Activity Based Costing

Questions:

Q.1 Fruitolay has decided to increase the size of the store. It wants the informations about the probability of the individual product lines:

Lemon, grapes and papaya. It provides the following data for the 2009 for each product line:

	Lemon	Grapes	Papaya
Revenues	Rs.79,350.00	Rs.2,10,060.00	Rs. 1,20,990.00
Cost of goods sold	Rs. 60,000.00	Rs. 1,50,000.00	Rs. 90,000.00
Cost of bottles returned	Rs. 1,200.00	Rs. 0	Rs. 0
Number of purchase			
Orders placed	36	84	36
Number of deliveries received	30	219	66
Hours of shelf stocking time	54	540	270
Items sold	12,600	1,10,400	30,600

Fruitolay also provides the following information for the year 2009:

Sr.No	Activity	Description of Activity	Total costs Rs.	Cost allocation basis
1.	Bottle returns	Returning of empty bottles to the store	1,200.00	Direct tracing to product line
2.	Ordering	Placing of orders of purchases	15,600.00	156 purchase orders
3.	Delivery	Physical delivery and the receipts of merchandise	25,200.00	315 deliveries
4.	Self-stocking	Stocking of merchandise on store shelves and ongoing restocking	17,280.00	864 hours of time
5.	Customer support	Assistance provided to customers including bagging and checkout	30,720.00	1,53,600 items sold

Required:

(i) Fruitolay currently allocates store support costs (all costs other than the cost of goods sold) to product line on the basis of the cost of goods sold of each product line. Calculate the operating income and operating income as the percentage of revenue of each product line.

(ii) If Fruitolay allocates store support costs (all costs other than the cost of goods sold) to the product lines on the basis of ABC system, calculate the operating income and operating income as the percentage of revenue of each product line.

(iii) Compare both the system.

Q.2 MK Ltd. manufactures four products, namely A, B, C and D using the same plant and process. The following information relates to a production period:

Product	A	B	C	D
Output in Units	720	600	480	504

The four products are similar and are usually produced in production runs of 24 units and sold in batches of 12 units. The total overheads incurred by the company for the period are as follows:

	Rs.
Machine operation and maintenance cost	63,000
Setup costs	20,000
Store receiving	15,000
Inspection	10,000
Material handling and dispatch	2,592

During the period the following cost drivers are to be used for the overhead cost:

Cost	Cost driver
Setup Receiving	No. of production runs
Store receiving	Requisition raised
Inspection	No. of production runs
Material handling and dispatch	Orders executed

It is also determined that:

- Machine operation and maintenance cost should be apportioned between setup cost, store receiving and inspection activity in the ratio 4:3:2.
- Number of requisition raised on store is 50 for each product and the no.of0 orders executed is 192, each order being for a batch of 12 units of a product.

Calculate the total overhead cost per unit of each product using activity based costing after finding activity wise overheads allocated to each product.

Q.3 A company manufactures several products of varying design and models. It uses a single overhead recovery rate based on direct labour hours. The overheads incurred by the Company in the first half of the year are as under:

Rs.

Machine operation expenses	20, 25,000
Machine maintenance expenses	3, 75,000
Salaries of technical staff	12, 75,000
Wages and salaries of store staff	5, 25,000

During this period, the company introduced activity based costing system and the following significant were activities were identified:

- Receiving materials and components
- Set up of machines for production runs
- Quality inspection

It is also determined that:

- The machine operation and machine maintenance expenses should be apportioned between store and production activity in 1:4 ratio.
- The technical staff salaries should be apportioned between machine maintenance, set up and quality inspection in 3:4:4 ratio.

The consumption of activates during the period under review are as under:

• Direct labour hours worked	80,000
• Production set-ups	4,080
• Material and components consignments received from suppliers	3,920
• Number of quality inspection carried out	2,560

The direct wages rate is Rs. 12 per hour.

The data relating to two products manufactured by the company during the period are as under:

		P	**Q**
Direct Materials costs	Rs	12,000	8,000
Direct labour hours	Hrs.	960	100
Direct Materials Consignments received	nos	48	52
Production runs	nos.	36	24
Number of quality inspection done	nos.	30	10
Quantity Produced	Unit in nos.	15,000	5,000

A potential customer has approached the company for the supply of 24,000 units of a component 'R' to be delivered in lots of 3000 units per quarter. The job will involve an initial design cost of Rs. 60,000 and the manufacture will involve the following per quarter.

Direct Materials costs	Rs.	12,000

Direct labour hours	Hrs.	300
Production runs	nos.	6
Inspection	nos.	24
Number of consignment of direct materials to be received	nos.	20

You are required to

1. Calculate the cost of products P and Q based on the existing system of single overheads Recovery rate.
2. Determine the most of products P & Q using Activity Based Costing system.
3. Compute the sales values per quarter of components 'R' using Activity Based Costing system (considering a mark up of 25% on cost)

Q.4 Linex Limited manufactures three products P, Q and R which are similar in nature and are usually produced in production runs of 100 units. Product P and R requires both machine hours and assembly hours, whereas product Q requires only machine hours. The overheads incurred by the company during the first quarter are as under:

	Rs.
Machine Department expenses	18, 48,000
Assembly Department Expenses	6, 72,000
Setup Costs	90,000
Store receiving cost	1, 20,000
Order processing and dispatch	1, 80,000
Inspection and Quality control cost	36,000

The data related to the three products during the period are as under:

	P	Q	R
Units produced and sold	15000	12000	18000
Machine hours worked	30000 hrs.	48000 hrs.	54000 hrs.
Assembly hour worked			
(Direct labour hours)	1500C hrs.	-	27000 hrs.
Customers orders executed	1250	1000	1500
(In numbers)			
Numbers of requisitions raised on the stores	40	30	50

Prepare a statement showing details of overheads costs allocated to each products type using activity based costing.

Q.5 X Ltd. makes a single products with the following details.

Description	**Current Situation**	**Proposed Change**
Selling Price (Rs. /Unit)	10	
Direct Costs (Rs. /Unit)	5	
Present number of setups per production period,(before each production run, setup is done)	42	
Cost per set up (Rs.)	450	Decrease by Rs.90
Production units per run	960	1008
Engineering hours for production period	500	422
Cost per engineering hour(Rs.)	10	

The company has begun Activity Based Costing of fixed costs and has presently identified two cost drivers, viz. production runs and engineering hours. Of the total fixed costs presently at Rs. 96,000, after the above, Rs. 72,100 remains to be analyzed. There are changes as proposed above for the next production period for the same volume of output.

(i) How many units and in how many production runs should X Ltd. produce in the changed scenario in order to break- even?

(ii) Should X Ltd. continue to break up the remaining fixed costs into activity based costs? Why?

Answers:

Q.1 Ans:

(i) Traditional Costing System

Particulars	Lemon	Grapes	Papaya	Total
Revenue	79,350	2,10,060	1,20,990	4,10,400
Less: Cost of Support sold (COGS)	60,000	1,50,000	90,000	3,00,000
Less: Store Support Cost	18,000	45,000	27,000	90,000
Operating income	1,350	15,060	3,990	20,400
Operating income %	1.70%	7.17%	3.30%	4.97%

(ii) ABC System Overhead Allocation Rate

Activity	Cost Heirarchy Level	Total Costs (Rs.)	Quantity of Cost Allocations Base	Overheads Allocation rate
Ordering	Batch	15600	156 Purchase orders	Rs. 100
Delivery self	Batch	25200	315 delivering orders	Rs. 80
Stocking	Output unit	17280	864 self-stocking hours	Rs. 20
Customer Support	Output unit	30720	153600 items sold	Rs. 0.20

Store Support Cost

Particular	Cost Driver	Lemon	Grapes	Papaya	Total
Bottle Returns	Direct	1200	0	0	1200
Ordering	Purchase orders	3600	8400	3600	15600
Delivery	Deliveries	2400	17520	5280	25200
Self-Stocking	Hours of time	1080	10800	5400	17280
Customer Support	Items Sold	2520	22080	6120	30720
Grand Total		10800	58800	20400	90000

Operating Income

Particulars	Lemon	Grapes	Papaya	Total
Revenue	79350	210060	120990	410400
Less: Cost of Goods sold	60000	150000	90000	300000
Less: Store support Cost	10800	58800	20400	90000

Operating income	8550	1260	10590	20400
Operating income%	10.78%	0.60%	8.75%	4.97%

Summary/Comparison

Particulars	Lemon	Grapes	Papaya	Total
Under Traditional Costing System	1.70%	7.17%	3.30%	4.97%
Under ABC System	10.78%	0.60%	8.75%	4.97%

The grapes line drops sizably when ABC is used. Although it constitutes 50% COGS, it uses a higher percentages of total resources in each activity area, especially the high cost of customer support area. In contrast, lemon line draws a much lower percentage of total resources used in each activity area than its percentages of total COGS. Hence under ABC, Lemon is most profitable. Fruitolay can explore ways to increase sales of lemons and also explore price increases on grapes.

Operating Income Ranking is highest for Grapes under Traditional system because other products bear its overheads cost, whereas under ABC a more accurate picture shows Grapes as the lowest ranking product.

Q.2 Ans:

1. Computation of ABC Recovery Rates

Activity	Activity Cost Pool	Cost Driver	Quantity	ABC Rate
Set Up	20,000 + 28,000 = Rs. 48,000	No. of Production Runs	96	Rs. 500 per Run
Stores Receiving	15,000 + 21,000 = Rs. 36,000	Requisitions raised	50 × 4 = 200	Rs. 180 per Reqn.
Inspection	10,000 + 14,000 Rs.24,000	No.of Production Runs	96	Rs. 250 per Run
Material handling	Given = Rs. 2,592	Orders executed	192	Rs. 13.5 per Batch

Note:

- Machine Operation and Maintenance Cost of Rs. 63,000 is apportioned to the first three activates in the ratio 4:3:2, i.e. Rs. 28,000, Rs. 21,000 and Rs. 14,000
    - Number of Production Runs and Number of Batches are computed as under:

Product	A	B	C	D	Total
(a) Output Quantity	720 units	600 units	480 units	504 units	
(b) Quantity per	24 units	24 units	24 units	24 units	

Production Run					
(c) Number of Production Runs (a ÷ b)	30 runs	25 runs	20 runs	21 runs	96 runs
(d) quantity per Batch Order	12 units	12 units	12 units	12 units	
(e) Number Batches (a ÷ b)	60 batches	50 batches	40 batches	42 batches	192 batches

2. Computation of OH Costs using ABC System

Product	A	B	C	D	Total
• Set up	500 × 30 = Rs. 15,000	500 × 25 = Rs. 12,500	500 × 20 = Rs. 10,000	500 × 21 = Rs. 10,500	Rs. 48,000
• Stores Receiving	Rs. 9,000	Rs. 9,000	Rs. 9,000	Rs. 9,000	Rs. 36,000
• Inspection	250 × 30 =Rs. 7,500	250 × 25 = Rs. 6,250	250 × 20 = Rs. 5,000	250 × 21 = Rs. 5,250	Rs. 24,000
• Material Handling	13.50 × 60 = Rs. 810	13.50 × 50 = Rs. 675	13.50 × 40 = Rs. 540	13.50 × 42 = Rs. 567	Rs.2,592
a) Total OH Cost	Rs. 32,310	Rs. 28,425	Rs. 24,540	Rs. 25,317	Rs.1,10,592
b) Output Quantity	720 units	600 units	480 units	504 units	
c) OH Cost P.u.	Rs. 44.875	Rs. 47.375	Rs. 51.125	Rs. 50.232	

Q.3Ans:

1. Statement of Computation of Unit Cost of Product P & Q on the Existing System

Particulars	P (Rs.)	Q(Rs.)
Direct Material	12,000	8,000
Direct Labour Cost	11,520 (Rs.12 × 960 hr.)	1,200 (Rs. 12 × 100 hr.)
Overheads (Direct Labour Hours × Rs. 52.5 per hour)	50,400	5,250
Total Cost	73,920	14,450
Quantity Produced (units)	15,000	5,000
Cost per unit	4,928	2.89

Single Factory Direct Labour Hour Overhead Rate

$= \frac{\text{Rs.}42,00,000}{80,000 \text{ labour hours}}$

= Rs. 52.50 per Direct Labour Hour

2. Working

Apportionment of Overheads **(Amount in Rs.)**

Particulars	Receiving supplies	Setups	Quality Inspection	Total
Machine Operation Expenses (1:4)	4,05,000 (Rs 20,25,000 × $\frac{1}{5}$)	16,20,000 (Rs. 20,25,500 × $\frac{4}{5}$)	-	20,25,000
Maintenance (1:4)	1,51,500 (Rs. 7,57,500 × $\frac{1}{5}$)	6,06,000 (Rs. 7,57,500 × $\frac{4}{5}$)	-	7,57,000 (1)
Salary of Technical Staff	-	5,10,000 (Rs. 12,75,000 × $\frac{4}{10}$)	3,82,500 (Rs. 12,75,000 × $\frac{3}{10}$)	8,92,500 (2)
Wages & Salary of Stores Staff	5,25,000	-	-	5,25,000
Total	10,81,500	27,36,000	3,82,500	42,00,000

(1) Rs. 3, 75,000 + Share of Technician's Salary (Rs. 12, 75,000 × $\frac{3}{10}$)

(2) Rs. 12, 75,000 – Share to Machine Maintenance (Rs. 12, 75,000 × $\frac{3}{10}$)

To identify the cost drivers for each activity and establish cost driver rates by dividing the activity costs by a measure of cost driver usage for the period.

Calculation of Activities Cost Driver Rate

Overheads	Activity Cost Driver Rate
Receiving Supplies [$\frac{\text{Rs. } 10,81,500}{3,920}$	Rs. 275.89 Per consignment
Performing Setups [$\frac{\text{Rs.}27,36,000}{4,080}$]	Rs. 670.59 per setup
Quantity Inspection [$\frac{\text{Rs.}3,82,500}{2,560}$]	Rs. 149.41 per quality inspection

Thus, costs are assigned to components based on their cost driver usage. The assignments are as follows:

Statement of determination of the Cost of product P & Q

Activity Based System

Particulars	P (Rs.)	Q (Rs.)
Direct Materials	12,000	8,000
Direct Labour @ Rs. 12 per hour	11,520	1,200
Receiving Supplies	13,243 (Rs. 275.89 × 48 Con.)	14,346 (Rs. 275.89 × 52 Con.)
Performing Setups	24,141 (Rs. 670.59 × 36 Set- ups)	16,094 (Rs. 670.59 × 24 Set-ups)
Quality Inspections	4,482 (Rs. 149.41 × 30QI)	1,494 (Rs.149.41 × 10 QI)
Total Costs	65,386	41,134
No.of Units Produced	15,000	5,000
Cost Per Unit	4.36	8.23

3. Calculation of Sales Value per quarter f Component 'R' (using ABC)

Particulars of Costs	Amount (Rs.)
Direct Materials	12,000
Direct labour (@ Rs. 12 per hour)	3,600 (Rs. 12 × 300 Hr.)
Initial design Cost (Rs. 60,000 ÷ 8 Quarter)	7,500
Receiving Supplies	5,518 (Rs. 275.89 × 20 Con.)
preforming Setups	4,024 (Rs. 670.59 × 6 Set-ups)
Quality Inspections	3,586 (Rs. 149.41 × 24 QI)
Total Costs	36,228
Add: Margin 25% of Rs.36,228	9,057
Total Sales Value	45,285

Q.4 Ans:

Computation of Activity Rate

Cost Pool	Cost (Rs.) [A]	Cost driver [B]	Cost Driver Rate (Rs.) [C] = [A] ÷[B]
Machine department expenses	18,48,000	Machine Hours (1, 32,000 Hrs.)	14.00
Assembly Department Expenses	6,72,000	Assembly Hours (42,000 hrs.)	16.00
Setup Cost	90,000	No.of Production Runs (450*)	200.00
Stores Receiving Cost	1,20,000	No.of Requisitions Raised on	1,000.00

		the Stores(120)	
Order Processing and Dispatch	1,80,000	No.of Customers Orders Executed (3,750)	48.00
Inspection and Quality Control Cost	36,000	No.of Production Runs(450*)	80.00
Total (Rs.)	29,46,000		

*Number of production Run is 450 (150+ 120 +180)

Statement Showing Overheads Allocation

Particulars of Cost	Cost Driver	P	Q	R	Total
Machine Department Expenses	Machine Hours	4,20,000 (30,000 × Rs. 14)	6,72,000 (48,000 × Rs. 14)	7,56,000 (54,000 × Rs. 14)	18,48,000
Assembly Department Expenses	Assembly Hours	2,40,000 (15,000 × Rs. 16)	---	4,32,000 (27,000 × Rs. 16)	6,72,000
Setup Cost	No.of Production Runs	30,000 (150 × Rs. 200)	24,000 (120 × Rs. 200)	36,000 (180 × Rs. 200)	90,000
Stores Receiving Cost	No.of Requisitions Raised on the Stores	40,000 (40 × Rs. 1,000)	30,000 (30 × Rs. 1,000)	50,000 (50 × Rs. 1,000)	1,20,000
Order Processing and Dispatch	No.of Customers Orders Executed	60,000 (1,250 × Rs. 48)	48,000 (1,000 × Rs. 48)	72,000 (1,500 × Rs. 48)	1,80,000
Inspection and Quality Control Cost	No.of Production Runs	12,000 (150 × Rs. 80)	9,600 (120 × Rs. 80)	14,400 (180 × Rs. 80)	36,000
Overheads (Rs.)		8,02,000	7,83,600	13,60,400	29,46,000

Q.5 Ans:

(a) Working

Statement Showing 'Non –unit Level Overhead Costs'

Particulars	Current Situation	Proposed Situation
No. of Production Runs/ Setups	42	40 $(\frac{960 \text{ runs} \times 42 \text{ setup}}{1{,}008 \text{ units}})$
Cost per Setup	Rs. 450	Rs. 360

Production Units Per Run	960 Units	1,008 units
Production Units	40,320(960 units × 42)	40,320
Engineering Hrs.	500	422
Engineering Cost Per Hour	Rs. 10	Rs.10

Requirement of Question

(i) Break Even Point (Changed Scenario)

Break Even Point

$$= \frac{\text{Fixed Cost} + (\text{Setups Cost} \times \text{No.of Setups}) + (\text{Engineering Costs} \times \text{No.of Engineering Hrs.})}{(\text{Price} - \text{Unit variable Cost})}$$

$$= \frac{\text{Rs.72,100} + (\text{Rs.360} \times 40 \text{ Setups}) + (\text{Rs.10} \times 422 \text{ Hrs.})}{(\text{Rs.10} - \text{Rs. } 5)} = 18{,}144 \text{ units}$$

Break-even Point (No. of Production Runs)

$$= \frac{\text{Break Even(units)}}{\text{Production (units per run)}} = \frac{18{,}144 \text{ units}}{1{,}008 \text{ units}}$$

= 18 Runs

(ii) A company should adopt Activity Based Costing (ABC) system for accurate product costing, as traditional volume based costing system does not take into account the Non-unit Level Overheads Costs such as setup Cost, Inspection Cost, and Material Handling Cost etc. Cost analysis under ABC system showed that while these costs are largely fixed with respect to sales volume, but they are not fixed to other appropriate cost drivers. If break up of the remaining Rs. 72,100 fixed costs consist of only a small portion of these costs, ABC need not be applied.

However, if may also be noted that the primary study has resulted in cost savings. If the savings in cost are expected to exceed the cost of study and implementing ABC, it may be justified. Further it is pertinent to mention that ABC offers no increase in product-costing accuracy for single- product setting.