

African Problems Ltd Least-square Regression Analyses		
	Data from all	Data from most recent
Coefficients of the regression equation:		
Constant	Sh.185.715	Sh.163.530
Independent variable	Sh. 2.40045	6.9655
Coefficient of correlation	0.47	0.69
Standard error of the estimate	19.504	11.210
Standard error of the regression Coefficient for t he independent variable	0.97	1.40
Calculated t statistics for the registration coefficient	1.64	3.01
Statistics required for a 95% confidence interval:		
10 degrees of freedom		2.23
34 degrees of freedom	1.96	

Required:

a)

i Formulate the flexible-budget equation that can be employed to estimate monthly manufacturing-overhead costs. (2 marks)

ii Calculate the estimate of overhead costs for a month when 37.500 direct labour hours are worked. (2 marks)

b) Using only the results of the two regression analysis above, explain which of the two results is more appropriate as a basis for the flexible-budget formula. (7 marks)

c) Evaluate and explain how each of the four issues raised by the accounting department staff influence our willingness to use the results of the statistical analyses as the basis for the flexible-budget formula. (9 marks)

(Total: 20 marks)

QUESTION THREE

A company makes a lotion that is manufactured through two processes, A and B. on the 1 November 1995, work in process consisted of the following:

		Sh.
Process A:	2000 units	
	Direct materials	1,000,000
	Direct labour	400,000
	Overheads	600,000
Process B:	6000 units	
	Direct materials	3,400,000
	Direct labour	760,000
	Overheads	1,200,000

In both processes the goods were 100% complete as to direct materials and 75% complete as to direct labour and overheads. In the month of November, the following additional costs were incurred.

	Process A	Process B
	Sh	Sh.
Direct materials	1,940,000	560,000
Direct labour	728,000	2,240,000
Overheads	1,080,000	4,200,000

On 30th November 1995, 4000 units were completed and passed form Process A to Process B while 1600 units remained in progress, 100% complete as to direct materials and 50% complete as to direct labour an overheads. On the same date, 10,000 units were passed from

Process B into finished goods while 4000 units remained in progress, 100% complete as to direct materials and 50% complete as to direct labour and overheads.

All inventories are valued on the weighted average cost basis and transfers from process A to Process B are treated as part of direct material cost.

Required:
The cost accounts for both processes for the month of November 1995.
Show all supporting computations including the inventory flow through each process.

(Total: 20 marks)

QUESTION FOUR

Siku Kuu Ltd. Manufactures and distributes a line of Christmas gifts. The company had neglected to keep its gifts line current. As a result, sales have decreased to approximately 25,000 units per year fro a previous high of 125,000 units. The gifts have been redesigned recently and is considered by company officials to be comparable to its competitors" models.
The company plans to redesign the gifts each year in order to compete effectively. Kama Kawaida, the Sales Manager, is not sure how many units can be sold next year, but she is willing to place probabilities on her estimates. Kama Kawaida"s estimates of the number of units that can be sold during the next year and the related probabilities are as follows:

Estimated Sales in units	probabilities
50,000	0.10
75,000	0.40
100,000	0.30
125,000	0.20

The units would be sold for sh.500 each. The inability to estimate the sales more precisely is a problem for Siku Kuu Ltd. the number of units of this product is small enough to schedule the entire year"s sales in one production run.

If the demand is greater than the number of units manufactured, then sales will be lost. If the demand is below supply, the extra units cannot be carried over to the next season and would be given away to various charitable organizations.

The production and distributions cost estimates are as follows:

		UNITS MANUFACTURED			
		50,000	75,000	100,000	125,000
Variable costs	(Sh)	9,900,000	14,850,000	19,800,000	24,750,000
Fixed costs	(Sh)	7,700,000	7,700,000	8,800,000	8,800,8000
Total costs	(Sh)	17,600,000	22,550,000	28,600,000	33,550,000

The company intends to analyze the data to facilitate making a decision as to the proper size of the production run.

Required:

a) Prepare a payoff table for the different sizes of production runs required to meet the four sales estimates prepared by Kama Kawaida for Siku Kuu Ltd.
If Siku Kuu Ltd. relied solely on the expected monetary value approach to make decisions, what size of production run would be selected? (6 marks)

b) Identify the seven basic steps that are taken in any decision process. Explain each step by reference to the situation presented by Siku Kuu Ltd. and your answer to requirement (a) (14 marks)

(Total: 20 marks)

QUESTION FIVE

The Uganda Bank (E.A.) Ltd has only two-branches. The head office branch is in the center of Kampala and the Kagera branch outside Kampala. The head office staff consists of the managing director and finance manager. With minor exceptions, the branch managers are permitted to conduct their affairs like the heads of two independent banks. The planning and control system centers on branch income statements prepared by the Finance Manager.

The Kagera branch, on the other hand, is located outside Kampala in a large and growing retirement community and as primary retail branch. Mr. Obok, the manager, is in his first year with the Uganda Bank. In his attempts to sell the bank"s services to the Kagera residents, he has found that his only success is the area of foreign deposits. Loan business, on the other hand, is both competitive and scarce.

The interest rate he can charge is constrained by the fact that the manager of the local competing branch of the other bank while not actively soliciting loan business is apparently charging rates below the prevailing Kampala prime rate. Additionally, there seems to be fundamental resistance in the part of the Kagera residents to the idea of borrowing even at the 12% rate Obok has been offering.

The Kampala branch located in the growing central business district, serves primarily commercial customers. The manger, Mr. Kamau, has found in recent years that while he faces a number of vigorous competitors the principal constraint on his ability to generate new loan business is lack of supporting deposits. The only alternative source of lending funds is the purchase of Euro currency, which are foreign deposits held in a bank outside Africa.

This opinion is considered less than acceptable by Kamau, as the 22% interest he would have to pay for such funds is higher than the rate he is able to charge loan customers currently at 20%.

In spite of his frequent lectures on the merits of leverage, the best Obok has been able to do is to generate a few goll-carat installment and social security cheque receivable loans. As a result, he finds himself with substantial excess savings deposits, which he has to keep in the vault to satisfy the government"s 20% cash reserve requirement, the vault additionally contains excess lendable funds equal to almost 70% of total savings deposits.

The finance manager has suggested that he lends these funds to Kamau at the Kampala branch. This was acceptable to both managers, although some disagreement arose as to the interest rate appropriate for such a loan. The argument was finally settled by the finance manger, who indicated that the theoretically correct rate was the rate Obok was paying on savings deposits, 10%. It has been further agreed that if Obok could find additional loans, any or all of the funds lent to Kamau would be returned.

Required:

a) Evaluate the 10% interbranch loan rate and suggest appropriate changes in relation to the following criteria:

i Motivating managers to act in a manner consistent with the best interests of the bank as a whole. (4 marks)

ii Evaluating the performance of individual branches. (3 marks)

b) Would your answer change if the Kagera branch loan rate were to rise to 14%, while all other rates as well as the level of loan demand at Kampala branch, remained the same? (4 marks)

c) Would your answer change if all rates were the same as in (a) above except that he cost of Euro currency dropped to 18%. (3 marks)

d) Based on your answers to the above, what general statements can you make about the interbranch loan rate appropriate for evaluation of individual managers? (6 marks)

(Total: 20 marks)

COMPREHENSIVE TEST 2

Time Allowed: 3 hours

Answer any FIVE questions. **All questions carry equal marks**

QUESTION ONE

Miujiza Co. Ltd. manufactures two industrial products: x-100, which sells for Sh.4,500 a unit, and Y-120 which sells for Sh.4,250 a unit. Each product is processed through both of the company"s manufacturing departments. The limited availability of labour, materials andequipment capacity has restricted the ability of the firm to meet the demand for its products. The production department believes that linear programming can be used to support and systematize the production schedule for the two products.

The following data are available to the production department:
Resources required per unit

	X-100	Y-120
Direct material –weekly supply limited to 1800 Kg at Sh.600 per kilogramme	4 Kg	2 Kg
Direct labour :		
Department 1 – weekly supply limited to 10 people at 40 hours each at an hourly cost of Sh.3000	40 min.	1 hour
Department 2 - Weekly supply limited to 15 people at 40 hours each at an hourly rate of Sh.400	1hr.15 min	1 hour
Machine time:		
Department I - Weekly capacity limited to 250 hours	30 min.	30 min.
Department 2 – Weekly capacity limited to 300 hours	0 hours	1 hour

The overhead costs for Miujiza Co. Ltd. are accumulated on a plant wide basis. The overhead is assigned to products on the bass of the number of direct-labour hours required to manufacture the product. This base is appropriate for overhead assignment because most of the variable-overhead costs vary as a function of labour time. The estimated overhead cost per direct labour hour is:

	Sh
Variable – overhead cost	300
Fixed overhead cost	300
Total overhead cost per direct Labour hour	600

The production department formulated the following equations for the linear-programming (L.P) statement of the problem.

A = number of units of X-100 to be produced
B = number of units of Y-120 to be produced

Objective function to minimize costs:

Minimize Z = 4250A + 3100 B
Constraints:

Material: - Dept.1	4A + 2B <=1,800 Kgs.
labour: - Dept. 2	2/3A + B <= 400 hours
labour: - Non-	1 ¼ + B < = 600 hours
negativity: -	A => = 0, B = >0

(**Note.**>= is greater than or equal to and <= is less than or equal to)

Required:

a) Evaluate the accuracy and application of the L.P. equations prepared by the production department. (6 marks)

b) Formulate and label equations for the L.P. statement of the production problem in line with your findings in (a) above. (8 marks)

c) Explain how L.P. could help Miiujiza Co. determine how large a change in the price of direct materials would have to be to change the optimum production Mix of X-100 and Y-120 (6 marks)

(Total: 20 marks)

QUESTION TWO

Kata Leo manages a factory that is currently processing a large order to make hundreds of newly designed computers. Several serious production problems have been encountered. Kata Leo is concerned whether the units will be of acceptable quality. If they are acceptable, the factory will have a net profit of Sh.1,000,000. If the units are of an unacceptable quality, the legal problems, warranty claims and unfavourable publicity will result in a net loss of Sh.625,000. However, Kata Leo could add an intricate inspection procedure so that all defective computers could be discovered and repaired before they leave the factory. The cost of his procedure would be Sh.1,307,500

Required:

a) Formulate Kat Leo"s problem as a "decision table" or "pay off table showing actions, events and outcomes. (4 marks)

b) Supposes that both events are equally likely and that Kata Leo bases his decision strictly on expected monetary return, which action will the management prefer? (6 marks)

c) Suppose that Kata Leo could obtain a consultant"s special accounting analysis that would affect his assessments probabilities of acceptable or unacceptable quality. The consultant is expected to produce one of three possible reports: neutral, optimistic or pessimistic.

The neutral report would not change the original decision in (b) above. The optimistic report would change Kata Leo"s assessments of probabilities to 0.7 acceptable and 0.3 unacceptable. The pessimistic report would have the reverse effect, changing the probabilities to 0.3 acceptable and 0.7 unacceptable.

Kata Leo assesses probabilities of receiving the various reports as follows:

Neutral report	-	0.3
Optimistic report	-	0.3
Pessimistic report	-	0.4

What is the highest price that Kata Leo should pay for the report? (10 marks)

(Total: 20 marks)

QUESTION THREE

Joy Musa is trying to decide between three capital projects of varying returns and risks as shown below:

	Internal Rate of Return	Standard Rate Deviation
Project A	32%	9
Project B	27%	6
Project C	42%	21

The manager"s performance is measured by the following linear equations: $Z = a + b(x - 27)$

$Z = 13 + 0.9(x - 27)$

Where Z is compensation based on the excess (shortage) of actual rate of return over the minimum desired rate of return; a is minimum compensation; b is the weighing of the difference between the actual rate and the minimum desired rate, x is the actual rate of return and 27 percent is the minimum desired rate of return.

After holding extensive discussions with Joy, you are convinced that her attitude towards risk and compensation would be expressed as:

$$F = u_z - 2\sigma_z$$

Where f is the utility value of each expected level of compensation; u_z is the expected value of z; and σ_z is the standard deviation of z and is measured by the expression $b^2\sigma_z$

Required:

a) What difficulties in the design of control systems are demonstrated by the above situation? (7 marks)

b) Compute Joy Musa"s expected utility from each capital project. (8 marks)

c) Which capital project would she choose and why? (5 marks)

(Total: 20 marks)

QUESTION FOUR

Computer Ltd., is in the process of deciding how to service a one-year warranty on the 1,000 computers sold to a large international company.
You have been presented with three alternatives:

Alternative A

A reputable computer service firm has offered to service the computers, including all parts and labour for a flat charge of Sh.27,000.

Alternative B

For Sh.22,500 another reputable service firm would provide all necessary parts and up to 1,000 service calls at no charge. Service calls in excess of that number would be Sh.6 each. The number of calls is likely to be:

Event	**Probability of Occurrence**	**Total Cost**
		Sh.
1,000 calls or less	0.5	22,500
1,500 calls	0.2	25,500
2,000 calls	0.2	28,500
2,500 calls	0.1	31,500
	1.0	

Alternative C

You can hire your own labour and buy your own parts. Your past experience with similar work has helped you to formulate the following probabilities and costs:

Event	Chances of Occurrence	Total Cost
		Sh.
Little trouble	10%	12,000
Medium trouble	70%	15,000
Much trouble	20%	45,000
2,500 calls	100%	31,500

Required:

a) For each alternative, compute the standard deviation and the coefficient of variation. (12 marks)

b) Which alternative is most risky? Explain. (3 marks)

c) What alternative would be taken? Explain. (5 marks)

(Total: 20 marks)

QUESTION FIVE

FMD Ltd, wishes to study the relationship between the total costs of operating one of its divisions and to the physical output of that division. It decides to begin with a simple linear probabilistic model relating monthly total operating cost to monthly output, as follows:

$Y = K_0 + K_1 x + Z$

Where y is monthly total operating cost, x is monthly unit production, and Z is a random variable assumed to follow a normal probability distribution with mean U of zero and standard deviation of o.

Required:

a) Give a precise interpretation of the parameters K_0 and K_1 of the model above, so that an accountant would understand what they stand for. (2 marks)

b) Give a brief outline of the role of Z in the model. In a particular, indicate why it is there. (6 marks)

c) FMD Ltd. obtains the following data on monthly production and costs:

Months ago	Units produced „000"	Total operating costs K£ „000" s
1	1	2
2	4	5
3	10	9
4	7	7
5	3	3

Using these data, compute the coefficient K_0 and K_1 of the model. (4 marks)

d) Outline how you would go about deciding whether or not the model above fits the data reasonably well and captures the underlying process generating the monthly operating costs. (6 marks)

e) Use the model to predict next month"s operating costs at a production level of 2,000 units. (2 marks)

(Total: 20 marks)

COMPREHENSIVE TEST 3

Time Allowed: 3 hours

Answer any FIVE questions. **All questions carry equal marks**

QUESTION ONE

Uganda Ltd. has the following standards for producing an alcoholic beverage:

Concentrate	590N	-	50 litres @ Ug.Sh.100	=	Ug.Sh. 5,000
Concentrate	KAG	-	50 litres @ Ug.Sh.300	=	Ug.Sh.15,000
			100 litres		Ug.Sh.20,000

Every 100 litres of input should yield 80 litres of Chovi, the finished product.

The production manager is supposed to make the largest possible amount of finished product for the least cost. He has some leeway to alter the combination of materials within certain wide limits, as long as the finished product meets specified quality standards. Actual results showed that 400,000 litres of Chovi were produced during last week. The raw materials used in this production were 280,000 litres of 590N and 240,000 litres of KAG. No price variances were experienced during the period.

Required:

a) A presentation of yield and mix variances. (13 marks)
b) Comment on the performance of the manager. (7 marks)

(Total: 20 marks)

QUESTION TWO

Katiba Ltd. is changing its current short-term planning approach in an attempt to incorporate some newer planning techniques that will permit selection of an optimum production mix.

The company‟s director of operations has developed the following price and cost information per unit of each product.

	PRODUCT 1	PRODUCT 2	PRODUCT 3
	Sh.	Sh.	Sh.
Selling price	4,500	5,400	7,200
Direct labour	1,350	1,800	2,250
Direct materials	1,620	1,080	1,890
Variable overhead	1,080	1,080	1,080
Fixed overhead	180	180	180

Assume the total production level of 60,000 units made up of equal amounts of each product. Required: (Parts (a) and (b) below are independent of each other)

a) All three products use the same direct material which cost Shs. 270 per kilogramme and direct-labour rate is Shs. 900 per hour. Monthly capacities are 2,000 direct-labour hours and 20,000 kilogrammes of direct materials. Fixed overhead is assumed to be the same for each product.

Formulate and clearly label the linear-programming (LP) functions necessary to maximize Kariba"s net income. Show supporting computation but do not solve t he linear programming functions.(11 marks)

b) Katiba"s management has decided to produce product 3 only. The sales and marketing director has presented the following results of a price analysis for product 3. at a selling price of Sh.7200 per unit, the probability distribution of total sales is uniform between Sh.27,000,000 and Sh.54,000,000. At a selling price lowered to Shs. 6,300 per unit. The probability distribution of total sales is uniform between Shs. 54,000,000 and Sh.81,000,000.

i What is the probability of at least breaking even at a selling price of Sh.7,200 per unit (5 marks)

ii Which pricing strategy yields a higher expected profit? (4 marks)

(Total: 20 marks)

QUESTION THREE

James Ugenya is the Final Director of Ugenya Ltd. He wishes to install an inventory control system an, in particular, calculate and utilize an optimal order quantity using the EOQ model. He has collected the following data about inventory item NPD:

- Purchase price	Sh.31.25 per unit
- Inventory insurance and other variable costs of storage paid at year-end	Sh.0.625 per unit
- Annual demand	1,250 units

Ugenya"s opportunity rate of return is 10 per cent. He anticipates no need for a safety stock. He is unsure about the cost behaviour associated with ordering inventory. He collected some data about the most recent 20 orders made for inventory item NPD. He also ran a regression using the number of units in each order to predict the total cost of the order. The results are as follows:

Total cost in shillings = 55.0 + 3.4125x Standard errors of the coefficients 11.0 0.54

$r^2 = 0.83$

x = number of units ordered

Where $EOQ = \left\{ \frac{2AP}{S} \right\}^{1/2}$

Where:

A	-	Annual inventory requirement
P	-	Ordering cost per order
S	-	Carrying cost per item per annum

Required:

a) Using only the data given above, what optimal order quantity would you recommend? (4 marks)

b) What is the 95% confidence interval of the variable ordering cost per unit ordered? (3 marks)

c) List two regression assumptions that must be maintained in order to answer (b) above. (3 marks)

d) The actual costs of ordering turned out to be Sh.50 per order plus Sh.4.375 per unit ordered.

e) Assuming that the recommendations in (a) above were implemented, what was Ugenya"s cost of prediction error! (10 marks)

(Total: 20 marks)

QUESTION FOUR

Chakula Engineering Company Limited (CECL) recently sent their chief designer to the USA and UK to review developments in the American and British Markets. He has now returned with details of a new type of food mixer that is being developed over there. CECL are considering the design and manufacture of a liquidizer gadget attachment to be used as an extra gadget for the new mixer when it is sold in Kenya. The chief designer"s notes show that 10% of the experts he questioned in both the UK and USA believed the new mixer would reach the Kenyan market in a year"s time, whereas 30% thought it would be launched in four year"s time, and the remainder suggested a five-year delay before it reached Kenyan.The presents value (PV) of net cash flows form making and selling the liquidizer are estimated by the company to be sh.8 million, if the market develops one year from now and sh.3.2 million if it develops five years from now.

CECL have not developed a liquidizer before, and whilst it immediate development would cost Sh.2 million, they feel they have only a 50% chance of a successful development at present. A number of alternative courses of action present themselves. The company could abandon the whole project, or wait for one year to see if the mixer has penetrated the Kenyan market. They would then abandon or develop the liquidizer at a PV cost of Sh.1.8 million, with a 70% chance of success, but they would be late into the market and the PV of their receipts they estimate at Sh.4.8 million, including the expenditure of Sh.400,000 on acquiring extra product data during the second year of delay, and the chance of a successful development would be 90%. At this point, however, the mixer could only come on the market at the four or five year point from now.

Required:
Using a decision tree approach, advise the company on the course of action to adopt.

(20 marks)

QUESTION FIVE

The Hatari Weapons Ltd. desires to submit a tender for 32 "string-to-surface" rockets required by Vita Ltd. it is estimated that each rocket will cost approximately Sh.40,000,000 for material and variable overhead costs. Total fixed costs will amount to approximately Sh.1,600,000 over the two years it will take to build the rockets all of which would have to be recovered against this contract.

The company, as a result of past experience, anticipates it could expect a 75 per cent learning curve and that the steady state would not be achieved during this production run. Building the first rocket would require approximately 400,000 hours of direct labour at a direct labour cost of Sh.150 per hour. Variable overhead costs which vary with direct labour amount to Sh.50 per direct labour hour.

Eight rockets will be built during the first year of the contract and the remaining 24 will be completed during the second year. The Hatari Weapons Ltd. always adds 25 per cent profit margin to the estimated costs of the contract for which they tender.

Required:
a) Calculate the total labour hours that will be required to build the 32 rockets. (5 marks)
b) Draw up a quotation showing the total price to be quoted, with details of the constituent parts of the cost structure and the profit added. (5 marks)
c) Assuming the contract is awarded to the company, and no costs are deferred over the two-year period, draft estimated income statements for the first and second years of the

contract life. Revenue is to be recognized on the basis of completed rockets. Fixed costs are incurred equally each year. (5 marks)

(Total: 15 marks)

COMPREHENSIVE TEST 4

Time Allowed: 3 hours

Answer any FIVE questions. All questions carry equal marks

QUESTION ONE

Mwendandamu Company Ltd. can produce a product using either labour-intensive or machine-intensive operations. Cost of each method are as follows:

	Labour – intensive Sh.	Machine – Intensive Sh
Variable costs per unit	15	5
Fixed cost	900,000	2,400,000

Demand for the product and unit selling price are uncertain. The following possible outcomes and associated probabilities have been estimated by management.

Demand		Unit selling price	
Number of Units	Probability	Price (Sh)	Probability
150,000	0.3	20	0.40
200,000	0.4	23	0.40
250,000	0.20	25	0.20
300,000	0.10		

Required:

a) Develop probability tree to show the possible profits from labour-intensive and machine-intensive production. (8 marks)

b) Determine the following for each production method:
   i Expected profits; (2 marks)
   ii Probability of at least breaking even; (2 marks)
   iii Probability of profits of at least Sh.1,000,000. (2 marks)

c) Which production method do you prefer and why? (2 marks)

d) Discuss other factors that Mwendamu Company Ltd."s management should consider before deciding on the production method. (4 marks)

(Total: 20 marks)

QUESTION TWO

Uchunguzi Ltd. plans to conduct a questionnaire survey. The table below shows the tasks involved, the immediately proceeding tasks and for each task duration the most likely estimate (L), optimistic estimate (O) and the pessimistic estimate (P).

				Number of days	
	Task	**Preceding Task**	**Most likely (L)**	**Optimistic (O)**	**Pessimistic (P)**
A	-				
B	-				
C	Pilot Survey	A	10	8	24
D	Interviewer recruitment	B	8	4	12
E	Interviewer training	D	6	6	6
F	Interviewer allocation	B	8	6	10
G	Interviews undertaken	C, E, F	20	16	36
H	Data entry on computer	G	6	4	8
I	Interviewer debriefing	G	4	4	4
J	Data analysis	HH	10	8	12
K	Writes a report	I, J	8	4	24

Using the project evaluation and review technique (PERT) the meantime, M and standard deviation O. for the duration of each task are estimated from the most likely (L), Optimistic (O) pessimistic (P) estimates by using the formulae:

$$M = 0.08333\ (4L + O + P)$$
$$O = 0.08333\ (P - O)$$

Required:

a) Compute the mean duration and standard deviation for each task. (11 marks)

b) The project is budgeted to cost Sh.500,000. Actual costs per day are Sh.10,000. Can the project be implemented within the budget?
(Hint: Determine critical path first). (9 marks)

(Total: 20 marks)

QUESTION THREE

Mitumba Ltd. has set the following standards:

	Sh.
75 litres of material X @ Sh.21	1,575
45 litres of material Y @ Sh.30	1,350
30 litres of material Z @ Sh.24	720
150	**3,645**

This standard mix should produce 135 litres of Maliza juice.

The company does not maintain any stocks of raw materials. Purchases are made as needed, so that all price variances related to materials used.

Actual results showed that 75,000 litres were used during March 2000;

	Sh.
39,000 litres of X at actual cost of Sh.18	702,000
24,000 litres of Y at actual cost of Sh.31.50	756,000
12,000 litres of Z at actual cost of Sh.28.50	342,000
75,000	1,800,000

The good quality output was as follows:

60,000 litres at standard cost of Sh.27	1,620,000
Total material variance to be explained.	180,000

Required:
Comprehensive computation showing the yield, mix and price variances. **(Total: 20 marks)**

QUESTION FOUR

Through the end of 1993, Viatu Ltd., a shoe manufacturer had always sold its products through distributors. In 1993, the turnover was Sh.87,500,000 and net profit was 10 per cent of turnover. Total fixed expenses (manufacturing and selling) were Sh.17,500,000.

During 1993, a number of Viatu"s competitors had begun selling their products throughdistributors. Viatu"s marketing research group was asked to predict the effects of eliminating distributors from the channels of distributors and selling direct to retailers.

The group was instructed to predict both changes in sales volume and changes in selling expenses, under the provision that the selling price per unit would remain unchanged.

The marketing analysis yielded the following predictions:

Turnover in1994 would drop 20 percent from the 1993 figures, but net profit for 1994 would rise to Sh.9,100,000 owing to savings in selling expenses.

This net savings in selling expenses from eliminating the "middleman" was impressive, since total fixed expenses manufacturing and selling) would increase to Sh.18,900,000 because of the additional warehouse and delivery facilities required:
If the 1993 distribution system were continued, however, 1994, results would replicate 1993.

Required:

a) What was the breakeven point (turnover) under the original situation prevailing in 1993? (5 marks)

b) What would be the breakeven point (turnover) under the proposed situation for 1994? (5 marks)

c) On the basis of this analysis, Viatu Ltd, adopted the new direct-distribution plan for 1994, and reduced 1994 production on the 70,000,000 turnover level. Unfortunately, it became clear by early December 1994 that sales would reach only 66,500,000 and Viatu cut back productions so that no ending inventory remained.
Variable costs per unit and total fixed costs were as predicted.
Compute the cost of Viatu"s prediction error.
Assume that sales would have been Sh.87,500,000 if the 1993 distribution system had been continued. (10 marks)

(Total: 20 marks)

QUESTION FIVE

a) Briefly give five examples of business applications of linear programming. (7 marks)

b) LP Ltd. produces two products, K-A and K-B by a joint process. One unit of input X processed in Department 1 total will yield three units of product K – A and two units of K – B. The variable operating costs in Sh.2.50 per unit of input X processed. Each unit of product K-A can either be sold at the split-off point for Sh.10 per unit or processed further in Department 2 to for product K-C. One unit of product K-A is needed to produce one unit of K-C. Variable processing costs incurred in Department 2 amount to Sh.7.50 per unit of K-A processed and each unit of K-C can be sold at a price of Sh.22.50 product K-B can be sold at Sh.8.75 per unit at the split-off point.

Highly skilled labour is required in each of the two departments and the total available labour force is limited to 80,000 hours per week. To process one unit of X requires 1.5 direct-labour hours. If K-A is processed further, three hours per unit of K-A processed are needed. Furthermore raw material X can be acquired up to a maximum quantity of 40,000 units per week.

The company „s market survey shows that the maximum weekly demand for product K-A is 40,000 units and for product K-C is 5,000 units. The survey further concludes that virtually any amount of product K-B can be sold immediately without difficulty. Weekly production does not have to be equal to weekly sales for any of the company"s products.

However, since all three products are perishable, any unsold quantity at the end of the week will be discarded.

Required:

(i) Formulate a linear programe to determine the optimal weekly production mix for LP Ltd. that maximizes profits subject to the various production, market and technology constraints.
Do not solve for optimal values but clearly define your variables. (8 marks)

(ii) Independent of (a) above, assume that at the optimum, the marginal values associated with the maximum market demand for K-A constraint, the maximum market demand for K-C constraint and the maximum supply of X constraint are Sh.10, Sh.15 and Sh.15 respectively. Assume further that all other constraints have zero marginal values.

What is the maximum achievable contribution? Show calculations. (5 marks)

(Total: 20 marks)

COMPREHENSIVE TEST 5

Time Allowed: 3 hours

Answer any FIVE questions. All questions carry equal marks

QUESTION ONE

Peter Oloo is a fishmonger in Kisumu. As a result of adverse business changes in the region, the supply and demand for fish are subject to random variations making it difficult to project the next day"s business.

Management accounts in relation to the previous 300 days reveal the following mode of behaviour:

Number of fish purchased from fishermen	Number of days	Number of fish Sold to customers	Number of days
100	30	100	45
200	60	200	60
300	90	300	90
400	90	400	75
500	30	500	30
	300		300

Peter Oloo buys each fish at Sh.40 and sells it for Sh.60 if sold on the same day; if the fish is sold the following day it will fetch only Sh.20. If not sold during the second day its value drops to zero and Peter Oloo do nates it to children"s home. Peter Oloo"s Policy is to satisfy the days demand from the fresh fish first; and any further demand will be satisfied from the stock of fish from previous day. Failure to satisfy demand costs Peter Oloo Sh.20 for every fish supplied to the customer. There are no backorders in the business.

Required:

a) Simulate Peter Oloo"s operations for 8 days clearly indicating profits made each day. (16 marks)

b) What are the average daily profits for Peter Oloo?
Use the following random numbers
573423709751483681320931644925928345 (4 marks)

(Total: 20 marks)

QUESTION TWO

Africa 1 and Kenya 1 are competing importers of lightweight industrial pick-up truck, the "Miracle". Market research suggests that there is demand for such vehicles of about 1,200 units per year evenly spread over the year and that bearing in mind the facilities available on the truck, its price should be around Sh.550,000 but discounts may be available. The price to the dealer is about Sh.400,000 depending upon exchange rates.

The management Accountant at Africa 1 has the task of determining the price to charge for the vehicle that will give the greatest monthly profit from the sale of Miracles. Past experience suggest that Africa1"s market share and profit will give the greatest monthly profit from the sale of Miracles. Past experience suggest that Africa1"s market share and profit depends not only on the price it charges, but also the price that Kenya 1 charges.

The following pattern seems to have emerged;
If both companies share the same price, then Africa 1 secures about 45% of the market and Kenya 1 , 55%.

When Kenya 1 has a lower price, then Africa 1 loses about 3% market share for every Sh.10,000 price difference. On the other hand, when Kenya1 has a higher price, then Africa 1 gains 2% market share over and above the 45% per sh.10,000 price difference. From africa1"s point of view, kenya1 normally changes its prices monthly.

Africa1"s Management Accountant has ruled out trial and error pricing an has decided to develop a simulation model to investigate price behaviour patterns based on monthly periods.

Required:

a) Develop a simulation model from Africa1"s point of view, using algebra, showing:

i An expression for monthly profits; (2 marks)

ii An expression for market share when Kenya1"s price is the same as Africa 1"s; (2 marks)

iii An expression for market share when Kenya1"s price is higher than Africa1"s; (2 marks)

iv An expression for market share when Kenya1"s price is lower than Africa1"s. (2 marks)

b) Draw a flow diagram to show how the model would be used to simulate pricing and demand behaviour using a computer. (8 marks)

c) Prepare a statement for the Management Accountant showing the strengths and weaknesses of simulation as a management technique. (4 marks)

(Total: 20 marks)

QUESTION THREE

Paul Akili, an aggressive entrepreneur, is working on some make – or – buy decisions and a related inventory system. For one such product, he decides to use the classic economic – lot – size model with no stockouts to determine an optimal order quantity. He initially predictsthat annual demand will be 2000 units, that each unit will cost sh.2,565, that the incremental cost of processing each order (and receiving the ordered goods) will be Sh.3,819 in this case, and the incremental cost of storage will be sh.342 per physical unit per year. Assume that the inventory cycle precisely repeats every year.

Required:

a) What is the optimal order quantity? (1 mark)

b) What are the total relevant costs of inventory from following your policy in (a) above? (3 marks)

c) Suppose that Paul Akili is incorrect in his sh.3,819 incremental – costs – per order prediction but is precisely correct in all other predictions.
State and solve the equation to predict the maximum amount Paul Akili should pay to discover the true incremental cost per order if:

(i) This true costs is sh.1,881 per order and
(ii) In the absence of any knowledge to the contrary, Paul Akili implement the solutions in (a) above and will not alter it for one full year. (6 marks)

a) What happens t your answer in (c) above if we admit that Paul Akili has also made errors in predicting demand price and the cost of storage? (2 marks)

b) Suppose Paul Akili implements the solution in (a) above for two years.

c) Further supposes that all of his initial predictions were, and are, correct except that the actual incremental cost of storage is sh.1,140 per average unit.

If it costs Akili a total of sh.228 to alter his inventory policy, state the equation to determine the cost of prediction error of not changing his inventory policy at the beginning of the second year. (8 marks)

(Total: 20 marks)

QUESTION FOUR

a) Racquet Sports produces a variety of racquets for the sports industry. It makes racquets for tennis, squash and badminton. The table below presents the relevant data for the products produced.

Racquet Sports Data

Product	Average Selling Price per unit	Average Variable Cost per unit (Sh)	Average Contribution Margin (Sh)	Percentage of Total Sales
Tennis racquet	4,000	3,000	1,000	50
Squash racquet	2,500	1,500	1,000	40
Badminton racquet	2,500	1,500	1,000	10
				100

Annual fixed costs – Sh.200,000
Production capacity – Sh.1,000,000 of total sales.

Required:

(i) Determine the contribution percentage on each shillings of sales for each of the products produced and sold. (6 marks)

(ii) What is the overall contribution that each sales shillings provides toward covering the firm"s fixed costs, that is overall break-even point in shillings sales? (7 marks)

(iii) Determine the profits if the plants operates at 70 per cent of the plant capacity. (2 marks)

b) Explain the limitations of the techniques you have used to solve part (a) above. (5 marks)

(Total: 20 marks)

QUESTION FIVE

Majimbo Ltd. Is a multi-divisional company operating in several countries. Division X wants to buy component for its final product. Suppliers outside Majimbo Ltd. Have given two bids for sh.30,000 and 31,800. The supplier who bid sh.31,800 will in turn buy some raw materials for sh.4,500 from Division Z of Majimbo Ltd. Which has spare capacity that will increase A"s contribution to overall company profits by sh.3,000. The supplier who bidssh.30,000 will not buy any materials from Majimbo Ltd.

Required:

a) Prepare a diagram of the cash flow for both alternatives.

Does the use of the international market prices lead to optimal decision for Majimbo Ltd.? Explain (5 marks)

b) Suppose Division Y is working at full capacity and can provide the needed part to Division X or to an outside customer at an assumed market price of sh.31,800. if market pricing were the rule, division Y would have to meet the sh.31,000 bid. Further, assume that the outlay costs to Y of filling the order were sh.22,500. Finally assume that Y unlike the outside suppler does not buy from Z because Majimbo Ltd is so large and communications are so bad that the division Y management is unaware of this alternative.

c) Will the use of sh.31,800 as a transfer price lead to optimal decisions for Majimbo Ltd? Show the net effects on cash flows. (10 marks)

d) What is the minimum transfer price (inclusive of the opportunity cost?)? (5 marks)

(Total: 20 marks)

ANSWERS - MOCKS

COMPREHENSIVE MOCK EXAMINATIONS

COMPREHENSIVE TEST 1

QUESTION ONE

(a) Annual Demand = 200,000 hooks

Cost per Order

	Hours		Shs.
Cost per Ship Chartered			20,000
Hours required to place an order	5		
Hours required to supervise on loading	4		
Total hours	9		
Labour cost 9 x 200			1,800
Overhead cost 9 x 160			1,440
Total			23,240

	Hours		Shs.
Cost per unit of average Inventory			
Hours required per hook per day	½		
Labour costs (½ x 200)		100	
Overhead cost (½ x 160)		80	180.00
Cost of capital filed up in inventory variable			
Costs expected at the time of purchase			
Purchase price		400.00	
Shipping cost		40.00	
Equipment rental $^1/_{25}$ x Sh.100		4.00	
Hours required: on loading	$^1/_{25}$		
On storage	$^1/_{40}$		
Total	$^{13}/_{200}$		
Labour cost $^{13}/_{200}$ x 200		13.00	
Overhead cost $^{13}/_{200}$ x 160		10.40	
		467.40	
Cost of capital 20% x 467.40			93.48
Total cost per unit			273.48

$$EOQ = \sqrt{\frac{2x200,000 \times 23,240}{273.48}} = 5,830 \text{ hooks}$$

$$\text{Reorder Level} = \frac{DL}{360} = 200,000 \times {}^1/_{52} = 3,846 \text{ hooks}$$

- Original decision order size is 5,830
- Results of optimal decision, given alternative parameter

(a) new rate = 16,000,000 + (Shs.240 x Total Labour hours)

The Shs.1,600,000 is irrelevant

Annual demand = 200,000 hooks

Actual cost per order = 23,240 + 9(240 – 160) =
23,960 Actual cost per unit of inventory
= 273.48 + ½(240 – 160) + 0.2(240 – 160) ($^{13}/_{200}$) = 314.52

$$EOQ = \sqrt{\frac{2Dco}{Ch}} = \sqrt{\frac{2 \times 200{,}000 \times 23{,}960}{314.52}} = 5{,}520 \text{ hooks}$$

$$TRC = \frac{D}{Q}Co + \frac{O}{2}Ch$$

Optimal

$$= \left(\frac{200{,}000}{5{,}520} \times 23{,}960 + \right)\left(\frac{5{,}520}{2} \times 314.52 = 1{,}736191.142\right) = 1{,}736{,}191.142$$

Actual results, given original decision

$$\text{TRC Actual} = \left(\frac{200{,}000}{5{,}830} \times 23{,}960\right)\left(+ \frac{2{,}830}{2} \times 314.52 = 1{,}738{,}781.203\right)$$

∴ Cost prediction error = 1,738,781.203 – 1,736,191.142
= Shs.**2,590.061**

QUESTION TWO

(a)(i) Estimated manufacturing Overhead (EMO)

Data from all
EMO = 185.715 + Sh.2.40045 (Direct labour hours)

Data from most Recent
EMO = Sh.163.53 + Sh.6.2965 (Direct labour hours)

(ii) Data from all
EMO = Shs.185.725 + Shs.2.40045 (37,500)

= Sh.90,202.59

Data from most Recent
EMO =163.53 + Shs. 6.29655(37,000)
= 236,284.155

(b) The results develop from the most recent 12 months are preferred because the t statistic for the 12 months data is 3.01 which is greater than the t-statistic of 2.23 for a 95% confidence interval.
The 48-month data have a t-statistic which is an important selection creation because, if the calculated t-statistic exceeds the table t-statistic for a specified confidence interval level, the indications that the true value of the regression coefficient may be different from zero. This means that the equation developed from the regression is statistically acceptable.

(c) **Issue 1**
Other things equal, the more observation the better. However, it does not necessarily follow that there will be a balancing of variations in efficiencies, obtaining more observations by using additional months may introduce spurious

elements which are no-longer relevant to estimating future manufacturing overhead. This happens to be the case in this problem. That, is the 12 month data provide a better estimating equation than 36 months data.

Issue 2

There are differing philosophies on this matter. Some would say that since aberrations has occurred in the past, they may occur in the future, and therefore should be included. However, if the abnormality is unlikely to occur, it should be eliminated from the observations that are used to develop the regression equation.

Issue 3

This issue is valued only if there is reason to believe that the underlying casual relationship has changed (for example: New Technology) or that shilling cost levels have changes. Otherwise, there is no reason to exclude observations due to the point in time at which they occurred.

Issue 4

The use of historical data is a reasonable starting point and furnishes a sound foundation for developing a flexible budget formula provided that these have been drastic changes in casual and/or cost relationships. Of course, the equation derived from the regression analysis should be modified for any information that management expects will affect the cost estimate in the future. This could include adjustments for any unit cost increase.

QUESTION THREE

PROCESS A – Weighted Average Method (WAM)

(i) Units flow

INPUT	TOTAL	MATERIAL	CONVERSION
Beginning WIP	2,000		
Added materials	3,600		
Units to account for	5,600		
OUTPUT			
Transferred out	4,000	4,000(100%)	4,000 (100%)
Ending WIP	1,600	1,600 (100%)	800 (50%)
Equivalent units	5,600	5,600	4,800
(ii)			
Cost flow (Sh)			
Beginning WIP	2,000,000	1,000,000	1,000,000
Current cost	3,748,000	1,940,000	1,808,000
Cost to account for	5,748,000	2,940,000	2,808,000
(iii)			
Cost per unit (Shs)			
Equivalent units		5,600	4,800
Cost per unit (Shs)	1,100 =	525 +	585
(iv)			
Cost Application Shs	(Workings)		
Transfer to Process B	4,440,000	(4,000 x 1,100)	
End up WIP	1,308,000	(1,600 x 525) + (800 x 585)	
Equivalent cost	5,748,000		

INPUT	Units	Amount (Shs)	PROCESS A ACCOUNT	Units	Amount (Shs) OUTPUT
Beginning WIP	2,000	2,000,000	Transfer to process B	4,000	4,440,000
Materials	3,600	1,940,000	Ending WIP	1,600	1,308,000
Labour		728,000			
Overheads		1,080,000			
	5,600	5,748,000		5,600	5,748,000

PROCESS B

(i)Units Flow

INPUT	TOTAL	TRANSFERRED IN	MATERIAL	CONVERSION
Beginning WIP	6,000			
Added materials	4,000			
Added from Process A	4,000			
Units to account for	14,000			
OUTPUT				
Transferred out	10,000	10,000	10,000	10,000
Ending WIP	4,000	4,000	4,000	2,000
Equivalent units	14,000	14,000	14,000	12,000

	TOTAL	TRANSFERRED IN	MATERIAL	CONVERSION
(ii) Cost flow (Shs.)				
Beginning WIP	5,360,000	-	3,400,000	1,960,000
Current cost	11,440,000	4,440,000	560,000	6,440,000
Cost to account for	16,800,000	4,400,000	3,960,000	8,400,000
(iii) Equivalent cost per unit (sh)	÷	÷	÷	÷
Equivalent units		14,000	14,000	12,000
Cost per unit (sh)	1,300	317.14	282.86	700

(iv) Cost Application

	(SHS)	(WORKINGS)
Transferred to Finished Goods	13,000,000	(10,000 x 1,300)
Ending WIP	3,800,000	2,000 (700) + 4,000 (282.86) + 4,000 (317.14)
Equivalent costs	16,800,000	

PROCESS B ACCOUNT

INPUT	Units	Amount (Shs)	OUTPUT	Units	Amount (Shs)
Beginning WIP	6,000	5,360,000	Transferred out	10,000	13,000,000
Material Added	4,000	560,000	Ending WIP	4,000	3,800,000
Transferred in	4,000	4,440,000			
Labour		2,240,000			
Overheads		4,200,000			
	14,000	16,800,000		14,000	16,800,000

QUESTION FOUR

(a)

		Production Runs „000"			
Demand	**Probability**	50	75	100	125
50	0.1	7,400	2,450	(3,600)	(8,550)
75	0.4	7,400	14,950	8,900	3,950
100	0.3	7,400	14,950	21,400	16,450
125	0.2	7,400	14,950	21,400	28,950
EMV		**7,400**	**13,700**	**14,900**	**11,450**

Profit (profit payoff) = (selling price x Quantity) – Total Costs

Working „000"
EMV at 50,000 Productions
= 7,400 x 1 = 7,400

EMV @ 75,000 production

= (-3,600 x 0.1) + (8,900 x 0.4) + (21,400 x 0.5) = 13,900

EMV @ 100,000 production

= (-3,600 x 0.1) + (8,900 x 0.4) + (21,400 x 0.5) = 13,900

EMV @ 125,000 Production

= (-8,550 x 0.1) + (3,950 x 0.4) + (16,450 x 0.3) + (28,950 x 0.2)
= 11,450

Decision
Produce at a production Run of 100,000 units because it yields the highest expected monetary value of Shs.13.9 million.

(b) Steps
1. Identify objectives
2. Search for alternative courses of Action
3. Gather data about alternatives
4. Select Alternative course of Action
5. Implement the decision
6. Compare actual and planned outcomes
7. Respond to divergencies from plan.

QUESTION FIVE

UGANDA BANK (E.A) Ltd

(a)

Solution to (i) and (iii)

- Where this transfer rate will provide the proper motivation, it"s not clear that it is appropriate for evaluating branch performance. With this rate the Uganda Bank (E.A) Ltd. receives all the credit for the 7.5% incremental system-wise contribution associated with lending Kampala Branch deposits at Uganda Bank Ltd. (i.e. 20% -12.5%), while the Kampala Branch will always show a loss of slightly less than it"s fixed and other expenses.
- Moreover, given that Uganda Bank Ltd"s only source of funds is the 22%Eurodollars, this incremental contribution is to a large extent attributable to the Kampala Branch.
- Perhaps a transfer rate equal to the 20% Uganda Bank (EA) Ltd loan rate is appropriate for evaluating the performance of the Kampala Branch.
- This would however fail to compensate Uganda Banks for the costs associated with soliciting and serving the loans. Thus the best policy may be to use dual rates, with the Uganda Bank rate being tied to the Kampala Branch cost of funds and the Kampala Branch rate being tied to the Uganda (EA) Ltd. rate (This structure would also provide the appropriate motivation, as transfers would take place except when the Uganda Bank (Ltd) loan rate dropped below the Kampala Branch cost of funds or Kampala branch loan rate which ever is higher or when the Kampala Branch cost of funds rose above the Uganda Bank (EA) Ltd Loan rate).
- At this point, it is worthy noting that the need for dual rates highlights the fact that the branches are sufficiently interdependent so as to make evaluation as individual financial performance centers a questionable practice. Since neither branch can obtain the 7.5% incremental contribution acting separately, it is difficult or impossible to evaluate them meaningfully as separate entities.
- Some students may raise the question about whether dual rates may lead to "Loose" cost of control by both branches. After all, each branch will be enjoying extremely favourable transfers prices.

b) Given an increase in the Kampala branch loan rate to 14% as well as no significant increase in Loan demand at this branch the "Outlay cost plus opportunity cost" rule will seem to profit to retention of the 12.5% transfer rate advocated in (a) as Mr. Obok still has "excess capacity" (i.e. excess lendable funds) and therefore no opportunity cost onthese funds.

- However, in sight of the loan rate differential between the two branches, total bank profits will be maximized only if all funds above the reserve requirement are transferred to Uganda Bank (EA) Ltd. Thus the appropriate transfer rate would be slightly above 14% because this is the lowest rate at which it is disadvantageous for Mr. Obok to solicit loans with rates below the Uganda Bank (EA) Ltd rate.
- In other words, the "general rule" in the chapter is interpreted as 12.5% + (14.0 – 12.5%) = 14% on any funds having a valid opportunity cost. (The word solicit was used because it is necessary to make a limited number of "Loss-Leader" loans in order to compete for the deposit business.
- If a credit worthy pastor of the retired community requests a loan, it is usually a competitive necessity that the loan be made.
- In a service, the outlay cost plus opportunity cost rule is still applicable because our objective is to put Obok in a position where he would not have "excesscapacity" (i.e., where he is servicing something less than the potential Kampala

Branch Loan Demand). Only if the Uganda Bank Loan rate drops below 14% would we prefer to have Mr. Obok lend his funds at Kampala Branch.

- The use of the 14% rate for evaluation of branch performance raises the same problems outsourced above, because the total bank profit-maximizing function of the Kampala Branch is to act as a saw material supplier for Uganda Bank, if separate evaluation is to be made, the dual rate structure outsourced above is still appropriate.

c) Assuming a decrease in the Eurodollar rate to 18%, as well as a 12% Loan rate at Kampala Branch, the 12.5% transfer rate advocated above remains proper from a motivational point of view.

- Under these circumstances, however it is possible to clearly indicate that incremental contribution attributable to each branch with a transfer price. Specifically, if the Kampala Branch had not been built, Uganda Bank would be making an incremental contribution of 2% (i.e. 20% - 18%). Thus the incremental contribution of the Kampala Branch is 5.5% (i.e. 18% - 12.5%), and the appropriate transfer price for evaluation of branches is the 18% Eurodollar rate. (In general, as long as the Eurodollar rate is below the Uganda Bank rate, a transfer price tied to the Eurodollar rate will also provide the proper motivation.)
- Mr. Obok will be motivated to solicit and transfer deposits to Uganda Bank so long as the Eurodollar rate is greater than his loan rate and/or cost of funds).
- It was pointed out in the above discussion on the transfer rate appropriate for evaluating branches that the branches are sufficiently interdependent so as to make individual evaluation by an income statement based on transfer prices of limited value.
- The same conclusion applies to management evaluation. A related problem is the fact that the income figure may fluctuate for seasons unrelated to the performance of the individual manager.
- For example, assume that we had decided to use the dual rate (i.e. 20% for Mr. Obok and 12.5% for Mr. Kamau) advocated above and that after the decline in the Eurodollar rate in (c) it was decided to use 18% for evaluation. The resulting 2% decline in Mr.Obok"s contribution is no way related to his performance or toany decision variables under his control.
- This type of fluctuation could probably be avoided by using the dual rate structure for management evaluation. However, even the approach is less than acceptable to the extent that Mr. Kamau"s performance is dependant on the rate Mr. Obok has to pay on savings deposits while Mr. Obok"s performance is dependent on the prevailing Uganda Bank (EA) Ltd. Loan rate, variables over which neither of them really has control.
- If income statements are to be used for evaluating managers, they should probably be based on dual rates combined with measures of variable more closely connected with managerial performance such as deposit and loan market share and cost control performance.

COMPREHENSIVE TEST 2

QUESTION ONE

Three products	Nitrate	Phosphate	Potash	Filler	Fertilizer selling price/tonnes
X1	0.1	0.1	0.2	0.6	83
X2	0.2	0.2	0.1	0.6	81
X3	0.3	0.1	0.1	0.6	81
Price per tonne	Shs.150	Shs.60	Shs.120	Shs.10	
Max. Available	Tones 1200	Tones 2000	Tones 2200	No limit	

Selling Price Per tonne

Manufacturing cost Fixed Sh.11 per tonne (Excluding raw material)

$Z = 21X_1 + 25X_2 + 16X_3$

$0.1X_1 + 0.1X2 + 0.2X3 \leq 1200$ (1)

$0.1X_1 + 0.2X2 + 0.2X3 \leq 2000$ (2)

$0.2X_1 + 0.1X2 + 0.2X3 \leq 2200$ (3)

Cost price product X1

(0.1x 150) + (0.1 x 0.60)+ (0.2 x 120) + (0.6 x 10) = 15 + 6 + 24 + 6
= Sh.45 + Sh.6

Total Price = Sh.51 + 11
= **Sh.62**

Product X_2
(0.1x 150) + (0.2 x 60) + (0.1 x 120) +(0.6 x 10) + 11 = 15 + 12 + 12 + 6 + 11 = **Sh.56**

Product X_3
(0.1x 150) + (0.1 x 60) + (0.1 x 120) +(0.6 x 10) + 11 = 30 + 6 + 12 + 6 + 11 = **Sh.65**

Contribution X_1 = 83 – 62 = **Sh.21**

X_2 = 81 – 56 = **Sh.25**

X_3 = 81 – 65 = **Sh.16**

$Z = 21 X_1 + 21 X_2 + 16 X_3$

$0.1X_1 + 0.1X_2 + 0.2X_3 + X_4 = 1200$ (Nitrate in tones)

$0.1X_1 + 0.2X_2 + 0.1X_3 + X_5 = 2000$ (Phosphate in tones)

$0.1X_1 + 0.1X_2 + 0.1X_3 + X_6 = 2200$ (Potash in tonnes)

$Z = 21X_1 + 25X_2 + 16X_3$ (Maximize)

b) X_4 when there is no production of X_1, X_2 X_3, X_4 given total nitrate available in tonnes.
When all X_4 is consumed, the final table gives shadow price of Nitrate.

Similarly X_5 and X_6.

c) Initial Simplex Table

Basic Variable	X_1	X_2	X_5	X_5	X_5	X_5	Solution Quantity	Ratio
X_4	0.1	0.1	0.2	1	0	0	1,200	12,000
X_5	0.1	0.2	0.1	0	1	0	2,000	10,000
X_6	0.2	0.1	0.1	0	0	1	2,200	22,000
Z	-21	-25	-16	0	0	0	0	

d) Final Matrix as given in question

Interpretation Procedure 4,000 unit of product X_1
Production Procedure 8,000 unit of product X_2
Do not produce product X_5

The total contribution from the production is Sh.284,000

Calculated as follow

$Z = 21\ X_1 + 25X_2 + 16X_5$

$= 21 \times 4{,}000 + 25 \times 8{,}000$

$= 84{,}000 + 200{,}000$

$=$ Sh.284,000

Dual price or shadow prices.

i) Chemical Nitrate has been fully, used and is a scarce quantity. Everyone tonne of this chemical available (above 1200 tonnes) will increase the production by Sh.170 (subject to maximum which can be calculated.

ii) Similarly chemical phosphates has been fully used, every extra tonnes, will increase the profit by Sh.40 (subject to a maximum which can be calculated)

iii) Potash not been fully used, there is still a surplus of 600 tonnes i.e. 2200 – 600 = 1600 tonnes has been used. Hence it has no scarcity value.

iv) Production of X_5 will reduce the overall profit by Sh.22 per unit. Hence on economic grounds it should not be produced.

QUESTION TWO

KATA LEO

(a)

	Events	
	Acceptable	**Unacceptable**
Actions	Shs.	Shs.
Don"t inspect	1,000,000	-625,000
Inspect	-37,500	-37,500

(b) If you don"t inspect: EMV = 1,000,000(0.5) – 625,000 (0.5)
= **Shs.187,500**

If you Inspect: EMV = -37,500(0.5) + -37,500(0.5)
= -37,500

Kata Leo would prefer to avoid inspecting because the expected gain is better than by inspecting

(c) Effect of changes inprobabilities

	Events		
	Success	**Failure**	
Optimistic report:			
Probability of Event	0.7	0.3	
Actions:	Gain	Gain	Expected value
Don"t inspect	1,000,000	-625,000	= 512,500 (i)
Inspect	-37,500	-37,500	= 37,500
Pessimistic Report			
Probability of event	0.3	0.7	
Don"t inspect	1,000,000	-625,000	= 137,500 (ii)
Inspect	-37,500	-37,500	= 37,500

(i) = 1,000,000 (0.7) – 625,000 (0.3) = 512,500
(ii) = 1,000,000 (0.3) – 625,000 (0.7) = 137,500

The expected values with imperfect information (The reports) would be:
If neutral; don"t inspect Sh.187,500
If optimistic, don"t inspect Sh.512,500
If pessimistic Inspect Sh.-37,500

Expected values

	Neutral	**Optimistic**	**Pessimistic**	**Expected value**
Probability	0.3	0.3	0.4	
Don"t Inspect	187,500	512,500	-	210,000 (i)
Inspect	-	-	-37,500	-15,000 (ii)
				195,000

(i) = 187,500 (0.3) + 512,500 (0.3) = **210,000**
(ii) = 37,500 (0.4) = **15,000**

The maximum price that should be paid for the report is the difference in the expected value with the report and the expected value with the existing information: 195,000 – 187,500 = Sh.**7,500**

QUESTION THREE

(a) Not only does this problem gives an opportunity to consider utilities, but it underscores a major difficulty in the design of control system; how to measure performance and tie compensation to performance in such a way that goal congruence is more likely. That is the top manager desires the subordinates to take the actions that help reach top management goal.

The problem may be used also to highlight the fact that superiors do not have the same information possessed by subordinates" every action is infeasible. Thus, thedesign of control systems that promote congruence is hampered by lack of knowledge of subordinates alternatives and risk attitudes.

(b)

Projects	**A**	**B**	**C**
Uz	17.5	13	26.5
δ_Z	7.29	4.86	17.01
f	2.92	3.28	-7.52

Workings

Project A

Uz= 13 + 0.9 (x – 27)
= 13 + 0.9 (32 – 27)
= 17.5

Project B

Uz = 12 + 0.9 (27 – 27)
= 13

Project C

Uz = 13 + 0.9 (42 – 27)
= 26.5

$\delta_Z = 0.9^2(\delta)$
$= 0.9^2(9)$
= 7.29

$\delta_Z = 0.9^2\ (6)$
= 4.86

$\delta_Z = 0.9^2(21)$
= 17.01

f = Uz- 2Qz
= 17.5 – 2(7.29)
= 2.92

f = 13 – 2(4.86)
= 3.28

f = 26.5 – 2(17.01)
= - 7.52

QUESTION FOUR

Computer Ltd.

(a) ALTERNATIVE A

Standard deviation (δ)

$$\sqrt{(27{,}000 - 27{,}000)^2\ 1} = \underline{0}$$

δ = Coefficient of valuation C.V

$$C.V = \frac{\delta}{\varepsilon R} = \frac{0}{27{,}000} = \underline{0}$$

ALTERNATIVE B

Event	Probability	Total cost	Expected cost
1000 calls or less	0.5	22,500	11,250
1500 calls	0.2	25,500	5,100
2000 calls	0.2	28,500	5,700
2500 calls	0.1	31,500	3,100
Expected cost			Sh.25,150

Standard deviation (δ)

$$\delta = \sqrt{(22,500-25,150)^2\, 0.5 + (25,500-25,150)^2\, 0.2 + (28,500-25,150)^2\, 0.2}$$

$$+ (31,500-25,150)^2\, 0.1 = \sqrt{9,812,500} = Shs.3,132.49$$

Coefficient of variation C.V.

$$= \frac{3132.49}{25150} = \underline{0.125}$$

ALTERNATIVE C

Event	Change of occurrence	Total cost	Expected cost
Little trouble	0.1	12,000	1,200
Medium trouble	0.7	15,000	10,500
Much trouble	0.1	45,000	4,500
Expected cost			Shs.16,200

Standard Deviation (δ)

$$\delta = \sqrt{12,000-16,200)^2\, 0.1 + (15,000-16,200)^2\, 0.7 + (45,000-16,200)^2\, 0.1}$$

$$= \sqrt{85,716,000} = shs.9,258.29 = Shs258.29$$

Coefficient of variation C.V

$$C.V = \frac{9258.29}{16,200} = \underline{0.57}$$

(c) The most risky alternative is Alternative C with the highest Standard deviation of Shs.9,258.29 as well as the highest coefficient of variation of 0.57 which is a more relative treasure of risk.

(c) Alternative C is the best option as it yield the lowest cost of Shs.16,200 compared to the other alternatives. However reliance on simple number may buy information that the executive may need for a wise decision.

QUESTION FIVE

1 Parameter (K_0) is interpreted as the weekly "Fixed costs" of operating the department and (K_1) as the variable costs per unit of output.

2 The random variable Z, is there because the Linear relationship between y and x is not exact. In say week there are a great number of random factors that throw total costs y "off the line" – that cause it to differ from what it would be if an exact linear relationship existed. Z represents the effect of these random factors.

(c)

$n = 5 \qquad \Sigma x = 25 \qquad \Sigma x^2 = 175$

$\Sigma xy = 170 \qquad \Sigma y = 26$

$$B_1 = \frac{n\Sigma xy - \Sigma x\Sigma y}{n\Sigma x^2 - (\Sigma x)^2}$$

$$= \frac{5(170) - (25)(26)}{5(175 - (25)^2} = 0.8$$

$$B_0 = \frac{\Sigma y(\Sigma x^2) - (\Sigma x(\Sigma xy)}{n\Sigma x^2 - (\Sigma x)^2}$$

$$= \frac{26(175) - 25(170)}{5(175) - (25)^2} = 1.2$$

(d) Y = 1.2 + 0.8 (2) = 2.8
Next weeks operating costs would be Sh.<u>2800</u>

(e) Evaluation of the regression model
The tests undertaken can be grouped into

i) <u>Logical relationship (economic plansibility)</u>
The analyst should study the data to see whether any relationship which exist is logical e.g. a high correlation between church attendance and beer consumption may not be logical.

ii) Goodness of fit
These tests can be divided into two

a) Testing the whole model (that is all independent variables taken together) by use of

- Coefficient of determination (r^2)
- Std error of estimate (S_e) (MAD)
- F – statistics.

b) Testing the size of the slope by use of

- Coefficient of correlation, (r)
- Standard error of the slope (Sb)
- T or Z – statistic depending on samples size

Note: For a simple linear regression only one of the tests should be done.

iii) Testing the assumptions (Specification tests)
The necessary assumptions in linear regression are:

1. The underlying relationship is linear – scatter diagram.
2. The independent variable x is assumed to be known and is used to predict the dependent variable y.
3. The errors on residuals e, are normally distributed with mean zero and a constant variance negative a histogram & scatter diagram
4. The errors are independent (auto correlation) _ Use Durbin Watson

COMPREHENSIVE TEST 3

QUESTION ONE

a) **Yield and Mix Variances**

Standard costs of finished products is Shs.$\frac{20,000}{80}$ = Shs.250 per liter

280,000 liters of 590N @ Shs.100	=Shs.28,000,000
240,000 litters of KAAG @ Shs.300	Shs.72,000,000
520,000	= 100,000,000

Good output was 400,000 liters @ a standard	
Cost of 250 per litter	= 100,000,000
Material efficiency variance	= Shs. 0 liter

The difference in quantities were.

		(1)	(2)	
		Budgeted	Actual	
Material	**Calculation**	**Liters**	**Liter**	**Differences**
590N	0.5(500,000)	250,000	280,000	-30,000
KAG	0.5 (500,000)	250,000	240,00	+10,000
TOTAL		**500,000**	**520,000**	**-20,000**

Yield variances		Shs.
590 N	-30,000 x Sh.200	= - 6,000,000 (U)
KAG	+10,000 x Sh.200	= +2,000,000 (f)
		- 4,000,000 (U)

Mix Variances

590N -30,000 x (100 – 200) shs.= +3,000,000 (F)
KAG +10,000 x (300 – 200) sh.= +1,000,000 (F)
4,000,000 (F)

b) The manager apparently altered the mix by introducing a higher proportion of the less expensive ingredients. However, this resulted in an equal trade off. As you might suspect the yield of good product is likely to suffer from a higher than normal proportion of the cheaper ingredient. If this phenomenon would not occur, there would be a higher proportion of the cheaper ingredient at all times.

QUESTION TWO

a) Let 1 be A
2 be B
3 be C

Objective function (Z)

MaxZ = 450A + 1440B + 1980C

Constraints:

$1.5_A + 2_B + 2.5_C + \leq$ (hours) 2000 G_A +
$4_B + 7_C + \leq$ (kilograms) 20,000
A, B, C, $5_A + 2_B \geq 0$ (N0n-Negativitiy)

Workings		(Shs.)	
	1	**2**	**3**
Selling price	4,500	5,400	7,200
variable costs			
Direct labour	1,350	1,800	2,250
Direct materials	1,620	1,080	1,890
Variable overheads	1,810	1,810	1,080
Total variable costs	4,050	3,960	5,220
Contribution margin	450	1,440	1,980
Labour hours			
Direct labour costs	1,350	1,800	2,250
hourly rate	900	900	900
	1.5	2	2.5
Direct materials			
Direct material costs	1,620	1,080	1,890
Rate per Kg	270	270	270
	6	4	7

QUESTION THREE

a)

$$EOQ = \sqrt{\frac{2AP}{S}} = \sqrt{\frac{2(1,250)\ 55}{4.023}} = 184.9 \approx \underline{185 \text{ units}}$$

$$S = 0.625 + 1 \text{ X } (31.25 + 2.75) = 4.023$$

b) The value of t form tables exhibit 18 degrees of freedom is 2.101. 2.75 ± 0.625 (2.101)0 implies a confidence interval form 1.417 to 4.043.

c) Some possible consumers

- No autocorrelation
- No heteroscedasticity
- Normality of disturbance terms

d) Actual S = 0.625 + 0.1 (31.25 + 4.275) = 4.1875

i Original decision, given original parameters = 184.9 units

ii Alternative parameter values Shs.50 and 4.375, optimal decision would provide total cost of

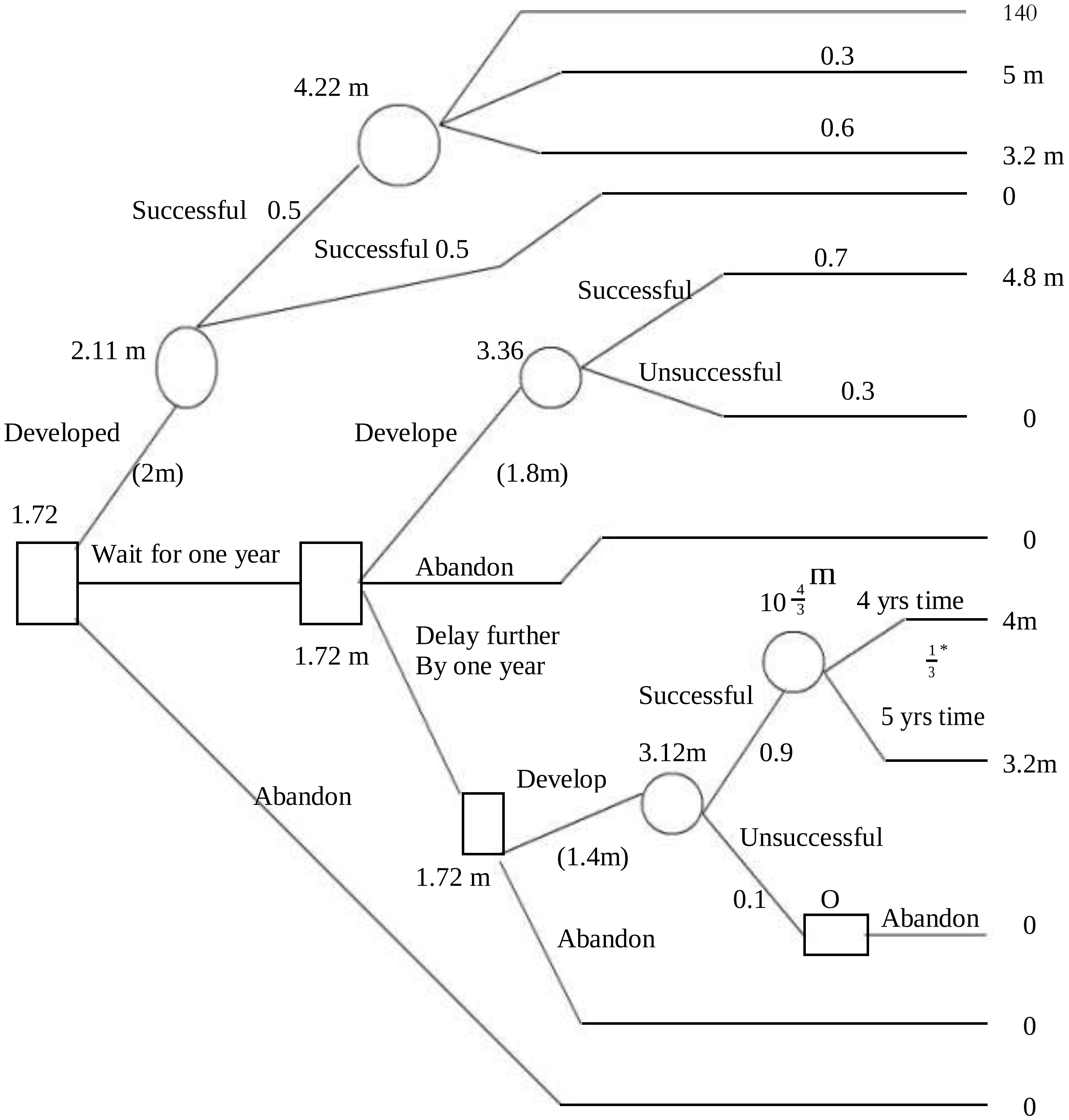
iii Given the original decision instep (i) and the alternative parameters in step (ii), compute the financial result.

$$C = \frac{1,250\ (50)}{184.9} + \frac{184.9(4.375)}{2} = 742.49$$

iv Cost of prediction error (ii) – (iii) $\underline{\underline{-2.98}}$

QUESTION FOUR

	Payoff	
10% years time	8 million	
30% 4 years time	5 million	
60% 5 years time		3.2 million



Decision

Wait for one year and then delay for one more year then develop for expected pay off of Shs.1.72 m

Workings

P(market in 4 years time) = 0.3

P(market in 5 years time) = 0.6
Total = **0.9**

* $0.3 \div (0.3 + 0.6) = \frac{1}{3}$

QUESTION FIVE

$\overline{Yx} = ax^{b+1}$ wher a = 400,000 hours

$$b = \frac{\text{Log of (learning curve important rate)}}{\text{Log } 2}$$

a) $= \frac{\text{Log } 0.75}{\text{Log } 2} = -0.4150375$

$$\overline{Yx} = Y_{32}$$

$Y_{32} = 400{,}000\ (32)^{-0.4150375 + 1}$

$= 400{,}000\ (32)^{0.5849625}$

= Shs.**3,037,500**

b)

Quotation	Shs. "000"
Material (40,000, x 32)	1,280,000
Direct labour hours (3,037,500 x 150)	455,625
Variable overhead (3,037,500 x 50)	151,875
Fixed costs	1,600,000
Total costs	3,487,500
Profit mark up ¼ - 1 = ⅓	1,162,500
	4,650,000

c) Average hours f or 8 rockets

$Y_8 = 400.000 \times 8)^{-0.4150375 + 1}$ = 1,350,000 hours

$Y_{24} = 400.000\ 24)^{-0.4150375 + 1}$
OR 3,037,500 – 1,350,00 = 1,687,500 hours

Fixed costs = $\frac{1{,}600{,}000{,}000}{2}$ = Shs.800,000,000

Price of the Rockets = $\frac{4{,}650{,}000{,}000}{32}$ =Shs.145,312,500/Rockets

Draft of Estimated Income

	1st year Shs. "000"		2nd year Shs. "000"
Sales {145,312.5 x 2}	1,162,500	{145,312.5 x 24}	3,487,500
Less:			
Material (40,000,000 x 8)	320,000	(40,000,000 x 24)	960,000
Direct labour (1,350,000 x 150	202,500	(1,687,500 x 150)	253,125
Variable Overhead (1,340,000 x 50)	67,500	(1,687,500 x 50)	84,375
Fixed overhead	800,000		800,000
Fixed overhead	(1,390,000)		(2,097,500)
Profit (Loss)	227,500		1,390,000

COMPREHENSIVE TEST 4

QUESTION ONE a)

Demand		Selling price	Joint probability	Labour intensive Shs. „000"	Machine intensive Shs. „000"
150,000	0.3	P(20) 0.4	0.12	(18)	(18)
		P(23) 0.4	0.12	36	36
		P(25) 0.2	0.06	36	36
200,000	0.4	P(20) 0.4	0.16	16	96
		P(23) 0.4	0.16	112	192
		P(25) 0.2	0.08	88	128
250,000	0.2	P (20) 0.4	0.08	28	108
		P(23) 0.4	0.08	88	168
		P(25) 0.2	0.04	64	104
300,000	0.1	P(20) 0.4	0.04	24	84
		P (23) 0.4	0.04	60	120
		P(25) 0.2	0.02	42	72
				576	**1,126**

Profit = (Selling price – Variable) Demand – Fixed cost

b) (i)Expected profit

Labour intensive = Shs. 576,000
Machine intensive= Shs.1,126,000

(ii) P(Break even) = 0.12 + 0.06 + 0.16 + 0.16 + 0.08 + 0.08 + 0.08 + 0.04 + 0.04 +
0.04 + 0.02

= 0.88
machine intensive = (1 – 0.12) = **0.88**

(iii) P(Profits at least Shs.1,000,000)
Labour intensive = **0.16**

Machine intensive = 0.16 + 0.08 + 0.08 + 0.08 + 0.04 + 0.04 + 0.04
= **0.52**

c) The best production method is machine intensive with the highest expected profit of Shs.1,126,000

d) (i)Constant demand
(ii) Constant variable, fixed cost
(iii) Constant selling price
(iv) Government legislation

QUESTION TWO

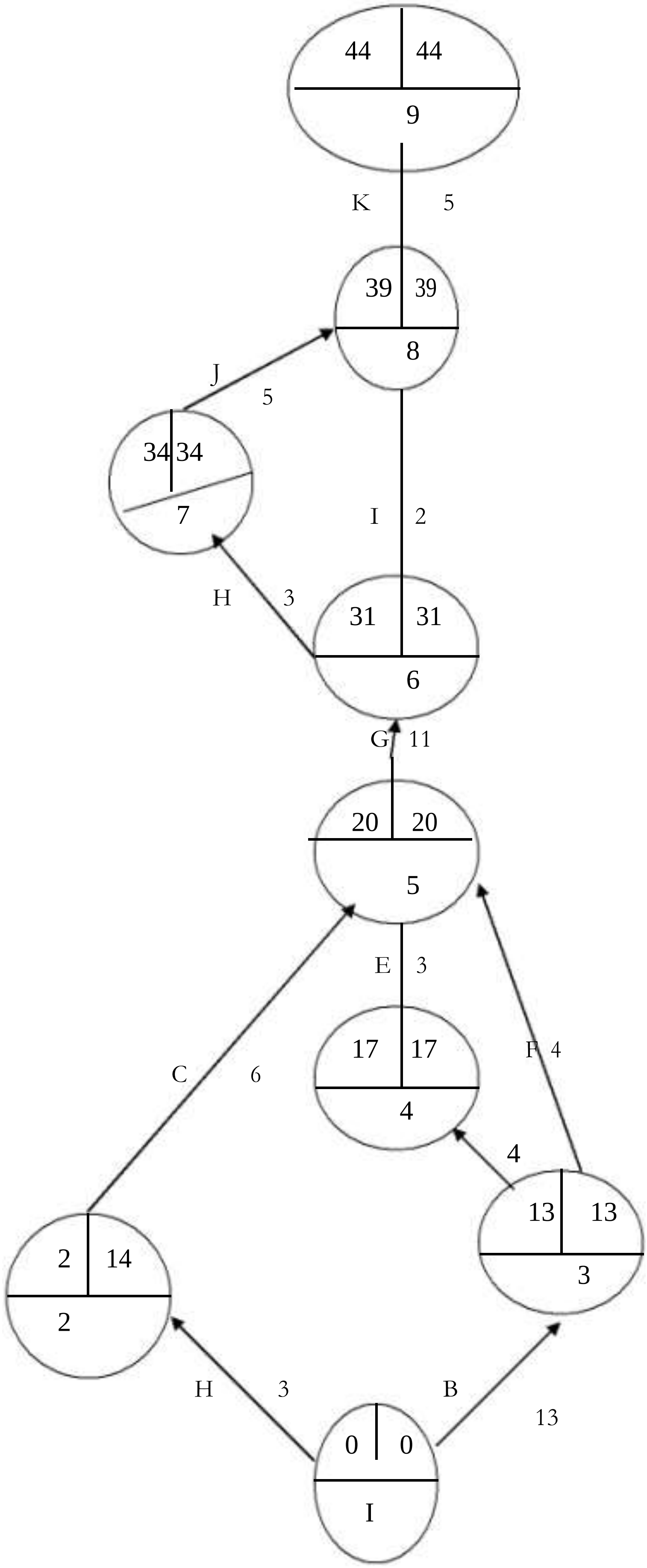
a) M = 0.08333 (4L + O + P)
σ = 0.8333 (P – O)

	M	σ
A	3	0.33332
B	13	1.6666
C	6	1.33328
D	4	0.06664
E	3	0
F	4	0.33332
G	11	1.6666
H	3	0.33332
I	2	0
J	5	0.33332
K	5	1.666

b) Critical path B –D – E – G – H – J – K.

Project duration = 44 days

Budgeted cost = Shs.500,000
Actual cost = 44 x 10,000
= 440,000
The project can be implemented within the budget since the budgeted cost is greater than the actual cost.


44 44
9
K 5
39 39
8
J 5
34 34
7
I 2
H 3
31 31
6
G 11
20 20
5
E 3
17 17
4
C 6
F 4
4
13 13
3
2 14
2
H 3
B 13
0 0
I

QUESTION THREE

The difference in quantities were:

Material	Detailed computation	(1) Budgeted or standard Quantity of inputs	(2) Actual quantity of **Inputs**	Difference
X	0.5 x 66,666	33,333	39,000	-5,667
Y	0.3 x 66,666	19,999	24,000	-4001
Z	0.2 x 66,666	13,333	12,000	1000
		66,666	75,000	-8,668

Yield variance

X – 5,667 x Shs.24.3 = - 137,708 (U)
Y – 4,001 x Shs.24.3 = - 97,224 (U)
Z + 1,000 x Shs.24.3 = +24,300 (F)
210,632(U) (Rounded)

Mix variance

X – 5,667 x Shs. (21 – 24.3) = +18,701 (F)
Y – 4,001 x Shs. (30 – 24.3) = -22,806 (U)

Z + 1,000 x Shs. (24 – 24.3) = -300 (U)
-4,405 (U) (Rounded)

Price Variance

X (21 – 18) Shs. X 39,000 = + 117,00 (F) Y
(30 – 31.5) Shs. X 24,000 = - 36,000 (U) Z
(24 – 28.5) Shs. X 12,000 = - 54,000 (U)
27,000 (F)

QUESTION FOUR

a) Sales = 87.5 M
Net profit 10% of turnover
Fixed expenses = Sh.17.5 M

	Sh
Sales	87.5
Profit	8.75M (10% of sales)
Expenses	78.75M
Fixed Expenses	17.50 M
Variable expenses	**61.25 M**

$$\text{BEP (sh)} = \frac{\text{F.C x Sales}}{\text{C.M}}$$

$$= \frac{17.5 \times 87.5}{[87.5 - 61.25]} = \text{Shs.}58,333,333$$

b) Sales 80% of 87.5 70 M
Profit 9.1 M
Total Expenses 60.9 M
Fixed Cost 18.9 M
Variable Cost **42 M**

B E P (Sh) = $\frac{\text{F.C x Sales}}{\text{C.M}}$

= 18.9M x 70
= 70 – 42
= **Shs.42,250,000**

c) Prediction
Assuming no change was made

Sales projection 87.5M
Profit would be 8.75M

With Change
Sales 66.5M
Variable Cost 39.9M
C.M 26.6M
F.C 18.9M
7.7M

Cost of Error 8.75 - 7.7 = Sh.1.050M

	Predict	**Actual**
Sales	70M	66.5
V.C	42	39.9
C.M	28	26.6
F.C	18.9	18.9
N.P	9.1	7.7

QUESTION FIVE

a) (i)Determination of optimum product mix
(ii) Determination of optimum machine and labour combinations
(iii) Determination of optimum material mix
(iv) Determination of optimum use of storage and shopping facilities.
(v) Any other situation of combining labour, materials and facilities to best advantage.

b) (i)Let A = quantity of product K – A sold at split off point
B = quantity of product K – B produced and sold
C = quantity of product K – C produced and sold
D = quantity of input X used

Objective – max = 10A = 8.75B + 15C – 2.5X

NB: Coefficient of C price minus separable processing cost subject to

A				$\leq$ 40,000 (market)
		C		$\leq$ 5,000 (market)
				x $\leq$ 40,000 (supply)
	B			-2x $\leq$ 0 (joint process)
A		+C		- 3x $\leq$ 0 (joint process)
		3C	+	1.5x $\leq$ 80,000 (Labour)
A, B, C, D, X				$\geq$ 0 (Non-Negativity)

(ii) Z = 10 (40,000) + 15(5,000) + 15(40,000) = Sh.1, 075,000

The maximum achievable contribution is therefore Shs.**<u>1, 075,000</u>**

COMPREHENSIVE TEST 5

QUESTION ONE

a) No. of fish purchased

Purchases	No. of days	Probability	Cumulative	RN
100	30	0.1	0.1	0
200	60	0.2	0.3	1 – 2
300	90	0.3	0.6	3 – 5
400	90	0.3	0.9	6 – 8
500	30	0.1	1.0	9

Number of fish sold to consumers

Demand	No. of days	Probability	Cumulative	RN
100	45	0.15	0.15	00 –14
200	60	0.2	0.35	15 – 34
300	90	0.3	0.65	35 – 64
400	75	0.25	0.9	65 – 89
500	30	0.1	1.	90 – 99

Day	RN	SS	RN	DD	Sale	Balance c/f	Shortfall	Profit
1	5	300	73	400	300	-	100	4,000
2	4	300	23	200	200	100	-	2,000
3	7	400	09	100	100	300	-	(6,000)
4	7	400	51	300	300	100	-	(2,000)
5	4	300	83	400	400	-	-	6,000
6	6	400	81	400	400	-	-	8,000
7	3	300	20	200	200	100	-	2,000
8	9	500	31	200	200	300	-	(4,000)
Total profits for 8 days								**10,000**

Workings

Days	1	2	3	4	5	6	7	8
Sales	18,000	12,000	6,000	18,000	20,000	24,000	12,000	12,000
Less cost of sales	(12,000)	(10,000)	(12,000)	(20,000)	(14,000)	(16,00)	(10,000)	(16,000)
Less deficit cost	(2,000)	-	-	-	-	-	-	-
Net profit	4,000	2,000	(6,000)	(2,000)	6,000	8,000	2,000	(4,000)

b) Average profits = $\frac{10,000}{8}$ = Shs.1,250

QUESTION TWO

a) Let P_A = African 1 price for Miracle
P_K = Kenya 1 price for miracle.
M_A = Africa 1 market share
S = Africa 1 monthly sales
Π_A = Africa 1 monthly profits

If the annual sales are about 1200 per annum, then monthly sales = $\frac{1200}{12}$ = 100 units

Africa 1"s monthly sales may be defined as 100 M_A

(i) Africa 1"s monthly profit
$\Pi_A = 100\ M_A = (P_A - 400{,}000)$.

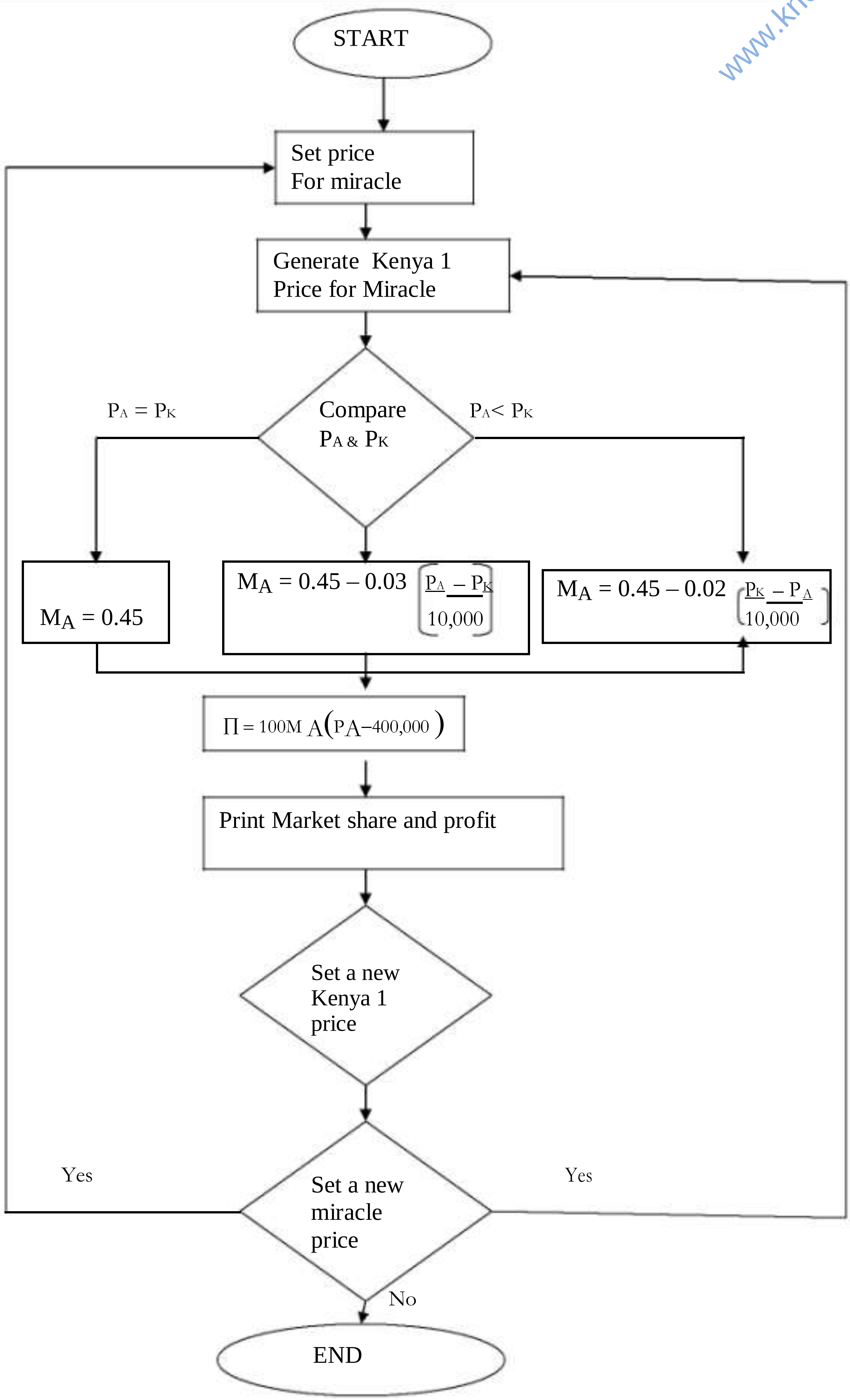
(ii) If $P_A = P_K =$, then $M_A = 0.45$

(iii) If $P_K > P_A$, then for every Shs.10,000 difference, Africa 1"s price grows by 2%

These are $\frac{P_K - P_A}{10{,}000}$ „Price steps"

(iv) If $P_K < P_A$
$M_A = 0.45 - 0.03 \left[\frac{P_A - P_K}{10{,}000}\right]$

b) The flow diagram includes a nested loop. The first loop will be used to set Africa1"s price for miracle and for every price set by Africa 1, a range of prices set by Kenya 1 will be generate.


START
Set price
For miracle
Generate Kenya 1
Price for Miracle
Compare
P_A & P_K
$P_A = P_K$
$P_A < P_K$
$M_A = 0.45$
$M_A = 0.45 - 0.03 \left[\frac{P_A - P_K}{10,000}\right]$
$M_A = 0.45 - 0.02 \left(\frac{P_K - P_A}{10,000}\right)$
$\Pi = 100M\ A(P_A - 400,000)$
Print Market share and profit
Set a new
Kenya 1
price
Set a new
miracle
price
Yes
Yes
No
END

QUESTION THREE

a) EOQ $= \sqrt{\frac{2 \times 2,000 \times 3,819}{342}}$ = 211.3449 units

Current EOQ = 211.3449 units

EOQ with Sh. 1140 storage cash.

$= \sqrt{\frac{2 \times 2000 \times 3819}{1140}}$

= 115.7584 units

Total relevant cost with accurate EOQ at 115.7584 units.

$= \frac{2000 \times 3819}{115.7584} + \frac{1}{2} \times 115.7584 \times 1140$

= Sh. 131,964.50

Total relevant cost using units used.

$\frac{2000 \times 3819}{211.3449} + \frac{1}{2} \times 211.3449 \times 1140.$

= Sh. 156,606.60

∴ Cost of prediction error

= Total relevant Cost with actual- EOQ − Total relevant cost with EOQ + Sh. 228

= 156,606.60 – 131,964.50 + 228

= Sh. 24,870.10

b) $TRC = \frac{D}{Q} Co + \frac{1}{2} QCL$

$= \frac{2,000\ (3,819)}{211.3449} + \frac{1}{2}(211.3449\ (342)$ = Sh.**72,280**

c) TRC Actual $= \frac{2,000(1,881)}{211.3449} + \frac{1}{2}\ (24.3489)\ (342)$

= **53,940**

Optimal Cost

$EOQ = \sqrt{\frac{2 \times 2,000 \times 1,881}{342}}$ = 148.32397

TRC Optimal $= \frac{2,000}{148.32397}\ (1,881) + \frac{1}{2}\ (148.32397)\ 342$

=Sh.**50,727**

Cost of perdition error = 53,940 – 50,727 = Sh.**3,213**

d) The cost of prediction error will also change to reflect the errors in other areas

e) Cost of prediction errors

Cost Incurred $= \frac{2,000}{211.3499}(3,819) + \frac{1}{2}(211.3449)\ 1,180$

$= $ **Shs.156,607**

EOQ Optimal $= \sqrt{\frac{2 \times 2,000 \times 3,819}{1,140}} = 115.75837$

Optimal Costs $= \frac{2,000}{115.75837}(3,819) + \frac{1}{2}(115.75837)\ 1,180$

$= $ **Sh.131,965**

The cost of not charging at beginning = (156,607 – 131,965) – 228 = Shs.**24,414** of second year.

QUSTION FOUR

a)

	Lacquet Sports		Contribution Percentage.
(i)	Tennis $= \frac{1,000}{4,000} \times 50\% \times 100$	=	12.5%
	Squash $= \frac{1,000}{2,500} \times 40\% \times 100$	=	16%
	Badminton $= \frac{1,000}{2,500} \times 10\% \times 100$	=	4%
	Total Contribution Margin	=	**32.5%**

(ii) Overall break-even-points (shs) $= \frac{\text{Total Fixed Costs}}{\text{Overall contribution margin}}$

$= \frac{200,000}{0.325}$

$= $ **Shs.615,385**

∴ For Tennis	= 50% x 615,385	= Shs.307,692.50
For Squash	= 40% x 615,385	= Shs.264,154.00
For Badminton	= 10% x 615,385	= Shs. 61,538.50
		Shs.**615,385.00**

(iii) Profit = Sales (IMR) – Fixed Cost
= (700,000 x 0.325) – 200,000
= **Shs.27,500**

b) CVP Analysis Limitations.

i. Fixed costs are likely to change at different activity levels (A stepped fixed cost scope is probably the most accurate representation).

ii. Variable costs and sales are unlikely to be linear. Extra discounts, overtime payments, the effect of learning curve, special price contracts and other similar matters make it likely that the variable costs and revenue units are some form of curve rather than a straight line.

iii. The charts depict relationships which are essentially short-term. It makes them inappropriate where the time scale spars several years.

iv. CVP analysis makes the assumption that changes in the level of output are the sole determinants of cost and revenue changes. This is likely to be a gross over simplication in practice although volume changes of course do have a significant effect on and revenues.

v. It is assumed that either there is a single product or a constant mix of products or a constant or mark-up on marginal costs.

vi. Risk an uncertainty are ignored and perfect knowledge of cost and revenue function is assumed.

vii. It is assumed that the firm is a price taker and a perfect market is deemed to exist.

viii. It is assumed that revenues and all forms of variable costs (Materials, Labour and all the components of variable overheads) Vary in accordance with the same activity indicator. This is an over-sight on most realistic situations etc.

QUESTION FIVE

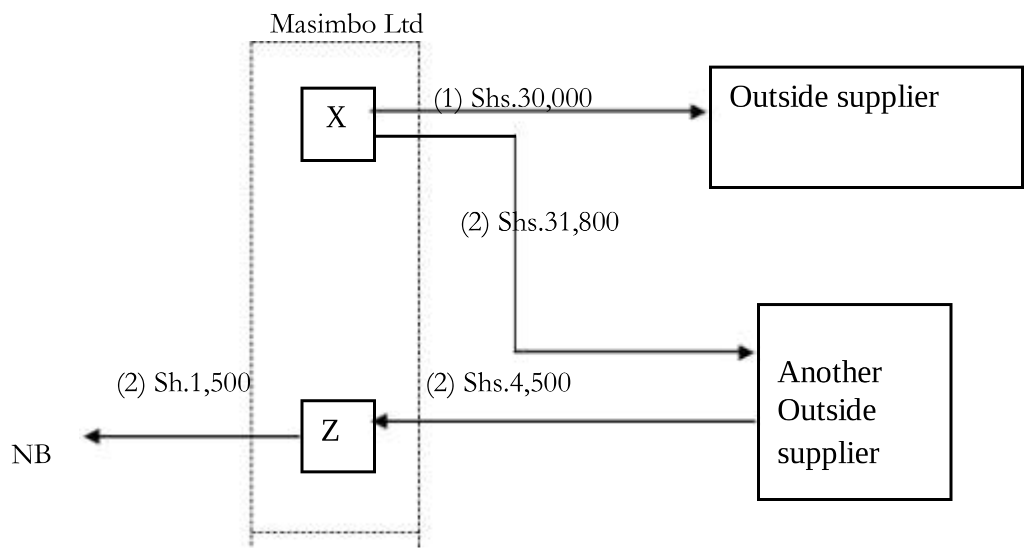
a) Transfer Pricing

The cash flows are diagrammed below for both alternatives

1) Buy at Shs.30,000
2) Buy at Shs.31,800

This case illustrates how external market prices may not be automatically lead to optimal decisions for the company as a while, even in a non-transfer pricing content. In this question, there is a net advantage of Sh.1,200 if the Shs.31,800 price is accepted.

	(1) **<u>Buy at Shs.30,000</u>**	(2) **<u>Buy at Shs.31,800</u>**
Cash flow for Firm as a whole	Shs.30,000	Shs.31,800 – (4,500 – 1,500) = Shs.28,800



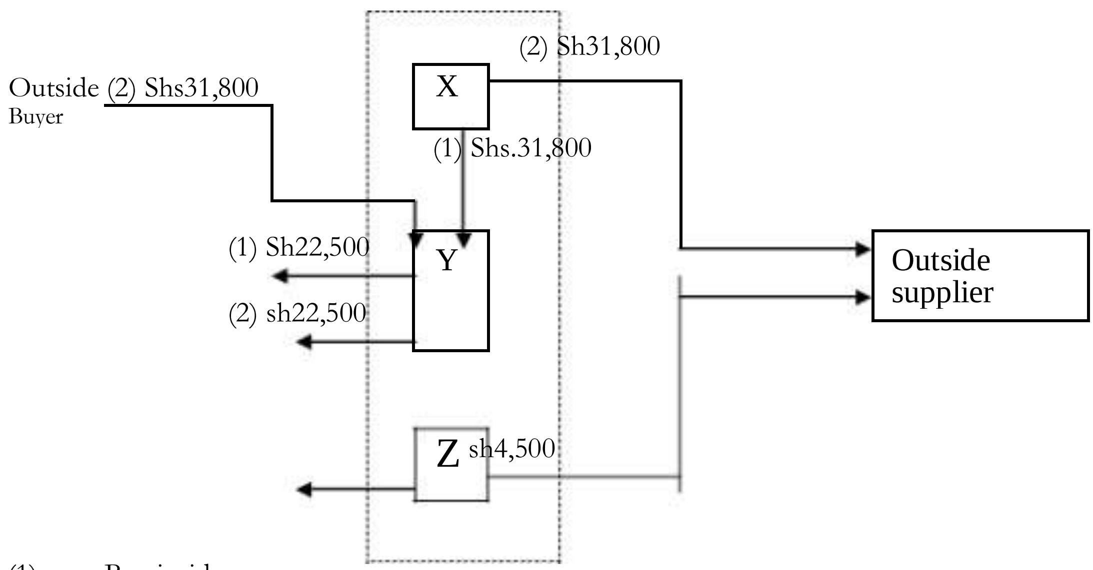
The conflicts among the two criteria for decentralization. The firm as a whole will benefit if X pays Shs.1,800 more of it"s goods. Z will also benefit. Goal congruence says that X be instructed or induced to pay Shs.31,800. However, if the system is not designed to give X some credit for its self sacrifice, the problems of managerial effort and autonomy well probably become more troublesome.

b) The decision to transfer at Shs.31,800 would have been wrong. The cash flow are diagrammed for both alternatives.

NET EFFECT ON CASHFLOWS

	Buy inside @ 31,800		Buy outside @ 31,800
Outflow of Y	(22,500)	Outflow of X	(31,800)
		Contribution	
		½ (31,800 – 22,500)	9,300
		½ (4,500 – 1,500)	3,000
			12,300
Cash outflow has firm as a whole	22,500	Cash outflow has Firm as a whole	19,500

Majimbo Ltd



(1) Buy inside
(2) Buy outside

NET EFFECT ON CASH FLOWS

	(1) Buy inside @ 31,800/=		(2) Buy outside @ 31,800/=
Outflow of Y	- 22,500	outflow of X	- 31,800/=
		contribution:	
		Y (31,800 – 22,500) Sh + 9,300	
		Z (4,500 – 1,500) Sh + 3,000	+ 12,300
Cash outflow for Firm as a whole	**- 22,500**	cash outflow for firm as a whole	**-19,500**

c) The general rule will work correctly. The minimum transfer price should be Outlay cost to point of transfer + opportunity cost for the firm as a whole.

22,500 + [(31,800 – 22,500) + (4,500 – 1,500)] = **Shs.<u>34,80</u>**

Part IV: Revision Questions and Answers

MANAGEMENT ACCOUNTING

Questions

QUESTION ONE

SPL Agencies specializes in the distribution of pharmaceutical products. They buy from pharmaceutical companies and resells to each of three different markets.

- General supermarket chains (GSC)
- Drugstore chains (DC)
- M and P Single-store pharmacies (MPS)

The management Accountant of SPL Agencies reported the following data for August 2003.

	GSC	DC	MPS
Average Revenue per delivery (shs)	30,900	10,500	1,980
Average cost of goods sold per delivery (shs)	30,000	10,000	1,800
Number of deliveries	120	300	1,000

SPL Agencies has been using gross margin percentage {(Revenue ÷ Cost of Goods sold)÷ Revenue}to evaluate the relative profitability of its customers groups (distribution outlets).

The management Accountant recently attended a seminar on activity based costing and decides to consider using it at SPL Agencies. The management Accountant meets with all the senior manages and other middle level managers. Generally, these individuals agree that there are five key activity areas at SPL Agencies.

Activity Area	Cost Driver
1. Customer purchasing order processing	1. Purchase orders by customers
2. Line item ordering	2. Line items per purchase order
3. Store delivery	3. Store deliveries
4. Cartons shipped to stores	4. Cartons shipped to a store per delivery
5. Shelf-stocking at customer store	5. Hours of shelf-stocking

Each customer purchase order consists of one or more line items. A line item represents a single product (such as Actifed Panadol Tablets). Each store delivery entails the delivery of one or more cartons of products to a customer. Each product is delivered in one or more separate cartons. SPL Agencies staff stack cartons directly onto display shelves in a store. Currently, there is no charge for this service and not all customers use SPL Agencies for this activity.

The August 2003 operating costs (other than cost of goods sold) of SPL Agencies are Shs 301,080. These operating costs are assigned to the five activity areas. The costs in each area and the quantity of the costs allocation base used in that area for August 2003 are as follows:

Activity Area	Total costs August 2003 (shs)	Total units of cost allocation base used in August 2003
1. Customer purchase order processing	80,000	2,000 orders
2. Line – item ordering	63,840	21,280 line items
3. Store deliveries	71,000	1,420 store deliveries
4. Cartons shipped to stores	76,000	76,000 cartons
5. Shelf stocking at customer stores	10,240	640 hours
	301,080	

Other data for August 2003 include the following:

	GSC	DC	MPS
Total number of orders	140	360	1,500
Average number of line items per order	14	12	10
Total number of cartons shipped per store delivery	300	80	16
Total number of store deliveries	120	300	1,000
Average number of hours of shelf – stocking per store delivery	3	0.6	0.1

Required:

(a) Compute the August 2003 gross – margin percentage for each of its three distribution markets and SPL Agencies operating income.

(b) Compute the August 2003 rate per unit of the cost allocation base for each of the five activity areas.

(c) Compute the operating income of each distribution market in August 2003 using the activity based costing information. Comment on the results. (11 marks)

(Total: 20 marks)

QUESTION TWO

SIMTON Limited has been operating a standard cost system and has accumulated the following information in relation to variances in its monthly management accounts:

i. Variances fall into two categories

	% of total No. of variances
Category A: Not worth investigating	64
B: Worth investigating	36
	100

ii. Out of category B, connective action has eliminated 70% of variances, but the remainder has continued.

iii. The cost of investigating averages is Shs 3,500 and that of connecting variances averages Shs 5,500.

iv. The average size of any variance not connected is Shs 5,250 per month and the company"s policy is to assess the present value of such costs at 24% per annum for a period of five months.

Required

(a) Prepare two decision trees, to present the position if an investigation is;
(i) Carried Out (4 marks)
(ii) Not carried (4 marks)

(b) Recommend, with supporting calculations, whether or not the company should follow a policy of investigating variances as a matter of routine. (2 marks)

(c) Explain briefly two types of circumstances that will give rise to variances in category A and two to those of category B. (6 marks)

(d) Mention any one variation in the information used that you feel would be beneficial to the company of you wised to improve the quality of the decision making rule recommended in (b) above. Explain briefly why you have suggested it. (4 marks)

(Total: 20 marks)

QUESTION THREE

Chemex limited manufactures three garden furniture products A B and C. The budgeted unit cost and resource requirements of each of these items are detailed below.

Timber cost	50	150	100
Direct labour cost	40	100	80
Variable overhead cost	30	75	60
Fixed overhead cost	45	112.50	90
Total cost	165	437.50	330
Budgeted volumes p.a	40,000	20,000	15,000

These volumes are believed to equal the market demand for these products. The fixed overhead costs are attributed to the three products on the basis of direct labour hours. The labour rate is Shs 40 per hour. The cost of the timber is Shs 20 per square metre. The products are made from a specialist timber.

A memo from the procurement manager advises you that because of a problem with the supplier it is to be assumed that this specialist timber is limited in supply to 20,000 square metres per annum.

The sales director has already accepted an order for 5,000 A, 1,000B and 1,500C, which if not supplied would incur a financial penalty of Shs 20,000. These quantities are included in the market demand estimates above.

The selling prices of the three products are:

A = Shs 200
B = Shs 500
C = Shs 400

Required

a) Determine the optimum production plan and state the net profit that this should yield per annum. (10 marks)

b) Calculate and explain the maximum prices, which should be paid per square metre in order to obtain extra supplies of the timber. (10 marks)

(Total: 20 marks)

QUESTION FOUR

Tumbo Limited makes and sells executive towels to which the following standard information relates:

i. Raw material is purchased at Shs 5.00 per square metre on a just-in- time basis. The purchasing manager has the responsibility for the servicing of raw material.
ii. The executive towel is made in a conversion process in which the variable conversion cost per product unit of output is estimated at Shs 12.50 (a half hour at Shs 25.00 per hour). The conversion process manager is deemed responsible for material usage and conversion process efficiency and expenditure variances.

The actual events for the period ending 31 December 2002, which may be considered as a representative
of future periods, are as follows:

i. 27,000 square metres of raw material purchased at Shs 4.50 per square metre is used to produce 8,000 units of the executive towels. The purchasing manager has made the decision to0 buy from a cheaper source.
ii. 4800 hours of conversion process time at a variable cost of Kshs 20.00 per hour is used to a achieve the output of Shs 8, 000 units of the executive towels. A charge in the processing method was implemented at the start of the period.

Production capacity is available in order to produce in excess of 5,000 units of the executive towels if the demand dictates.

Required:

i. Calculate standard cost variances for material usage and price and for conversion process efficiency and expenditure for the period ended 31 December 2002. (5 marks)
ii. Suggest, giving your reasons, whether decisions should be based on:

1. The variances over which each manager has control or
2. The effect of each material cost variance and conversion cost variance (5 marks)

It has been established that the reasons for the variances for the period ended 31 December 2002 are as follows;

i.80% of the extra material used is due to purchasing from the cheaper source. The balance off extra material usage is due to the amended processing method, which was introduced.
ii.60% of the extra hours used is due to the ammended processing method, the balance of extra hours id due to the change to a cheaper material source.

Required

i. Prepare a schedule of costs for the four alternative strategies, which incorporate different combinations of existing and amended material sources and conversion process methods and hence determine the profit maximizing strategy. (6 marks)
ii. Prepare a report which discusses ways in which the alternative decision making focus in each off sections (a) and (b) of the question has contributed to a change in decision making strategy by the company. (4 marks)

(Total: 20 marks)

QUESTION FIVE

Kenya Charity Organization has been holding annual dinner and dance for the last 100 years with the primary intention of raising funds.

This year, there is a concern that an economic recession may adversely affect both the number of persons attending the function and advertising space that will be sold in the programme published for thee occasion.

Based on past experience and current prices and quotations, it is expected that the following costs and revenues will apply for the function:

Shs.

Costs 2,800	Dinner and Dance	Hire of premises	700
		Band and entertainments	
		Raffle prices	800
		Photographer	200
		Food at shs 12 per person (With a guarantee of 400 Persons minimum)	
	Programme:	A fixed cost of shs 2000 Plus shs5 per page.	
Revenues	Dinner and Dance	Price if tickets shs20 per person Average revenue from; Raffle shs5 per person Photographs shs1 per person	
	Programme	Average revenue from advertising is shs70 per page	

A sub-committee formed to examine more closely the likely outcome of the function discovered the following from previous records and accounts:

No of tickets sold	No of past occasions
250 – 349	4
350 – 449	6
450 – 549	8
550 – 649	2
Total	20

No of programme pages sold	No of past occasions
24	4
32	8
40	6
48	2
	20

Several members of the sub-committee are in favour of using a market research consultant to carry out a quick enquiry into the likely number of tickets and the likely number of pages of advertising space that would be sold for this year"s dinner and dance.

Required:

(a) Calculate the expected value of the profit to be earned from the dinner and dance this year.

(b) Recommend, with relevant supporting financial and cost date, whether or not the Kenya Charity should spend Shs 500 on the market research enquiry and indicate the possible benefits the enquiry could provide. (10 marks)

(Total: 20 marks)

QUESTION SIX

a) Decision-making situations under short-term conditions require consideration of;

i. The cost classifications which the management accountant should use or ignore, and

ii. Factors which may affect the behavior of costs and hence the accuracy of the cost analysis and the relevance of the decision making.

Required

In the context of the above statement, discuss whether a company should make quantities of a component used in a manufacture of a product or buy in the component from an outside supplier or out source. (10 marks)

b) Coordination between operational and strategic planning is very essential in any organization, but lack of it may results in unrealistic plans, inconsistent goals. Poor communication and inadequate performance measurement.

Required

i. State key features or characteristics, which should be incorporated in each of strategic planning and operational planning. (4 marks)

ii. List and comment briefly on examples of the cost implications of each of the factors underlined in the above statement which may occur from lack of relevant and appropriate operational planning. Your answers should be in the context of strategic planning goal of sustaining competitive advantage at minimum cost through speedy delivery of quality products to clients. (6 marks)

(Total: 20 marks)

QUESTION SEVEN

A summary of additional information relating to the above points is as follows

	Units	Probability	Advance order (kshs)	Consversion Discount (kshs)	Conversion premium (kshs)
High	15,000	0.3	10.00	-	-
Medium	12,000	0.5	12.00	-	-
Low	8,000	0.2	14.00	-	-
Special ingredient B order discount or premium cost on conversion from:					
Low to medium				1.50	
Medium to high				1.00	
Low to high				2.00	
Medium to low					4.00
High to medium					3.00
High to low					9.00

Required:

(a) Prepare a summary which shows the total budgeted contribution earned by Botton Limited from the new product for the coming year for each of the nine possible outcomes which may result from the above data. (11 marks)

i. Using figures from your answer to (a) as relevant, indicate the advance level order size which should be chosen for special ingredient B and comment on the management attitude to risk where decision is based on each of the following criteria:

i. Maximizing expected value
ii. Maximax
iii. Maximum (9 marks)

(Total: 20 marks)

Bottom Limited identified a market for a new product at a selling price of shs 300 per unit. It has yet to quantify its estimate of the volume of the market in production units. The estimated cost structure of the product per unit is as follows:

- Raw materials; 8.5kg @ Kshs. 5 per kg.
- Special ingredient B 1.5kg
- Other variable costs; 60% of selling price

Bottom Limited must place an advance order for the coming year with the supplier of special ingredient B. It intends to enter into advance contract for special ingredient B for the coming year at one of 3 levels; high, medium or low – which correspond to the requirements of a high, medium or low of demand for the product.

The level of demand for the product will not be know when the advance order for special ingredient B is entered into. A set of probabilities have been estimated by management as to the likelihood of demand for the product being high, medium or low.
The amount of special ingredient B actually supplied will always be equal to the actual demand level. However, because of the effects of unidentified volume on supplier costs, the following points should be noted:

- Where the advance order entered into for special ingredient B is lower than that required for the level of demand which is actually achieved, a discount from the original price of supply is allowed to Bottom Limited for the total quantity of special ingredient B which is purchased.
- Where the advance order entered into for special ingredient B is in excess of that required for the actual level of demand achieved, a penalty payment; premium in excess of the original price of supply is payable for the total quantity of special ingredient B which is purchased.

Required:

- Prepare a summary, which shows the total budgeted contributions earned by Bottom limited from the new product for the coming year for each of the nine possible outcomes, which may result from the above data.
- Using figures from your answer to (a) as relevant indicate the advance level order size, which should be chosen for special ingredient B and comment on the management attitude to risk where decision is based on each of the following criteria.

QUESTION EIGHT

(a) Badi Division is part of the Dendi Group. Badi Division produces a single product for which it has an external market, which utilizes 80% of its production capacity.

Lewi Division, which is part of the Dendi Group, requires units of the product available from Badi Division as input to a product, which will be sold outside of the group. Lewi Divisions requirements are equal to 40% of Badi Divisions production capacity.

Lewi Division has a potential source of supply from outside the Dendi Group. This outside supplier can supply 75% of Lewi Divisions requirements. The outside source may wish to quote a higher price of Lewi Division only intends to take up part of its product availability.

Required:
Discuss aspects of transfer pricing principles and information availability, which will affect the likely achievement of group profit maximization from the sourcing decisions made by Lewi Division in the above situation. (14 marks)

(b) The management accountant may make use of opportunity cost in the following situations:

(i) Operation of a standard cost system;
(ii) Setting transfer prices from one division to another;
(iii) Deciding whether or not to accept a contract.

Required:

Discuss the relevance of the use of opportunity cost in each of the above applications.
(6 marks)
(Total: 20 marks)

QUESTION NINE

Kwaree Group limited has recently recruited you as the Accounts manager. You have been contacted to help in preparing a report entitled "How to design an effective management accounting information system." The report should incorporate references to specific environments/organization type(s) and examples of the management accounting tools that would be of use.

Required:
Prepare a draft report in a format that is presentable to the senior management team of Kwaree Group limited. **(Total: 20 marks)**

QUESTION TEN

Tobil Limited produces two products namely Winfil and Bootfil. Both are components that have a wide range of industrial applications. Tobil Limited share of the market for winfil is insignificant but is one of a limited number of suppliers of bootfil. Winfil is a long-established product and Bootfil is a new product.

The market price off winfil is shs320 and that of Bootfil is Shs. 237.50. Tobil Limited is unable to influence these prices.

The resource requirements for producing one unit of each of the two products are:

Products	Process hours	Kgs of material	Labour hours
Winfil	10	20	54.5
Bootfil	7.5	35.625	18.75

Materials cost Shs. 7.5 per Kg and labour costs Shs. 8 per hour. Other costs are constant. During the coming year the company will have the following recoveries available to it; 3,000 process hours, 10,000 Kgs of material and 15,000 labour hours.

Required:

Advise the company of output combination of winfil and bootfil that will maximize its profit in the coming year. (Support your advise with full financial analysis). (14 marks)

Draft a memorandum suitable for the circulation to Tobil limited board of directors explaining the commercial limitations of the model you have used in your answer in part (a) above. (6 marks)

(Total: 20 marks)

QUESTION ELEVEN

Solomon"s Limited sells an electric calculators but finds that it runs our of stock onoccasions and thus loses the contribution on missed sales. The estimated demand is 12,000 units per year which can be purchased at shs100 each and sold at Shs 155 each. The lead-time is 5 days guaranteed and the cost of holding a calculator is sh20 per year. The company"s economic order quantity is 1,200 calculators. Solomon"s Limited works a five-day week for 48 weeks a year. The demand figures have been analyzed for the last 27 weeks;

Calculators sold	No of days Level of sales occurred
30	10
40	20
50	50
60	30
70	15
80	5
90	5
	135

At present Solomon"s Limited uses a re-order level of 2,500 calculators and does not carryany safety stock because of the guaranteed delivery time. Ideally it wishes to satisfy customers on average at least 95% of the time whilst minimizing the associated costs.

Required:

1. The annual stock-out costs of using the present re-order level. (15 marks)
2. The re-order level at which the company would meet it"s 95% requirement. (5 marks)

(Total: 20 marks)

QUESTION TWELVE

Two companies are considering their bid strategy for installation of a computer center in a new university. Company A is considering four alternative courses of action;

A1- bid on both the hardware and the software

A2- bid only on the hardware

A3- bid only on the software

A4- no bid.

Company B is considering three alternative courses of action:

B1- bid on both

B2- bid only on the hardware

B3- no bid.

If Company A bids a1 and Company B bids b1, then the expected payoff to Company A is again of 2 (units of utility).

Company B is going to have a loss of 2. If company A bids a3 and Company B bids b2, then thee expected payoff to company A is a loss of 3 (A gain of 3 to Company B). We estimate thee payoffs in all other possible alternatives and summarize the information in the table below.

		Player B		
		B1	b2	b3
	A1	2	-1	3
	A2	-2	1	3
Player A	A3	-2	-3	2
	A4	-1	1	0

Required:

a. Find whether a pure-strategy solution exists. (3 marks)
b. Solve the problem. (4 marks)

The labour contract between Uchumi Company and its workers is about to expire and a new one has to be negotiated. From previous wage bargaining the union have certain strategies from the most hard-line (u1) to the most compromising (U4). The Company has similar strategies (c1 to c2) the payoff matrix is as follows:

Company

	C1	C2	c3	c4
U1	(5, -6)	(0, -2)	(-1,18)	(-2, -21)
U2	(7, -9)	(1, -1)	(3,4)	(-2,3)
U3	(13 -25)	(4,12)	(-4,3)	(-8,9)
U4	(-4,18)	(-7,10)	(-7,2)	(-12,15)

Required:

Determine the solution of the game if:

a. Co-operation is not allowed. (5 marks)
b. The Company and the union can negotiate. (4 marks)
c. What are the limitations of a game theory in business applications. (4 marks)

(Total: 20 marks)

QUESTION THIRTEEN

Minwa Tods Limited purchases a large number of wooden pullets for use in the storage and transportation of its products to replace those cost or damaged in transit. The average yearly requirement for the past 3 years has been 6,000 pullets. A quantity, which can be applied realistically to this year as well. The need for replacement pullets is relatively constant and the cost associated with the placing and receipt of an order is Shs30.

The inventory cost policy that Minwa Tods ltd has traditionally employed is to charge 22% of the purchase cost as the annual inventory holding cost for any item in the inventory. The standard price charged by the major manufacturing company is Shs16 per pallet.

Required:

a) Determine the optimum order quantity and the consequent time between orders (3marks)

b) Describe the assumptions you have made in part (a) and assess their likely validity within the context of this question. (6 marks)

c) The manufacturer offers a discount of 4% if Minwa Tods order 4,000 or more pullets at a time. Show that the discount is not financially beneficial to Minwa Tods. What percentage discount would be required for Minwa Tods to order 4,000 or more pullets at a time? (6 marks)

d) State the effect on the company"s inventory policy described in (a) if the supply of pullets has a variable lead-time. (5 marks)

(Total: 20 marks)

QUESTION FOURTEEN

(a) In transportation problems the following difficulties do occur; degeneracy, inequality of supply and demand and non - unique optimal solution.

Required:

(i) Explain the underlined words. (3 marks)

(ii) Explain how the transportation algorithm is adapted to overcome the above difficulties. (3 marks)

(a) Yoloks molders limited had orders to be completed next week for three of its products A, B, C as given the table below:

Product	order units
A	8000
B	4800
C	2000

There are 3 machines available for the manufacturing operations, and all thee 3 can produce each of the products at the same production rate. However, the unit cost of these products varies depending upon the machine used. The unit costs (in Shs.) of each machine are given in the following table:

		Products		
		A	B	C
	X	24	26	22
Machines	Y	28	26	30
	Z	22	20	26

Furthermore, it"s known that capacity for next week for machines Y and Z is 6,000 units and for machine X is 4,000 units.

Required:

i. Use the transportation model to find the minimum cost production schedule for the products and machines. Determine minimum cost. (6 marks)

ii. If this optimal solution is not unique, describe all other production schedule with the minimum cost. If the production manager would like the minimum cost schedule to have the smallest number of changeovers of production on machines, recommend the optimal solution. (8 marks)

(Total: 20 marks)

QUESTION FIFTEEN

Chopa manufacturers limited operate 30-day terms for all its customers. Experience has shown that 80% of all accounts are settled within one month and 70% of the remainder is settled during the second month after the customer has been sent a standard overdue account letter of those accounts still unpaid after two months. 50% are settled during the third month after a „final demand" has been sent. Any accounts still not paid after three months are dealt with in one of two ways. If the amount owing exceeds shs 1 million, the Company institutes legal proceedings to recover the money. Taking into account the legal costs involved, the proportion of the original sum owing, which is ultimately recovered varies as follows;

	Proportion recovered %	Probability
	Upto 40	0.1
40-60	0.3	
40-61		0.4
40-62	0.2	

This process takes a further three months before payment is finally received. If the amount owing is less than Shs 1 million, the debt is sold to a debt collecting company in return for 50% of the sum involved which is obtained after a further month i.e. at the end of month four, In recent months, the size of the accounts issued by Chopa is shown by the following distribution;

Size of account (Shs)	Probability
Upto 200,000	0.1
200,000-500,000	0.2
500,000-1,000,000	0.3
1,000,000-2,000,000	0.3
2,000,000-5,000,000	0.1

You may assume t6hat these is no relationship between the size of the account when its settled and the proportion recovered and that all accounts are settled on the last day of the month. The Company"s cost of capital is the equivalent of 1.5% per month.

Required:

What is the probability that, for any particular account, payment is received at the end of:

(i) The second month
(ii) The third month
(iii) The fourth month
(iv) The sixth month (5 marks)

What is the expected present value of a new account which has Shs 2 million outstanding.

Monthly Discount factors are;

Month	1	2	3	4	5	6	
Factor	0.9852	0.9707	0.9563	0.9422	0.9283	0.9145	(5 marks)

(c) Show how the system as a whole may be simulated by using the following random digits to determine the present value of two simulated accounts.

(d) Account 1 8 8 7 5 7

(e) Account 2 9 98 2 9 (10 marks)

(Total: 20 marks)

Answers

QUESTION ONE

a) Gross profit margin % = $\frac{\text{Revenue–cost of sales}}{\text{Revenue}}$ x 100%

GPM(GSC)=$\frac{30{,}900–30{,}000}{30{,}900}$ X 100% = 2.9%

GPM (DC) = $\frac{10{,}500–10{,}000}{10{,}500}$ X 100% = 4.8%

GPM (MPS\0 = 1980 – 1,800 X 100% =
9.1% 1,980

Operating Income
For Period Ending August 2003

Gross profit (GSC) = (30,900 – 30,000) x 120	108,000
Gross profit (DC) = (10,500 – 10,000) x 300	150,000
Gross profit (MPS) = (1,980 – 1,800) x 1,000	180,000
Total Gross profit	438,000
Less operating cost	301,080
Operating profit	136,920

b)
(i) Customer purchase order processing = $\frac{80{,}000}{2{,}000}$ = Sh 40 per order

(ii) Line item ordering = $\frac{63{,}840}{21{,}280}$ = Sh 3 per line item.

(iii) Store deliveries = $\frac{71{,}000}{1{,}420}$ = Shs 50 per store delivery

(iv) Cartons stopped to stores = $\frac{76{,}000}{76{,}000}$ = Shs 1 per carton

(v) Shelf-stocking at customer stores = $\frac{10{,}240}{640}$ = Shs 16 per hour

c) Operating income based on ABC
For the period ending August 2003

Gross profit as in (a)	108,000	150,000	180,000
Less operating costs			
(i) Customer purchase order processing	(5,600)	(14,400)	(60,000)
(ii) Line- item ordering	5,880)	(12,960)	(45,000)
(iii) Store deliveries	(6,000)	(15,000)	(50,000)
(iv) Cartons shipped to stores	(36,000)	(24,000)	(16,000)
(v) Shelf-stocking at customer store	(5,760)	(2,880)	(1,600)
Operating profit (loss)	48,760	80,760	(7,000)

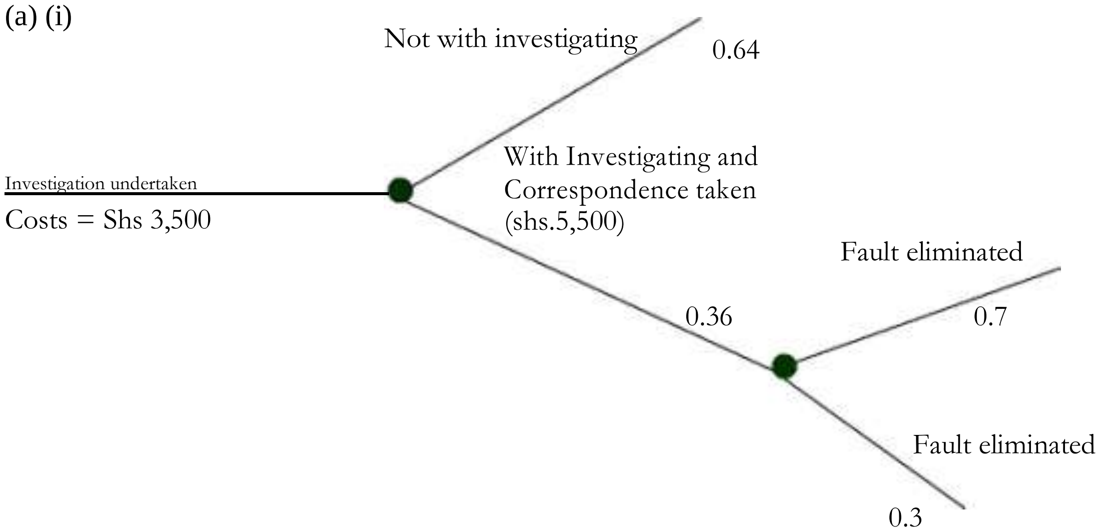
Comment

Drug-store is performing better than the other distribution chains with an operating profit of Shs 80,760.

QUESTION TWO

SIMTON LTD

(a) (i)



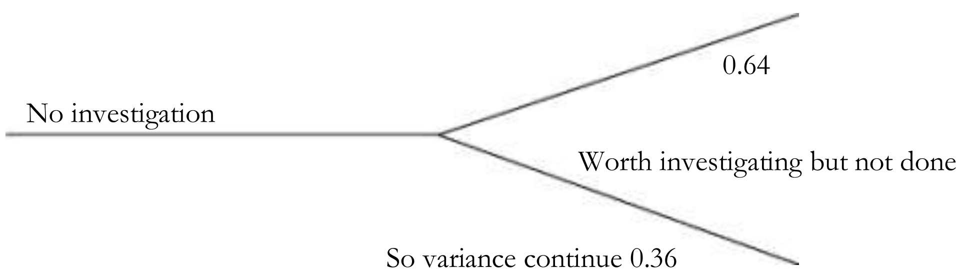
It is assumed that the Shs. 5,500 correction cost applies to all variances that the initial investigation indicates are worthy of further investigation. The expected cost of the investigation is carried out as:

Shs3,500 + (0.36 x Shs. 5,500) conctrine action + 0.36 x 0.3 x 24,746 (wl) (continuing variance) = Shs

Workings:

(i) Present value of Shs 5,250 for 5 months @ 24% p.a
(Shs 5,250 x 4,7135) = Shs 24,746 = Shs 8,153.

(b) Decision tree if an investigation is not carried out.



The expected cost if no investigation is undertaken = 0.36 x Shs 5,250 x 4,7135 = Shs 8,909.

c) Applying the expected value decision rule, the company should follow policy of investigating variances as a matter of routine. The expected cost of investigation is

Shs 8,153. Compared with an expected cost if no investigation is undertaken of Shs 8,909. On average, the befits from investigation are Shs 750 per variance.

d) Examples of category A variances include:

e) The above analysis assumes that the average variance is Shs 5,250 and additional costs of Shs 5,250 in excess of standard continue for five months. Presumably, working practices are changed every five months.

Costs of investigation and corrective action are Shs. 3,500 and Shs. 5,500 irrespective of the amount of the variance. It would therefore be appropriate to determine the value of variances which justify investigation. Let x be savings per month. The expected cost of investigation is equal to the expected cost of no investigation where:

Shs. 3,500 + (0.36 x Shs 5,500) + (0.36 x 0.3 x 4.7135x) = 0.36 x 4.7135x ∴ Only variances in excess of Shs 4,610 should be investigated.

QUESTION THREE

(a) Chemex Limited

	A	B	C	Total
Timber required per unit (m^2)	2.5(shs. 50÷Shs. 20)	7.5(shs. 150÷20)	5.0(shs. (100÷20)	
Budgeted sales volume (units)	40,000	20,000	15,000	
Total timber required (m^2)	100,000	150,000	75,000	325,000

Production requirements exceed the available supply of materials by 125,000m^2(325,000-200,000)

	A	B	C
Unit contribution (shs)	80.00	175.000	160.00
Timber requirements (m^2)	2.50	7.50	5.00
Contribution per m2 (shs)	32.000	23.33	32.00
Ranking	1	3	1

The scarce materials should be allocated as follows:

	Materials used	Balance unused
A (40,000 units x 2.5)	100,000	100,000
C (15,000 units x 5)	75,000	25,000
B (25,000/75 = 3,333 units)	25,000	-

The above production plan is sufficient to meet the order that has been accepted. The profit arising from the above production plan is calculated as follows:

	Shs
A (40,000 units x 80)	3,200,000
C (15,000 units x 160)	2,400,000
B (3,333 units x 175)	583,275
Total contribution	6,183,275
Fixed overheads(40,000 x Shs 45)+(20,000x112.50)+(15,000x shs90)	5,400,000
Profit	783,275

(a) The above production plan indicates that maximum sales demand for furniture products A and C has been met but there is unutilized demand for the furniture product B. Therefore any additional materials purchased will be used to make B yielding a contribution per unit of Shs 175,000 and a contribution per metre for material used of Shs 23.33 (see part (a) for calculation). The company should not pay above Shs 23.33 in excess of the acquisition cost of materials. The maximum purchase price is Shs 43.33 (Shs 20 + 23.33).

QUESTION FOUR

(i) 8000 units should have used (x 3 m^2)	24,000 m^2
But it used	27,000 m^2
Usage variance mm^2	3,000 m^2 (A)
X standard cost per metre	x shs5
Material usage variance	15,000 (A)

27,000 m2 should have cost (shs5)	shs 135,000
But it costed (x shs 4.50)	shs 121,000
Material price variance	Shs 13,500 (F)

8,000 units should have taken (0.5 hours)	4,000 hours
But took	4,800 hours
Efficiency variance in hours	800 hours
X standard cost per hour	x shs25 hours
Conversion process expenditure variance	20,000 (A)

4,800 hours should have cost (shs 25)	120,000
But cost (x shs20)	96,000
Conversion process expenditure variance	24,000 (F)

(ii) If the decisions are based on variances over which each manager has control;

The purchasing manager has control over the material price variance and he is likely to continue to purchase raw material from the cheaper supplier as such action will result in a favourable measure against which he will be assessed.

The conversion process manager would want to reduce the adverse material usage variance and so could desire additional expenditure on high-quality raw material, employee training or improved quality control procedures. Given that the conversion process efficiency variance over which he has control is also adverse, he could well request additional expenditure to improve the efficiency and effectiveness of the process. New machines or staff training could well reduce this variance.

2. If decisions are based on the effect of each of the variances.

The total material variance is an adverse variance of shs1500. Principally, because of the Kshs. 15,000 adverse usage variance. This could result in the purchase of a higher-quality (but not too expensive) raw material with the aim of reducing wastage.

The total conversion process variance is a favourable variance of Kshs. 4,000. Additional expenditure on improvements to the processing method would therefore not be desirable

(b)

	Existing material. Existing process	Existing material Amended process	Amended material Existing process	Amended material Amended process
Material				
3 x 8,000 x Shs. 5	120,000	-	-	-
3.075 (wl)x8000x Shs. 5	-	123,000	118,800	-
3.3 (wl) x 8000 x Shs. 4.50	-	-	-	-
3.375 (wl) x 8000 x Shs. 4.50	-	-	-	121,500
Conversion process			-	-
0.5 x 8000 x Shs. 25	100,000	-	-	-
0.56 x 8000 x Shs. 20	-	89,600	-	-
0.524 x 8000 x Shs. 25	-	-	104,800	-
0.6 x 8000 x Shs. 20	-	-	-	96,000
	220,000	212,600	223,600	217,500

The profit maximizing strategy is to use the existing material source and the amended conversion process, giving a total material and conversion cost of Kshs 212,60.

Workings:

1 actual material usage per unit of product (executive towels) with amended process and amended source) =27,000/8,000 = 3.375m^2

Additional usage per unit due to amended material source = (3.375 – 3) x 80% = 0.3m^2

Additional usage per unit due to amended conversion process =(3.375-3) x 20% = 0.075m^2

∴ If source changed standard usage per unit = 3.3m^2

If process charged, standard usage per unit = 3. 075m^2

2 Actual hours per unit of the executive towel (with amended process and amended source)

$= \frac{4800}{8000} = 0.6$ hours

Additional hours per unit due to amended conversion process =(0./6- 0.5) x 60% = 0.06 hours.

Additional hours per unit due to amended material source (0.6 – 0.5) x 40% = 0.024 hours.

∴ If process charged, standard hours per unit = (0.5 + 0.06) =\ 0.56 hours

If source charged, standard hours per unit = (0.5 + 0.24) = 0.524 hours.

QUESTION FIVE

KENYA CHARITY ORGANIZATION

(a) Expected value of profit

Dinner & Dance

No of tickets sold	Frequency	Probability (a)	Revenues excluding programs	Food costs (shs)	Fixed costs (shs)	Profit(loss) (b)	Expected value (ax5) shs
300	4	0.2	7,800	4,800	4,500	(1,500)	(300)
400	6	0.3	10,400	4,800	4,500	1,100	330
500	8	0.4	13,000	6,000	4,500	2,500	1,000
600	2	0.1	15,600	7,200	4,500	3,900	390
	20	1.0					1,420

∴ Expected profit p.a. for dinner = Kshs. 1,420 Programmes

Pages sold	Frequency	Probability (a)	Income (shs)	Costs Shs	Profit(loss) shs (b)	Expected value
24	4	0.2	1,680	2,120	(440)	(88)
32	8	0.4	2,240	2,160	80	32
40	6	0.3	2,800	2,200	600	180
48	2	0.1	3,360	2,240	1,120	112
						236

Expected profit from programmes = Kshs. 236

∴Total expected profit = 1656 (1420=236)

(b) There is no indication given on the reliability or the results expected from the market research enquiry so that this part of the question cannot be answered without making assumption. Therefore the following assumptions are made in answering this question:

i. That the dinner need not be held each year i.e. if the enquiry shows that not enough tickets will be sold to produce a profit the dinner can be cancelled.

ii. If the dinner is cancelled no programmes are sold or produced.

iii. The shs2000 fixed cost is an avoidable charge if no programmes are produced.

iv. The programmes sales (an associated probabilities) are independent of the number of tickets sold i.e. the schedule of the programme demand could occur for any level of ticket sales.

Based on these assumptions, the expectable loss can be calculated:

(Loss when 300 tickets sold (P= 02) Kshs		Profit (loss) on programme sales with Kshs		Total loss as Kshs	Joint probability (prTxprP) (b)	Expected loss (axb) Kshs
	Pr T		Pr P			
(1500)	0.2	600	0.3	(900)	0.06	(54.0)
(1500)	0.2	(440)	0.2	(1940)	0.004	(77.6)
(1500)	0.2	80	0.4	(1420)	0.08	(113.6)
(1500)	0.2	1120	0.1	(380)	0.02	(7.6)
						252.8

∴The total avoidable expected loss is Kshs. 252.8 and the survey costs Kshs. 500 and thus it"s not worthwhile.

QUESTION SIX

COST CLASSIFICATIONS FOR DECISION MAKING

The cost (and benefits), which should be used for decision making, are relevant costs: in general, future, incremental cash flow, which arise as a consequence of choosing a particular course of action

(a) Future Costs

Any cost that was incurred in the past and cannot now be recovered in a cost and is therefore not relevant to decision making. Only costs that will be incurred in the future if a particular course of action is taken are relevant.

(b) Incremental Costs

Incremental costs are the additional cost incurred as a result of decision and is therefore relevant. Any costs will be incurred in the future regardless of whether or not the decision is taken (committed costs) are not relevant.

(c) ©Cash Flow

It is assumed that a decision is taken to maximize „satisfaction" of the person or organization in question. Although the time value of money affect the worth of cash flow from a project over a longer period, all short-run decision are assumed to improve, „satisfaction „ if they increase net cash in flow. Depreciation is not, therefore a relevant cost and it is only information pertaining to a cash flow, which is relevant to decision making.

In general, variable costs are relevant costs because they are only incurred if a decision to do something is taken, whereas fixed costs are irrelevant to decision because they will be incurred regardless of the course of action taken. There is, however, a school of thought that argues that fixed costs are not always irrelevant. They have put forward the idea of the attributed cost whi8ch is made up of the following;

(a) Short run visible costs

(b) Divisible fixed costs. A fixed cost is divisible if significant shifts in the level of activity will require increases in the total amount of that costs.

(c) Indivisible traceable costs. This is an indivisible fixed costs that can be traced directly to a product or function

Finally, opportunity costs (the benefit forgone by choosing one option instead of the next best alternative) are relevant. Historic costs are not. One area in which the concept of relevant costs is needed is the make or buy situation.

A make or buy problem involves a decision by an organization about whether it should make a product with its own internal resources, or whether it should buy the product from an outside supplier. If an organization has the choice of whether to manufacture a component internally or buy in from outside and it has no source resources that put a restriction on what it can do itself, the principal relevant costs are the differential costs between the two options.

Costs behaviour and decision-making

Although it is easy to generalize and to state that, for example, variable are relevant to a decision and fixed cost are not a proper understanding of the behaviours of c0osts is vital to ensure that the cost analysis is accurate. Consider the simple example in part (a) of the answer. The variable cost per unit could be made up of direct materials, direct labour and direct machinery costs. The direct material cost may include discounting for material that are used for a variety of items. The company overall costs may increase if the level of such materials purchased falls. The direct labour cost may not be wholly variable in the short term. Some employees ay be made redundant if internal manufacturing ceases and may not be fully utilized on other work, thereby making labour a semi-variable cost, the fixed cost, the fixed part of which would have to be estimated.

Strategic planning is the process of setting or changing the long-term objectives orstrategic target of a organization. These would include such maters as the selection of products and markets, the required level of company profitability, the purchases and disposal of subsidiary companies or major fixed asset. And so on. A notable characteristic of strategic planning is as follows;

a. It will generally be formulated in writing, and only after much discussion by committee (the board).
b. It will be (or should be) circulated to all interested parties within the organization and perhaps even to the press.
c. It will trigger the production not of direct action but of a series of lesser plan for sales. Production, marketing, and so on.

Operational planning work out what specific tasks needs to be carried out in order toachieve the strategic plan. For example a strategy may be to increase sales by 5% per annum for at least five years, and an operational plans to achieve this would be sales reps" weeklysales target. (Note: we use the word „strategic" and „operational" in the sense implied in the well-known work of Robert Anthony).

Notable characteristic of operational planning are the speed of response to changing conditions and the use and understanding of non-financial information such as data about customer orders or raw material input.

ii)

1. Unrealistic operational plan will force staff to try hard with too few resources. Mistakes and failure are almost inevitable. This means poor quality products; costs include lost sales arranging for returns, and time wasted dealing with complaints and rectification work. Over ambitions plan may also mean that more stocks are produced than an organization could realistically expected to sell (meaning the costs of written-offs, opportunity costs of wasted production resources and unnecessary stock holding cost are incurred.
2. Inconsistent strategic planning and operational planning goals may mean that additional cost are incurred. For example, an operational plan may require additional inspection point in a production process so as to ensure that quality products are delivered to customers. The resulting extra costs will be at odds with the strategic planning goal of minimum costs.
3. Poor communication between the senior management who set strategic goals and lower level operational management could mean that operational manager are unaware

of the strategic planning goal of sustaining competitive advantage at minimum cost through speedy delivery of quality products to customers. Some operational managers may therefore choose to focus on quality of products while others attempts to produce as many product as possible as quickly as they can; still others will simply keep their heads down and do as little as possible. This will lead to lack of co-ordination; there will be bottlenecks in some operational areas, needing expensive extra resource in the short term, and wasteful idle time in other areas.

4. Inadequate performance measurement will mean that the organization has little idea of which area is performing well and which need attention. If quality of products and speed of delivery are the main source of competitive advantage a business needs to know how good it is these thing. For example, if an organization measures only conventional accounting results it will know how much stock it has and how much it has spent on „carried out". It will not know the opportunity cost of cancelled sales though not having stock available when need or not being able to deliver it on time.

Equally, the quantity of products need to be measured in terms not only of sales achieved, but also in terms of customers complaints and deed back; again the costs is the opportunity cost of cost sales.

Otherwise, repairs and maintenance cost of machinery would vary withy the level of activity but machines would still need a certain level of maintenance even if they were not being used,(the company might, one the other hand, be considering selling the machinery, accounts of which may not have been taken). The estimate of direct attribute fixed costs may be subjective judgments, such as deciding which supervisor salaried would be avoidable if the service were contracted out. The variable costs may be based on past data that does not take account of potential reduction or increases in productivity due to factors such as untrained staff or new machines.

Finally, the costs of buying in may also be high subjective. Accounts may not have been taken of costs such as increases or decreases in tie spent delivering the components (from abroad perhaps) or complaints or costs resulting from badly made component. It is therefore obvious that the behavior of costs associated withy a decision must be fully understood and their relevance to that decision ascertained before the decision is finally made.

QUESTION SEVEN

BOTTOM LIMITED

1. The variables in this instance are advance order size (high, medium, low) and actual level demand (high, medium, low).

Advance order size	Actual demand	Contribution excluding ingredient B(wks)	Cost of ingredient B(wks)	Net contribution
		Shs. „000"	Shs. „000"	Shs. „000"
High	High	1162.5	225.0	937.5
	Medium	930.0	234.0	696.0
	Low	620.0	228.0	392.0
	High	1165.5	247.5	915.0
	Medium	930.0	216.0	714.0
	Low	620.0	192.0	428.0
	High	1165.5	270.0	892.5
	Medium	930.0	225.0	705.0
	Low	620.0	168.0	452.0

Workings:

1. Cost of excluding costs of special ingredient B

	Shs.
Selling price	300.00
Raw materials (8.5kg x 5)	42.50
Variable cost (60% x 300)	180.00
	77.50

	High	Medium	Low
Production demand (units)	15,000	12,000	8,000
X contribution per unit	77.50	77.50	77.50
	1,162,500	930,000	620,000

➢ **High advance order, high actual demand**

Cost of B = 15,000 X 1.5 KG X Shs 10 = Shs 225,000

➢ **High advance order, medium actual demand (Shs. 3.00 premium)**

Cost of B = 12,000 x 1,5kg x Shs (10 +3) = Shs 234,000

➢ **High advance order, low actual demand (Shs. 9.00 premium)**

Cost of B = 8,000 x 1,5kg x Shs. (10 + 9) = Shs 228,000

➢ **Medium advance order, high actual demand (Shs. 1 discount)**

Cost of B = 15,000 x 1,5kg x Shs (12 – 1) = Shs. 247,500

- **Medium advance order, medium actual demand**

  Cost of B = 12,000 x 1.5kg x Shs. 12 = Shs. 216,000

- **Medium advance order, low actual demand (Shs. 4.00 premium)**

  Cost of B = 8,000 X 1.5kg x Shs. (12 +4) = Shs. 192,000

- **Low advance order, high actual demand (Shs 2 discount)**

  Cost of B = 15,000 x 1.5kg x Shs. (14 – 2) = (Shs 1.50 discount)

- **Low advance order, medium actual demand (Shs 1.50 discount)**

  Cost of B = 12,000 x 1.5kg x Shs (14 – 1.50) = Shs 225,000

- **Low advance order, low actual demand**

  Cost of B = 8,000 x 1.5kg x Shs 14 = Shs 168,000

(b) (i) maximizing expected value

EMV_{High} = 0.3(937.5) + 0.5(696) + 0.2(392) = Shs 707,650

EMV_{medium} = 0.3(915) + 0.5(714) + 0.2(428) = Shs 717,100

EMV_{low} = 0.3(892.5) + 0.5(705) + 0.2(452) = Shs 710,650

If management wishes to maximize expected value, a medium sized advance order should be placed. This approach takes a neutral attitude towards risk since all possible outcomes and probabilities are taken into consideration.

(ii) Maximax

The maximax decision rule involves choosing the strategy with the possible result, in this instance choosing the strategy which maximizes contribution. The decision maker would therefore choose to make a high advance order, so that there is a chance of contribution of Shs 937,500.

Such an approach takes a risk-seeking attitude since, although it offers the chance of the highest contribution, there is a 20% chance that the lowest possible contribution of Shs 392,000 could occur.

(iii) Maximum

The maximum decision rule involves choosing the strategy that offers the least unattractive worst outcome, in this instance choosing the outcome strategy which maximizes the minimum contribution. The decision maker would therefore choose to place a low-sized advance order, which has a lowest possible contribution outcome of Shs. 452,000. This is better than the course possible outcome from high and medium advance order sizes, which would provide contributions of Shs. 392,000 and Shs. 428,000 respectively. Such an approach therefore takes a risk-averse attitude.

QUESTION EIGHT

a. Generally, transfer prices should be set at marginal cost + opportunity cost of the transfer to Dendi Group. In order that transfer prices can be set at marginal plus opportunity cost to the group of the internal transfer of the product, information must flow freely between Lewi and Badi Division. The degree of autonomy granted to the individual division will affect how freely information flows. However, if management of Badi Division is allowed a significant degree of autonomy whereby they make decisions independently and are not tied down by instructions from head office, the transfer price they offer is likely to be as high as the market will bear. As per the transfer pricing policy;

(i) Badi Division has an external market for 80% of it"s production capacity, the transfer price of those products representing this proportion of Badi Division"s production capacity should be set at the product"s market price (because the opportunity cost of not making the transfer would be the contribution forgone on an external sale). If Lewi Division is able to acquire the product from an external supplier at less than the market price, group profits will therefore be increased because Badi Division can sell at market price and Lewi Division can purchase at less than the market price.

(ii) It"s possible that these may be some costs incurred on external sales of the product, which are not incurred when the product is transferred internally (such packaging and delivery costs). If this is the case, the transfer price should be an adjusted market price (i.e. market price less costs not incurred on transfers). Such a transfer price allows Badi Division to earn the same profit on internal transfers and external sales and means that Lewi Division will not consider buying from external suppliers quoting a price higher than the adjusted market price fo9r this proportion of it"s requirements.

(iii) The output from the 20% of Badi Division"s production capacity not utilized on supplying the external market should be offered to Lewi Division at transfer price based on the marginal cost of the product (because there id no opportunity cost associated withy transferring this output to Lewi Division). Lewi Division will therefore not buy from any external supplier quoting a price in excess of the marginal cost of the product for this proportion of its requirements.

(iv) The external supplier can supply 75% of Lewi Division"s requirements, which is equivalent to 30% (75% x40%) of Badi Division production capacity. Given that 20% of Badi Division"s production capacity is spare, the division should aim to supply 20% of this 30% at marginal cost. The remaining 10% represents sales that Badi Division makes outside the Group. The 10% should therefore be offered to Lewi Division at and adjusted market price.

Badi Division should therefore offer the following transfer prices

- 20% of production capacity at marginal cost
- 80% of production capacity at adjusted market price.

Lewi Division can therefore compare these prices against those being offered by the outside supplier and, taking into account that a higher price may have to be paid if the full 75% is not purchased from the outside supplier, decide on the source of the product that it requires.

(b)

i. The opportunity cost can be used in standard costing systems which report the contribution gained or lost as a result of deviations from the budget. Opportunity costs are particularly if the standard costs are updated so that planning and operational variances cam be identified. For example, the sales volume variance can then be analyzed to show the potential contribution gained or lost as the result of various deviations from the budget
ii. Opportunity cost is relevant in the setting of transfer prices if the transferring division is working at full capacity and is able to sell it"s output externally at a profit.

In this case, the transfer price would be equal to variable cost plus opportunity cost, where the opportunity cost is the contribution forgone from the external sale. The resulting transfer price should result in the most profitable use of the transferring divisions resources, but it may lead to behavioral problems.

iii. If a contract involves the use of resources which can be used profitably in other ways, opportunity cost can be a useful concept., It provides a common basis for the valuation of resources which have a number of competing demands on them. The use of opportunity costs also help to avoid overstating the costs of a contract because it excludes irrelevant sunk or past costs.

N/B Out of all the above three case, the main problem is the identification of opportunitycost in practice and the fact that changing conditions may mean opportunity costs change frequently.

QUESTION NINE

Management accounting information has three principal objectives:

a. Aid to short term planning and strategic planning
b. To facilitate control and decision making
c. To provide the base for the effective use of management accounting techniques.

This planning, controlling and decision-making activities are essential of the organization is to achieve its objectives. These objectives may encompass a wide range of issues from high-level strategic plan to the control of detailed operating activities, such as the labour hours worked during the month. There is therefore a need to identify the information needed for abroad range of business activities.

Given a spectrum from long term strategic to short term operation information need, the data source will probably exhibit the following characteristics. Strategic information need will tend toward long term, external and global data, which is obtainable from customers, suppliers, trade associations and government, whereas detailed operational information need are likely to come from within the business.

The recording and processing methods adopted need to consider;

- Collecting and recording monetary and non-monetary information
- The influence and need of management accounting techniques
- The influence of IT system
- The type of business entity

In deciding on the format of the report generated, consideration should be given to;

- Analysis and dissemination to relevant individuals and group
- Management culture, structure and style
- The appropriate accuracy, detail and speed and any trade-off between them
- Security, access and controllability and other organizations
- Needs, skills and system knowledge of the potential users.
- Other general issues that need to be considered are;
- Expected planned life of the system
- Developments in MIS
- Available resource and time constraints in terms of commissioning dates

The above discussion should include reference to a specific organization of which the candidate has experience/knowledge.

The design of the system should consider the management accounting tools that there are likely to be utilized e.g. budgeting, costing, TQM, bench making can these system deliver the information need of these techniques.

QUESTION TEN

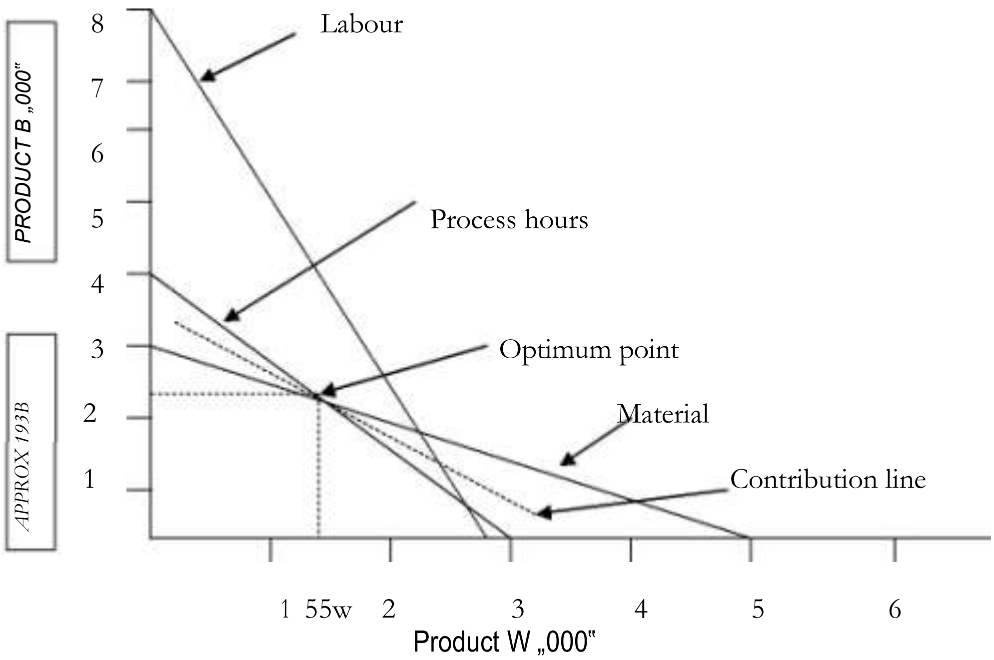
a) Let: Winful be W (output)
Bootful be B (output)

	W (Shs)	B (Shs)
Material Shs 7.5/kilo	60.00	106.875
Labour Shs 8/hour	174.40	60.00
	234.40	166.875
Selling price	320.00	237.50
contribution	85.6	70.625

Maximize z = 85.6W + 70.625B

Subject to: 10W + 7.5B ≤3,000 (process hours)
20W + 35.625B ≤10,000 (materials)
54.5W + 18.75B ≤15,000 (labour hours) W, B, ≥ 0 (non negativity)

The constraints are graphed and the contribution line drawn at a slope of 1.21200: 1B (i.e 85.6: 70.675)



Maximum contribution = 153(85.6) + 193(70.625 = Shs 26,898.625

(b) Limitations of LP model.

(i) Can only be used when relationships can be assumed to be linear, it thus cannot be applied appropriately in situations where the relationship isn"t linear.

(ii) Linear programming can only be used if an optimal solution actually exists.

(iii) It also assumes that units produced are resources allocated are infinitely divisible which is not always the case in reality.

(iv) The model assumes that the contribution per unit for each product and the utilization of resources per unit are the same whatever quantity of output is produced and sold within the output range being considered.

QUESTION ELEVEN

Solomons Limited

b) Cost of Stock outs

Re-order level	safety	Holding stock	Possible Costs (shs)	Probability Shortage	No of orders	Shortage costs (shs)
250	0	0	50	0.22	10	6050
			100	0.11	10	6050
			150	0.04	10	3300
			200	0.04	10	4400
			Total cost = Shs 19,800			
300	30	600	50	0.11	10	3025
			100	0.04	10	2200
			150	0.04	10	3300
			Total cost = Sh 9,125			
350	70	1,400	50	0.04	10	1100
			100	0.04	10	2200
			Total cost = Shs 4,900			
400	130	2,600	50	0.04	10	1100
			Total cost =Shs 3,700			
450	180	3,600	0	0.0	10	0
			Total cost = Shs 3,600			

∴ Annual stock out cost of using present re-order level of 250 = Shs 19,800 (from the table)

(b) From the table; at 450 – re-order level has the minimum cost and enables the company meet its 95% requirement.

Workings:

Units sold	No of days	Probability	Units x probability
30	10	0.07	2.1
40	20	0.15	6.0
50	50	0.37	18.5
60	30	0.22	13.2
70	15	0.11	7.7
80	5	0.04	3.2
90	5	1.00	3.6
	135	1.00	54.3

Average demand = 54.3 units per day = 54 units per day.

Average usage in lead time 543 x 5 = 270 units

Orders per annum = $\frac{12,000}{1,200}$ = 10

Stock out cost per unit = Shs 155 – shs 100 = Shs. 55

QUESTION TWELVE

GAME THEORY

$$\begin{array}{c|ccc|c}
 & b_1 & b_2 & b_3 & \text{min} \\
\hline
a_1 & 2 & -1 & 3 & -1 \\
a_2 & -2 & 1 & 3 & -2 \\
a_3 & -2 & -3 & 2 & -3 \\
a_4 & -1 & 1 & 0 & -1 \\
\hline
\text{Max} & 2 & 1 & 3 &
\end{array}$$

No saddle point

(i) Reduction process from above.

a_1 is better than a_3 thus eliminate a_3
b_1 is better than b_3 thus eliminate b_3
a_4 is better than a_2 thus eliminate a_2

		2/5 bi	3/5 bj
2/5	a:	2(4/25)	-1(6/25)
3/5	a:	-1	1(9/25)

Let aij bij Proportion of each player playing their respective strategies.

$\Sigma ai = bj = 1$
$2a_i - 1a_4 = -ai + a_4$
$3a_i - 2a_4 = 0$
$2a_i - 2a_4 = 2$
$5a_i = 2$
$a_i = 2/5 \; a_4 = 3/5$

$3b_i - 2b_2 = 0$
$2b_i + 2b_2 = 2$
$5b_i = 2$
$b_i = 2/5 \quad b_2 = 3/5$

EXPECTED VALUE OF THE GAME
$= 8/25 - 6/25 - 6/25 + 9/25 = 8/25 + 9/25 = 17/25$

In the long run, a wins 17/25 and that b losses 2

	C_1	C_2	C_3
U_1	(0,-2)	(-1,18)	(-2,-21)
U_2	(1, -1)	(3,4)	(-2, 3)
U_3	(4, 12)	(-4,3)	(-8, 9)

$OX_1 + X_2 + 4X_3 = -1X_1 + 3X_2 - 4X_3$
$OX_1 + X_2 + 4X_3 = -2X_1 - 2X_2 - 8X_3$
$X_1 + X_2 + X_3 = 1$

(ii)

	C_2	C_3	C_4
U_2	(1, -1)	(3, 4)	(-2, 3)
U_3	(4, 12)	(-4, 12)	(-8, 9)

$X_1 + 4X_2 = 3X_1 - 4X_2 = -2X_1 - 8X_2$

(c) LIMITATIONS OF GAME THEORY IN BUSINESS APPLICATIONS

(i) Game theory has weary theoretical foundations for example it does not adequately cater for negotiations, collusions, coalitions and informational asymmetry.

(ii) Presence of government: the government is usually a participant sometimes an active player and in other situations, the government acts as an arbitrator.

(iii) Presence of trade unions: trade union members belong to competing firms. There is no provision on how to incorporate this in game theory.

(iv) As the number of players increase, the analysis becomes exceedingly complex.

(v) Data availability: Data may not be early or readily available e.g. opponent"s strategies, and pay-off specification.

QUESTION THIRTEEN

(a) Determine the optimum order quantity and consequent time between the orders:

Annual demand D = 6,000 pallets per year.
Cost of order Co = Kshs. 30 per order
Cost of purchase C = Kshs. 16 per pallet
Cost of holding Ch = 22% of 16 per pallet per year

$$EOQ = \sqrt{\frac{2CoD}{Ch}} = \sqrt{\frac{2x30x6,000}{0.22x16}} = 320 \text{ pallets per order.}$$

The optimum order quantity is 320 pallets.

$$\text{No of orders per year} = \frac{D}{EOQ} = \frac{6,000}{320} = 19$$

∴The orders should be placed every 19/12 years, that is 1 ½ every month approximately.

(b) Assumptions implicit in the EOQ model.

(i) Demand for pallets is spread evenly through the year. This assumes that the pallets are lost or damaged on a regular basis and that production is uniform throughout the year. Both of these are unlikely to be strictly the case in practice.

(ii) Cost of ordering and storage are known and fixed, and independent of the order size. This is probably true fro the storage costs, since they are based on the costs of capital. The assumption is probably not reliable for the ordering costs since the order size is likely to affect the cost of delivery, unloading etc.

(iii) Lead time is known and fixed so that new order arrives just as the stock level falls to zero. This assumption may be reliable – it depends on the supplies.

(c) Total annual cost of stockholding and purchase, TC, in shillings per year is:

$$TC = Co\frac{D}{EOQ} + Ch\frac{EOQ}{2} + CD \text{ Kshs. per year}$$

At EOQ = of 320

$$TC = 30x\,\frac{6{,}000}{320} + 0.22x16x\,\frac{320}{2} + 16x6{,}000$$

$= 562.5 + 563.2 + 96{,}000 = Sh97{,}125.7$

With the discount, the purchase price = 96% of Kshs 16 = Kshs. 15.36

Therefore, when EOQ = 4,000

$$TC = 30x\,\frac{6{,}000}{4{,}000} + 0.22x15.36x\frac{4{,}000}{2} + 15.36x6{,}000$$

$= 45 + 6{,}758.4 + 92{,}160 =$ Kshs. 98,963.4 per year.

This is a higher cost. The discount is not worth having, since the saving in the purchase price and ordering costs does not compensate for the increased storage costs.

Consider the purchase price at the point at which the total annual cost is the same with and without the discount. Suppose at this breakeven point the purchase price is x% of Kshs. 16, then:

$$TC = 30x\,\frac{6{,}000}{4{,}000} + 0.22x\frac{(xx16)}{100}x\,\frac{400}{2} + \frac{(xx16)}{100}x6{,}000$$

$45 + 70.4x + 960x = 45 + 1{,}030.4x$

When $TC_{4000} = TC_{320}$

$45 + 1{,}030.4X = 97{,}125.7$

$\therefore\ 1{,}030.4x = 97{,}080.7$

$x = 94.2{,}165$

The discount which must be offered is (100 – 94.22)% = 5.78%

(d) If the lead time is variable the company may go out of stock of pallets if the re-order level is fixed. This problem can be reduced by the holding of a buffer stock. The size of this buffer stock would be chosen so that the probability of a stock out is reduced on an acceptable level.

QUESTION FOURTEEN

(a)

i. It is a transportation algorithm whereby the allocation of a number of routes used is less than (number of rows + number of columns – 1)

Inequality of supply and demand

It is a requirement of the transportation algorithm whereby it requires that the total amount demanded at all the destinations to be equal to the total amount available at all the origins.

Non-unique optimal solution

The optimal solution is non-unique if there is more than one allocation of routes which produce the minimum cost.

ii. Degeneracy

The difficulty may be overcome by the use of dummy routes. For example, if the actual number of routes used is one too few, then an empty cell is selected and treated as if it were an allocated cell. If we wish, we can allocate a very small amount to this cell. The amount allocated should be so small that the associated transport costs can be ignored. If the transport allocation is degenerated by two routes, then we use two empty cells in this way, etc.

Inequality of supply and demand

If the above statement (a(i)) is not true, then algorithm cannot be used until a dummy origin or destination has been added to satisfy this condition. If the total supply exceeds the total demand, then a dummy destination is added which has a demand equal to the excess supply. If the total supply is less than the total demand, then a dummy origing is added which has a supply equal to the shortfall. The transportation costs for all routes involving the dummy are zero.

Non – unique optimal solution

The existence of other optimal allocations can be identified by examining the shadow cost. If any of the costs are zero, then alternative optima exist. A zero shadow cost means that items may be moved into that cell without increasing the total cost of the allocation. Non-unique optimal solutions are not a difficulty in the transportation problem, but it does mean that the decision maker must use some criterion other than cost, to chose the allocation of routes to be used.

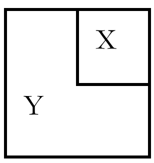
(b)

(i) Find the minimum cost production schedule using the transportation method:

Total capacity of the machine is 16,000 units
Total requirements is 14,800 units.
Therefore there is excess capacity of 1200 units. A dummy product must be included in the transportation tableau, for which the demand is1200 units next week.

Set up a transportation tableau and use of Vogel"s methods to make the initial allocation.

Key: unit production cost



Allocation

The subscripts indicate the order in which the allocation are made, for example, the penalty 26, is the first penalty selected. The allocation 600, is the first allocation made etc.

		Products				
	A	B	C	Dummy	Capacity	Penalty
X	24 2000_4	26 -	22 2000_3	0 -	0	22 2 2
Y	28 4,800	26 -	30 -	1,200	0	26 2 2
Z	22 $1,200_4$	20 $4,800_2$	26 -	-	0	20 2 4
Demand:	0	0	0	0		
Penalty	2 2 2	6 6_2	4 4 4_3	0		

For a basic allocation, we require:

No. of allocated cells = no of rows + no. of columns – 1

In this case, no of rows + no of columns – 1 = 3 + 4 – 1 = 6 which is the same as the number of allocated cells. The allocation is basic.

Test of Optimality

For each allocated cell, we split the unit cost Cij into a raw component Ui and a column component, Vj.

For each empty cell, we calculate the shadow cost, Sij where Sij = Cij – (Ui + Vj)

Allocated Cells

C11 = 24 = U1 + V1	Let U1 = 0, then V1 = 24
C13 = 22 = U1 + V3	V3 = 22
C21 = 28 = U2 + V1	U2 = 4
C24 = 0 U2 +V4	V4 = 4
C31 = 22 = U3 + V1	U3 = 2
C32 = 20 = U3 + V2	V2 = 22

For the empty cells:

S12 = 26 – (0 + 22) = 4
S14 = 0 – (0 – 4) = 4
S22 = 26 – (6 + 20) = 0
S23 = 30 – (4 + 22) = 6
S33 = 26 – (-2 + 22) = 6
S34 = 0 – (-2 – 4) = 6

All of the shadow cost are positive or zero, therefore the allocation is optimal – since there is a zero shadow cost, we know that this is a non-unique optimum.

The minimum cost of production is:

Machine X makes 2,000 A and 2,000 Z and is fully utilized.

Machine Y makes 4,800 A and is under – used by 1,200 units.
Machine Z makes 1,200 A and 4,800 B and is fully used.

The minimum cost is

24 x 2,000 + 22 x 2m000 + 28 x 4,800 + 22 x 1,200 + 20 x 4,800 = Shs 348,800

(ii)

Select the optimum allocation which has the least number of machine change over; The current optimum schedule requires machine changeovers (1 of each machines X and Z).

Using the stepping stone method we can allocate N items to cell (Y, B) and adjust the row and column allocations.

We find that N = 4,800 and that the solution has become degenerated. However, the solution is still optimum. The total cost is Shs 348,800. The alternative optimum is:

		Products		
Machine	A	B	C	Dummy
X	24 2000	26 -	22 2000	0 -
Y	28 -	26 - 4,800	30 -	0 1,200
Z	22 6,000	20 -	26 -	0 -

This solution requires only one changeover (Machine X) and therefore is preferred choice.

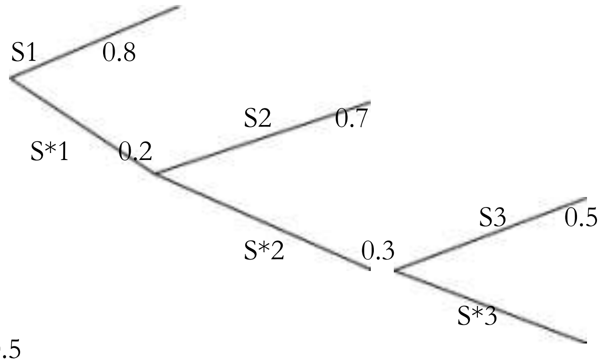
The preferred minimum cost production schedule is:

Machine X makes 2,000 A and 2,000 C and is fully used.
Machine Y makes 4,800 B and is under-used by 1,200 units.
Machine Z makes 6,000 A and is fully used.

QUESTION FIFTEEN

a) S_n denotes that the account is settled at the end of the month n. S_n * denotes that the account is not settled at the end of month n. The problem may be illustrated by a tree diagram:

b)



0.5

i. P (a/c settled at end of month 2) = P(S1*) x P(S2)
= 0.2 x 0.7 = 0.14

(i) P (a/c settled at end of month 3) = P(S1*) x P(S2*) x P(s3)
= 0.2 x 0.3 x 0.5 = 0.03

ii. Payment is received at the end of month 4 only if the amount is less than Shs 1 million agency used.

Proportion of accounts ≤ Shs 1,000,000 is (0.3 + 0.2 + 0.1) = 0.6
P(a/c settled at end of month 4)
=P(S1 x P(S*2) x P(S3*) x P(s4) x P(a/c ≤Shs 1,000,000)
= 0.2 x 0.3 x 0.5 x 1 x 0.6 = 0.018

iii. P(a/c settled at end of month 6)
=P(S1*) x P(s2*) x P(s3*) x P(S6) x P(a/c >Shs 1m)
= 0.2 x 0.3 x 0.5 x 1 x 0.4 = 0.012

c) Expected value of a new account of Shs 2 million.

A = Σ(Px X Ak) where Pk is the probability that payment Ak is received at the end of month K.

Expected present value of amount outstanding = $\sum P_X x \frac{Ak}{\left(1+\frac{r}{100}\right)^k}$

The value of the debt is Shs 2 million, therefore if its not paid by the end of month 3, legal proceedings are taken.

Estimate of the expected proportion recovered if legal action is taken.

Expected proportion recovered = Σ(mid-point proportion x probability)
= 0.2 x 0.1 + 0.5 x 0.3 + 0.7 x 0.4 + 0.9 x 0.2
= 0.63

The expected amount recovered = 0.63 x Shs 2,000,000 = Shs 1,260,000 = A6

P(a/c of Shs 2 million settled at end month
6) = P(S1*) x P(s2*) x P(S3*) x P(S6)

= 0.2 x 0.3 x 0.5 x 1 = 0.03 = P6

Account settled at end month	Probability Pk	Account received A/C Kshs. million	PV of amount received Shs. million	Expected PV (millions)
1	0.8	2	2 x 0.9852 = 1970.4 x	0.8
2	0.14	2	2 x 0.970 = 1941.4 x	0.14
3	0.03	2	2 x 0.9563 = 1912.6 x	0.03
6	0.03	1.26	1.26 x 0.9145 = 1152.3 x	0.03
			Total	1940.06

The expected PV of the amount Kshs. 1,940,060

d) The variables in the problem are:

1. Size of the account
2. Time taken to settle the account
3. If legal proceedings are required, the proportion of the debt recovered.

(i) Size of the account

Size of account Shs.	Mid point Shs.	Probability	Cumulative probability	Random number
Upto 200,000	100,000	0.1	0.1	0
200,000 – 500,000	350,000	0.2	0.3	1 – 2
1,000,000 – 2,000,000	750,000	0.3	0.6	3 – 5
2,000,000 – 5,000,000	1,500,000	0.3	0.9	6 – 8
	3,500,000	0.1	1.0	9

(ii) Account settled

End of month	Probability	Cumulative probability	Random number
1	0.8	0.8	00 – 79
2	0.14	0.94	80 – 93
3	0.03	0.97	94 – 96
4 or 6	0.03	1.00	97 - 99

iii) If legal proceedings are taken:

Proportion received	Mid point	Probability	Cumulative probability	Random number
Upto 0.4	0.2	0.1	0.1	0
0.4 – 0.6	0.5	0.3	0.4	1 – 3
0.6 – 0.8	0.7	0.4	0.8	4 – 7
Above 0.8	0.9	0.2	1.0	8 - 9

Simulations

Account 1: Using the random digits in the order given, the RN 8, produces an account value of Kshs 1,500,000. The next two digit RN, 87, produces a settlement time of end of month 2. Therefore the PV of the amount received is:

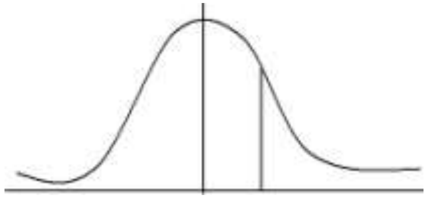
Shs 1,500,000 x 0.5 x 0.9707 = Shs **1,456,050**

Account 2: The first RN9 produces an account size of Shs 3,500,000. The next 2 random digits, 98, select a settlement time of 4 or 6 months. Since the account is > Shs 1 million, legal proceedings are taken and a proportion is recovered at the end of month 6. The next RN is 2, which selects the proportion recovered as 0.5. Therefore the present value of the amount received is:

Shs 3,500,000 x 0.5 x 0.9145 = Shs **1,600,380.**

Table I

Areas under the Standard Normal Curve from 0 to Z



Z	0	1	2	3	4	5	6	7	8	9
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0199	0.0239	0.0279	0.0319	0.0359
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0754
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.1517
0.4	0.1554	0.1591	0.1623	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
0.6	0.2258	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2518	0.2549
0.7	0.2580	0.2612	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.2910	0.2939	0.2967	0.2996	0.3023	0.3051	0.3073	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3531	0.3554	0.3577	0.3599	0.3621
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015

1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4761	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4669	0.4970	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4877	0.4978	0.4979	0.4979	0.4780	0.4781
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3.0	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990
3.1	0.4990	0.4991	0.4991	0.4991	0.4992	0.4992	0.4992	0.4992	0.4993	0.4993
3.2	0.4993	0.4993	0.4994	0.4994	0.4994	0.4994	0.4994	0.4995	0.4995	0.4995
3.3	0.4995	0.4995	0.4995	0.4996	0.4996	0.4996	0.4996	0.4996	0.4996	0.4997
3.4	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4998

3.5	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998
3.6	0.4998	0.4998	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999
3.7	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999
3.8	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999
3.9	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000

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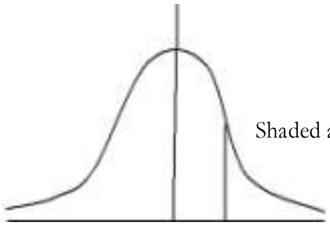
Table II

Normal distribution

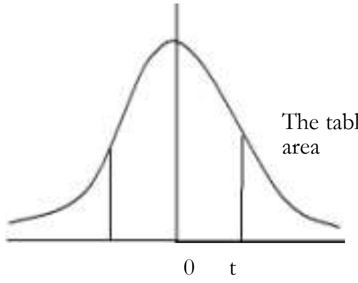


Z	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
P	0.500	0.460	0.421	0.382	0.345	0.308	0.274	0.242	0.212	0.184
Z	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9
P	0.159	0.136	0.115	0.097	0.081	0.067	0.055	0.045	0.036	0.029
Z	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9
P	0.023	0.018	0.014	0.011	0.008	0.006	0.005	0.003	0.003	0.002
Z	3.0	3.1	3.2	3.3	3.4					
P	0.0013	0.0010	1.0007	0.0005	0.0003					

Table III

Percentage points of the t distribution.

The table gives the values for the area in both tails.



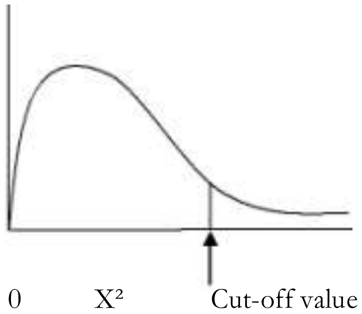
The table shows the total of the shaded area

Degree of freedom	Area in both tables combined .10	.05	.02	.01
v = 1	6.314	12.706	31.821	63.657
2	2.920	4.303	6.965	9.925
3	2.353	3.182	4.541	5.841
4	2.132	2.776	3.747	4.604
5	2.015	2.571	3.365	4.032
6	1.493	2.447	3.143	3.707
7	1.895	2.365	2.998	3.499
8	1.860	2.306	2.896	3.355
9	1.833	2.262	2.821	3.250
10	1.812	2.228	2.764	3.169
11	1.796	2.201	2.718	3.106
12	1.782	2.179	2.681	3.055
13	1.771	2.160	2.650	3.012
14	1.761	2.145	2.624	2.977
15	1.753	2.131	2.602	2.947
16	1.746	2.120	2.583	2.921
17	1.740	2.110	2.567	2.898
18	1.734	2.101	2.552	2.878
19	1.729	2.093	2.539	2.861
20	1.725	2.086	2.528	2.845

Degrees of freedom	Area in both tables combined .10	.05	.02	.01
v = 21	1.721	2.080	2.518	2.831
22	1.717	2.074	2.508	2.819
23	1.714	2.069	2.500	2.807
24	1.711	2.064	2.492	2.797
25	1.708	2.060	2.485	2.787
26	1.706	2.056	2.479	2.779
27	1.703	2.052	2.473	2.771
28	1.701	2.048	2.467	2.763
29	1.699	2.045	2.462	2.756
30	1.697	2.042	2.457	2.750
40	1.684	2.021	2.423	2.704
60	1.671	2.000	2.390	2.660
12	1.658	1.980	2.358	2.6170
∞	1.645	1.960	2.326	2.576

Table IV

The X^2 distribution



Degrees of freedom	Level of significance 5%	1%
v = 1	3.841	6.635
2	5.991	9.210
3	7.815	11.345
4	9.488	13.277
5	11.070	15.086
6	12.592	16.812
7	14.067	18.475
8	15.507	20.090
9	16.919	21.666
10	18.307	23.209

Table V

Percentage points of the f distribution

V_1 = Degrees of freedom for numerator

$_2$ *V =Degrees of freedom for numerator*

	1	2	3	4	5	6	7	8	9	10	11	12
1	161	200	216	225	230	234	237	239	241	242	243	244
	(4,052)	(4,999)	(5,403)	(5,625)	(5,764)	(5,859)	(5,928)	(5,981)	(6,022)	(6,056)	(6,082)	(6,106)
2	18.51	19.00	19.16	19.25	19.30	19.33	19.36	19.37	19.38	19.39	19.40	19.41
	(98.49)	(99.01)	(99.17)	(99.25)	(99.30)	(99.33)	(99.34)	(99.36)	(99.38)	(99.40)	(99.41)	(99.42)
3	10.13	9.55	9.28	9.12	9.01	8.94	8.88	8.84	8.81	8.78	8.76	8.74
	(34.12)	(30.81)	(29.46)	(28.71)	(28.24)	(27.91)	(27.67)	(27.49)	(27.34)	(27.23)	(27.13)	(27.05)
4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00	5.96	5.93	5.91
	(21.20)	(18.00)	(16.69)	(15.98)	(15.52)	(15.21)	(14.98)	(14.80)	(15.68)	(14.64)	(14.45)	(14.37)
5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.78	4.74	4.7	4.68
	(16.26)	(13.27)	(12.06)	(11.39)	(10.97)	(10.67)	(10.45)	(10.27)	(10.15)	(10.05)	(9.98)	(9.89)
6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10	4.06	4.03	4.00
	(13.75)	(10.92)	(9.78)	(9.15)	(8.75)	(8.47)	(8.26)	(8.10)	(7.98)	(7.87)	(7.79)	(7.72)
7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68	3.63	3.60	3.57
	(12.25)	(9.55)	(8.45)	(7.35)	(7.46)	(7.19)	(7.00)	(6.84)	(6.71)	(6.62)	(6.54)	(6.47)
8	5.32	4.46	4.07	3.34	3.69	3.58	3.50	3.44	3.39	3.34	3.31	3.28
	(11.26)	(8.65)	(7.59)	(7.01)	(6.93)	(6.37)	(6.19)	(6.08)	(5.91)	(5.82)	(5.74)	(5.67)
9	5.12	4.26	3.83	3.63	3.48	3.37	3.29	3.23	3.18	3.13	3.10	3.07
	(10.56)	(8.02)	(6.99)	(6.42)	(6.06)	(5.80)	(5.62)	(5.47)	(5.35)	(5.38)	(5.18)	(5.11)
10	4.96	4.1	3.71	3.48	3.33	3.22	3.14	3.07	3.02	2.97	2.94	2.91
	(10.04)	(7.58)	(6.55)	(5.99)	(5.64)	(5.39)	(5.21)	(5.06)	(4.93)	(4.85)	(4.76)	(4.71)
11	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90	2.86	2.82	2.79
	(9.65)	(7.20)	(6.22)	(5.67)	(5.32)	(5.07)	(4.88)	(4.74)	(4.63)	(4.54)	(4.46)	(4.40)
12	4.75	3.88	3.49	3.26	3.11	3.00	2.92	2.85	2.80	2.70	2.73	2.69
	(9.33)	(6.93)	(5.95)	(5.41)	(5.06)	(4.82)	(4.65)	(4.50)	(4.39)	(4.30)	(4.23)	(4.18)

Values of f:

Right tail of the distribution for P = .05

Right tail of the distribution for P = .01 (in brackets).

Table VI

(a) Table of individual Poisson probabilities

	Number of occurrences (x)						
Mean (m)	0	1	2	3	4	5	6
0.1	0.9048	0.0905	0.0045	0.0002	0.000	0.000	0.000
0.2	0.8187	0.1637	0.0164	0.0011	0.0001	0.000	0.000
0.3	0.7408	0.2222	0.0333	0.0033	0.0003	0.000	0.000
0.4	0.6703	0.2681	0.0536	0.0072	0.0007	0.0001	0.000
0.5	0.6065	0.3033	0.0758	0.0126	0.0016	0.0002	0.000
0.6	0.5488	0.3293	0.0988	0.0198	0.0030	0.0004	0.000
0.7	0.4966	0.3476	0.1217	0.0284	0.0050	0.0007	0.0001
0.8	0.4493	0.3595	0.1438	0.0383	0.0077	0.0012	0.0002
0.9	0.4066	0.3659	0.1647	0.0494	0.0111	0.0020	0.0003
1.0	0.3679	0.3679	0.1839	0.0613	0.0153	0.0031	0.0005

Table shows probability of a given number of occurrences for a given mean (m).

(b) Table of cumulative Poisson probabilities

	Number of occurrences (x)						
Mean (m)	0	1	2	3	4	5	6
0.1	0.9048	0.9953	0.9998	1.00	1.00	1.00	1.00
0.2	0.8187	0.9824	0.9988	0.9999	1.00	1.00	1.00
0.3	0.7408	0.9630	0.9963	0.9996	0.9999	1.00	1.00
0.4	0.6703	0.9384	0.9920	0.9992	0.9999	1.00	1.00
0.5	0.6065	0.9098	0.9856	0.9982	0.9998	1.00	1.00
0.6	0.5488	0.8781	0.9769	0.9967	0.9997	1.00	1.00
0.7	0.4966	0.8442	0.9659	0.9943	0.993	1.00	1.00
0.8	0.4493	0.8088	0.9526	0.9909	0.9986	0.9998	1.00
0.9	0.4066	0.7725	0.9372	0.9866	0.9977	0.9997	1.00
1.0	0.3679	0.7358	0.9197	0.9810	0.9963	0.9994	0.9999

Table shows probability of finding x or fewer occurrences for a given mean (m).

Table VII
Compound interest

Table shows value of £1 at compound interest $(1 + r)^n$

Years (n)	Interest rates (r) % 1	2	3	4	5	6	7	8	9	10	11
1	1.010	1.020	1.030	1.040	1.050	1.060	1.070	1.080	1.090	1.100	1.110
2	1.020	1.040	1.061	1.082	1.102	1.124	1.145	1.166	1.188	1.210	1.232
3	1.030	1.061	1.093	1.125	1.158	1.191	1.225	1.260	1.295	1.331	1.368
4	1.041	1.082	1.126	1.167	1.216	1.262	1.311	1.360	1.412	1.464	1.518
5	1.051	1.104	1.159	1.217	1.276	1.338	1.403	1.469	1.539	1.610	1.685
6	1.061	1.126	1.194	1.265	1.340	1.419	1.501	1.587	1.677	1.772	1.870
7	1.072	1.149	1.230	1.316	1.407	1.504	1.606	1.714	1.828	1.949	2.076
8	1.083	1.172	1.267	1.369	1.477	1.594	1.718	1.851	1.993	2.144	2.304
9	1.094	1.195	1.305	1.423	1.551	1.689	1.838	1.999	2.172	2.358	2.558
10	1.105	1.219	1.344	1.480	1.629	1.791	1.967	2.159	2.367	2.594	2.839
11	1.116	1.243	1.384	1.539	1.710	1.898	2.105	2.332	2.580	2.853	3.152
12	1.127	1.268	1.426	1.601	1.796	2.012	2.252	2.519	2.813	3.138	3.498
13	1.138	1.294	1.468	1.665	1.886	2.133	2.410	2.720	3.066	3.452	3.883
14	1.149	1.319	1.513	1.732	1.980	2.261	2.578	2.937	3.342	3.797	4.310
15	1.161	1.346	1.558	1.801	2.079	2.397	2.759	3.172	3.642	4.177	4.785
20	1.220	1.486	1.806	2.191	2.653	3.207	3.870	4.661	5.604	6.727	8.062
25	1.282	1.641	2.094	2.666	3.386	4.292	5.427	6.848	8.623	10.835	13.585

Years (n)	Interest rates (r) % 12	13	14	15	16	17	18	19	20	25	30
1	1.120	1.130	1.140	1.150	1.160	1.170	1.180	1.190	1.200	1.250	1.300
2	1.254	1.277	1.297	1.322	1.346	1.367	1.392	1.416	1.440	1.562	1.690
3	1.405	1.443	1.481	1.521	1.561	1.602	1.643	1.685	1.728	1.953	2.197
4	1.573	1.630	1.689	1.749	1.811	1.874	1.939	2.005	2.074	2.441	2.856
5	1.762	1.842	1.925	2.011	2.100	2.192	2.288	2.386	2.488	3.052	3.713
6	1.974	2.082	2.195	2.313	2.436	2.565	2.700	2.840	2.986	3.815	4.827
7	2.211	2.353	2.502	2.660	2.826	3.001	3.186	3.379	3.583	4.768	6.275
8	2.476	2.658	2.853	3.059	3.278	3.511	3.759	4.021	4.300	5.960	8.157
9	2.773	3.004	3.252	3.518	3.803	4.108	4.435	4.785	5.159	7.451	10.604
10	3.106	3.395	3.707	4.046	4.411	4.807	5.234	5.695	6.192	9.313	13.786
11	3.478	3.836	4.226	4.662	5.117	5.624	6.176	6.777	7.430	11.641	17.922
12	3.896	4.334	4.818	5.350	5.936	6.580	7.288	8.064	8.916	14.552	23.298
13	4.363	4.898	5.492	6.153	6.886	7.699	8.599	9.596	10.699	18.190	30.287
14	4.887	5.535	6.261	7.076	7.988	9.007	10.147	11.420	12.839	22.737	39.374
15	5.474	6.254	7.138	8.137	9.265	10.539	11.974	13.589	15.407	28.422	51.186
20	9.646	11.523	13.743	15.366	19.461	23.106	27.393	32.429	38.338	86.736	190.050
25	17.000	21.230	26.462	32.920	40.874	50.658	62.669	77.388	95.396	264.698	705.641

Table VIII

Present value factors. Present value of £1 $(1 + r)^{-n}$

Periods (n)	Interest rates (r) % 1%	2%	4%	6%	8%	10%	12%	14%	15%
1	0.990	0.980	0.962	0.943	0.926	0.909	0.893	0.877	0.870
2	0.980	0.961	0.925	0.890	0.857	0.826	0.797	0.769	0.756
3	0.971	0.942	0.889	0.840	0.794	0.751	0.712	0.675	0.658
4	0.961	0.924	0.855	0.792	0.735	0.683	0.636	0.592	0.572
5	0.951	0.906	0.822	0.747	0.681	0.621	0.567	0.519	0.497
6	0.942	0.888	0.790	0.705	0.630	0.564	0.507	0.456	0.432
7	0.933	0.871	0.760	0.665	0.583	0.513	0.452	0.400	0.376
8	0.923	0.853	0.731	0.627	0.540	0.467	0.404	0.351	0.327
9	0.914	0.837	0.703	0.592	0.500	0.424	0.361	0.308	0.284
10	0.905	0.820	0.676	0.558	0.463	0.386	0.322	0.270	0.247
11	0.0896	0.804	0.650	0.527	0.429	0.350	0.287	0.237	0.215
12	0.887	0.788	0.625	0.497	0.397	0.319	0.257	0.208	0.187
13	0.879	0.773	0.601	0.469	0.368	0.290	0.229	0.182	0.163
14	0.870	0.758	0.577	0.442	0.340	0.263	0.205	0.160	0.141
15	0.861	0.743	0.555	0.417	0.315	0.239	0.183	0.140	0.123
16	0.853	0.728	0.534	0.394	0.292	0.218	0.163	0.123	0.107
17	0.855	0.714	0.513	0.371	0.270	0.198	0.146	0.108	0.093
18	0.836	0.700	0.494	0.350	0.250	0.180	0.130	0.095	0.081
19	0.828	0.686	0.475	0.331	0.232	0.164	0.116	0.083	0.070
20	0.820	0.675	0.456	0.312	0.215	0.149	0.104	0.073	0.061
21	0.811	0.660	0.439	0.294	0.199	0.135	0.093	0.064	0.053
22	0.803	0.647	0.422	0.278	0.184	0.123	0.083	0.056	0.046
23	0.795	0.634	0.406	0.262	0.170	0.112	0.074	0.049	0.040
24	0.788	0.622	0.390	0.247	0.158	0.102	0.066	0.043	0.035
25	0.780	0.610	0.375	0.233	0.146	0.092	0.059	0.038	0.030

Periods (n)	Interest rates (r) % 16%	18%	20%	22%	24%	25%	26%	28%	30%
1	0.862	0.847	0.833	0.820	0.806	0.800	0.794	0.781	0.769
2	0.743	0.718	0.694	0.672	0.650	0.640	0.630	0.610	0.592
3	0.641	0.609	0.579	0.551	0.524	0.512	0.500	0.477	0.455
4	0.552	0.516	0.482	0.451	0.423	0.410	0.397	0.373	0.350
5	0.476	0.437	0.402	0.370	0.341	0.328	0.315	0.291	0.269
6	0.410	0.370	0.335	0.303	0.275	0.262	0.250	0.227	0.207
7	0.354	0.314	0.279	0.249	0.222	0.210	0.198	0.178	0.159
8	0.305	0.266	0.233	0.204	0.179	0.168	0.157	0.139	0.123
9	0.263	0.225	0.194	0.167	0.144	0.134	0.125	0.108	0.094
10	0.227	0.191	0.162	0.137	0.116	0.107	0.099	0.085	0.075
11	0.195	0.162	0.135	0.112	0.094	0.086	0.079	0.066	0.056
12	0.168	0.137	0.112	0.192	0.076	0.069	0.062	0.052	0.043
13	0.145	0.116	0.093	0.075	0.061	0.055	0.050	0.040	0.033
14	0.125	0.099	0.178	0.062	0.049	0.044	0.039	0.032	0.025
15	0.108	0.084	0.065	0.051	0.040	0.035	0.031	0.025	0.020
16	0.093	0.071	0.054	0.042	0.032	0.028	0.025	0.019	0.015
17	0.080	0.060	0.045	0.034	0.026	0.023	0.020	0.015	0.012
18	0.069	0.051	0.038	0.028	0.021	0.018	0.016	0.012	0.009
19	0.060	0.043	0.031	0.023	0.017	0.014	0.012	0.009	0.007
20	0.051	0.037	0.026	0.019	0.014	0.012	0.010	0.007	0.005
21	0.044	0.031	0.022	0.015	0.011	0.009	0.008	0.006	0.004
22	0.038	0.026	0.018	0.013	0.009	0.007	0.006	0.004	0.003
23	0.033	0.022	0.015	0.010	0.007	0.006	0.005	0.003	0.002
24	0.028	0.019	0.011	0.008	0.006	0.005	0.004	0.003	0.002
25	0.024	0.016	0.010	0.007	0.005	0.004	0.003	0.002	0.001